Silicon Compounds: Silanes and Silicones

A Survey of Properties and Chemistry

3rd Edition
Edited by Barry Arkles & Gerald L. Larson

ISBN 978-0-578-12235-9

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- **Tin**
- **Lead**

Silicones
- **Reactive Silicones**
- **Inert Silicones**

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Metal Diketonates
Metal-Organic Monomers
Silicon-Based Blocking Agents
Silicon-Based Reducing Agents
Silicon-Based Cross-Coupling Agents
Silane Coupling Agents

Performance Products
- **Coatings**
- **Impregnants**
- **Gels**

TABLE OF CONTENTS

Introduction

Section 1- Silicon Chemistry Articles

Section 2- Silicon Compounds: Registry of Products and Properties

Section 3- Silicone Articles

Section 4- Silicone Polymers: Registry of Products and Properties

Section 6- Metal-Organic Compounds: Abbreviated Listing

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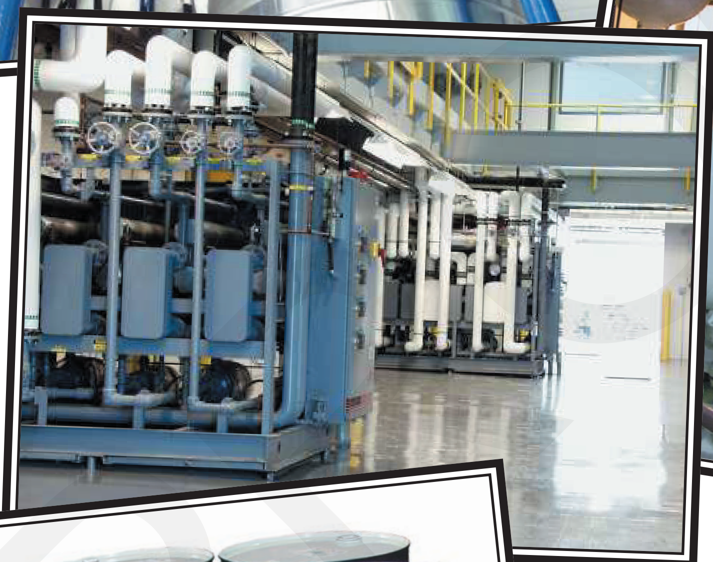

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④**tech** と記載されている商品　：**Total active component** を数値として示しています。

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① 金属アルコキシド類、グリニアール試薬類、ケイ素ハロゲン化物類及びゲルマニウムハロゲン化物類は非可逆的に加水分解を起こします。

② 一部の安定な化合物では水との反応で化学量論的に水和物を生じます。これはペンタンジオネート類を含む金属塩ではしばしば認められます。

③ 安定な化合物への非結合水の可逆的吸収。有機金属塩類はしばしば吸湿している場合があります。この水は真空乾燥や真空デシケーターで除くことができます。真空システムやグローブボックス装置内での取り扱いが可能であれば、化合物を水との接触から確実に遮断することができます。乾燥窒素やアルゴンガスでパージしたシステム内で適切にハンドリングする技術があれば、グローブボックス等の設備は不必要となります。相対湿度が８０％を越す場合には化合物を取り移す際にも細心の注意が必要です。

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本カタログは、シラン化合物、シリコーンオイル、反応性シリコーン、コーティング剤等の多彩なシリコン化合物を収録しております。シラン化合物はアルファベット順に記載されております。また、化合物の物理的性質、慣用名、それに特徴や用途についての文献名を記載しております。本カタログに収録された化合物の多くは、その研究の歴史が浅く、十分な精度を持たない数値、記述、引用も含まれるかと思われますので、ご使用に際しては独自にご確認されますようお願い申し上げます。

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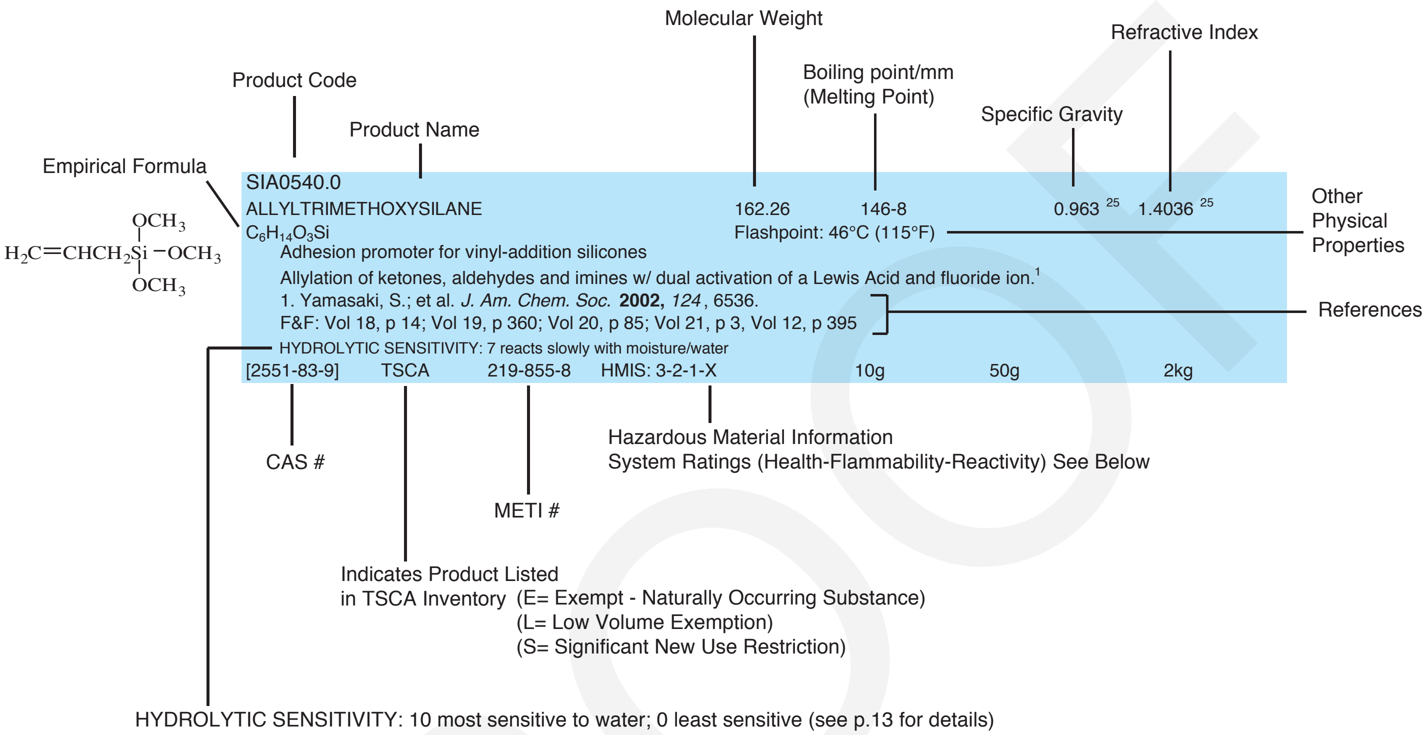
SIV9220.0→ｻｲﾗｴｰｽS210

USING THIS HANDBOOK

We have attempted to provide physical properties, phrases and references which refer both to behavior and reported uses of the compounds in this handbook. They are drawn from literature, patents, communications to Gelest and our direct determinations and experience. We expressly disclaim any responsibility for the accuracy of this information. We expressly do not make any recommendations concerning the use of the compounds.



Commercial Status- produced on a regular basis for inventory
Developmental Status- available to support development and commercialization

HAZARD RATING INDEX

Health Hazard

4 - **Extreme:** Highly Toxic — May be fatal on short term exposure. Special protective equipment required.
3 - **Serious:** Toxic —Avoid inhalation or skin contact.
2 - **Moderate:** Moderately Toxic — May be harmful if inhaled or absorbed.
1 - **Slight:** Slightly toxic — May cause slight irritation.
0 - **Minimal:** All Chemicals have some degree of toxicity.

Flammability Hazard

4 - **Extreme:** Extremely flammable gas or liquid. Flash Point below 73°F
3 - **Serious:** Flammable — Flash Point 73°F to 100°F
2 - **Moderate:** Combustible — Requires moderate heating to ignite. Flash Point 100°F to 200°F
1 - **Slight:** Slightly combustible — Requires strong heating to ignite.
0 - **Minimal:** Will not burn under normal circumstances.

Reactivity Hazard

4 - **Extreme:** Explosive at room temperature
3 - **Serious:** May explode if shocked, heated under confinement or mixed with water.
2 - **Moderate:** Unstable, may react with water.
1 - **Slight:** May react if heated or mixed with water
0 - **Minimal:** Normally stable, does not react with water

X - **Protective Equipment:** Consult supervisor for instructions.

ABBREVIATIONS

AIBN	2, 2' azobis(isobutyronitrile)
ALD	Atomic Layer Deposition
ca	approximate concentration
Cal	calories (equivalent to 4.1868 joules)
C	temperature in °Centigrade
Ce	coefficient of thermal expansion
cSt	centistoke
d	decomposes
d_4 (20°)	specific gravity or density
CVD	chemical vapor deposition
e, Q	copolymerization cross propagation factors according to the Alfrey-Price treatment: e (esu) is associated with radical and monomer polarization; Q (kcal/mole) is afunction of monomer reactivity principally determined by resonance.
F&F	*Fieser & Fieser, Reagents for Organic Synthesis,* Wiley
g	grams
gpg	guinea pig
H	hour
ihl	inhalation
ipr	intraperitoneal
ivn	intravenous
LC	lethal concentration
LD	lethal dose
Lo	lowest reported
MEHQ	hydroquinone, monomethyl ether
mus	mouse
Mn	molecular weight, number average
MOCVD	metal-organic chemical vapor deposition
n_D	refractive index (sodium D line-589.3 nm)
orl	oral
Pc	critical pressure
PCVD	plasma assisted chemical vapor deposition
ppm	parts per million (1 x 10^{-6})
rbt	rabbit
RTV	room temperature vulcanizing resin
SAM	self-assembled monolayer
s, sub.	sublimes
Tc	critical temperature
Tg	glass transition temperature
TLV	threshold limit value; the concentration of an airborne constituent to which workers may be exposed repeatedly, day by day, without adverse effect
TSCA	Toxic Substance Control Act; compounds so designated have been listed in the TSCA inventory L = Low Volume Exemption; S = Significant New Use Restriction; E = Exempt (naturally occurring substance)
v, visc.	viscosity
γ	surface tension, m$^{\gamma}$/m=dynes/cm.
γc	critical surface tension
ΔHcomb	heat of combustion
ΔHform	heat of formation
ΔHfus	heat of fusion
ΔHvap	heat of vaporization
50	50% fatality of test animals
100	100% fatality of test animals
°	degrees C unless otherwise noted (°C = °K-273.15)
>	greater than
<	less than

BEWARE –WATER, WATER EVERYWHERE

The effective utilization of most of the compounds offered by Gelest demands awareness of humidity in the laboratory environment. The three most common problems with water are as follows:

1. Irreversible hydrolysis occurs with metal alkoxides, Grignards, silicon halides and germanium halides.
2. Binding of water with stable compounds can take place, forming stoichiometric hydrates. This most often occurs with metal salts including pentanedionates.
3. Reversible absorption of unbound water to stable compounds. The metal organic salts frequently contain absorbed water which can be removed by vacuum drying or dessication.

While vacuum systems and glove boxes provide insurance in protecting compounds from water contact, these techniques are usually not necessary if the user has facile technique and works in nitrogen or argon purged systems. The difficulty in transferring the compounds increases enormously when relative humidity exceeds 80% and the more rigorous techniques may be required.

HYDROLYTIC SENSITIVITY

We have attempted to rate the effect of moisture and water on the compounds provided. The rating is somewhat subjective, but is designed to provide a guideline for investigators unfamiliar with the classes of compounds offered in this handbook.

10 reacts extremely rapidly with moisture and oxygen – may be pyrophoric
glove box or sealed system required

9 reacts extremely rapidly with atmospheric moisture – may be pyrophoric
glove box or sealed system required

8 reacts rapidly with moisture, water, protic solvents
work under dry inert gases such as nitrogen or argon

7 reacts slowly with moisture/water
purge bottles and equipment with dry nitrogen

6 forms irreversible hydrate
purge bottles and equipment with dry air or nitrogen

5 forms reversible hydrate
purge bottles and equipment with dry air or nitrogen

4 no reaction with water under neutral conditions
keep containers tightly closed

3 reacts with aqueous base
keep containers tightly closed

2 reacts with aqueous acid
keep containers tightly closed

1 no significant reaction with aqueous systems
keep containers tightly closed

0 forms stable aqueous solutions
keep containers tightly closed

INTELLECTUAL CAUTION

The Gelest handbook is presented with the intention of stimulating development of new chemistry and applications for organometallics. In order to do so, we have taken a few liberties. Be careful of the following:

1. We have included formulas with each of the listing which present structural organic features of the compounds. For the most part, the formulas do not represent coordination, molecular complexity, or ionic nature of the compounds depicted.
2. Applications and references cited in the literature are not meant to be complete. The references are selected subjectively, based on either their interest or their representative nature in research or commercial activities. We have not substantiated whether applications are practical or if they are protected by patents.

一般的な安全衛生情報について

毒性

-CN、-N3、-NMe2、-NEt2、-NCO、-NCS、-OMe、-Cl の原子団が直接ケイ素、ゲルマニウム、錫に結合している場合には、水又はプロトン性溶剤中で分解して毒性物質を生成する場合がありますので十分注意をお払い下さい。低級トリアルキル錫化合物は高毒性を示します。トリエチル錫とトリメチル錫化合物は溶媒和化５配位化合物を形成し神経組織に直接影響を与えます。ジアルキル錫体や高級アルキル基置換体になると毒性は減少します。ニトリルまたはアジド化合物を取り扱う場合には、特別な注意が必要です。芳香族シラトランはきわめて高レベルの毒性を有しています。カタログ収録の大部分の化合物は毒性試験を行っておりませんので、取り扱う際には適切な装置対応や保護具使用等、あらゆる予防措置を講じて下さい。

爆発の危険性

アジ化物は重金属、特に銅及び鉛と接触すると爆発性の不安定物質を生成する可能性があります。アジドシランがビニルクロロシランと反応すると爆発性化合物を生じます。フェニル其と水素を含有するシランはハロゲン化アルミニウムの存在下で、激しく不均化することがあります。N-リチオ及びソジオシラザン類は空気に触れると爆発する事があります。テトラアルキル鉛は加熱すると分解爆発する恐れがあります。

火災の危険性

ケイ素、ゲルマニウム、錫原子に３個ないし、それ以上の水素原子が結合しているケイ素、ゲルマニウム、錫化合物は、いずれも発火の危険性を持っています。クロロアミノシランの混合物は紙などの可燃性物質に接触すると自然発火する場合があります。全ての有機ケイ素化合物及び水素含有ケイ素化合物は可燃性です。引火点（f.p.）を参照下さい。水素及びアルコキシ基を有するシラン化合物は、金属塩、アミンや白金触媒の存在下で不均化反応を起こし発火性物質を生成することがあります。

眼への危険性

全てのケイ素化合物の蒸気に、眼を曝すのは非常に危険です。特に、トリエトキシシラン、テトラメトキシシラン及びトリエトキシシランは一見無害に見えますが、角膜組織への浸透性が非常に高く、甚だしい場合には失明に至る可能性がありますので、取り扱いには十分注意してください。

腐食の危険性

ケイ素に結合した塩素は非常に不安定な為、クロロシラン類は水又はプロトン性溶剤に接触すると塩化水素を発生し腐食性を発現します。全てのクロロシラン類は多くの材質を侵すと同様に、人体の部位を危険に曝す腐食性を持っています。アルカリ金属及びアルカリ土類金属のアルコキシド類は強い塩基性で腐食性を有しています。

GENERAL SAFETY INFORMATION

The information provided below is of a general nature for metal-organics. Chemical-specific data in the product listings is provided primarily to aid the professional user in selection of alternatives. The user is strongly urged to review the Material Safety Data Sheet (MSDS).

Toxicity Hazard

Although toxicity data for certain compounds is reported from available literature, Gelest is not responsible for the accuracy of such information nor is omission of such data an indication that a compound is not toxic. Additionally, the user should be aware that the following groups are labile when bound to silicon, germanium, and tin, and will yield toxic materials when the parent compound is subjected to water or protic solvents.

Group	Product	Toxicity	
—CN	hydrogen cyanide	orl-mus LD50	4mg/kg
—N_3	hydrazoic acid	ipr-mus LD50	22 mg/kg
—NMe_2	dimethylamine	orl-rat LD50	698 mg/kg
—NEt_2	diethylamine	orl-mus LD50	649 mg/m^3
—NCO	OCN—as K^+	orl-mus LD50	841 mg/kg
—NCS	SCN—as K^+	orl-rat LD50	859 mg/kg
—OMe	methanol	orl-man LDca	1400 mg/kg
—Cl	hydrogen chloride	ihl-rbt LCca	1000 mg/kg

Lower trialkyltin compounds exhibit high orders of toxicity. Triethyltin and trimethyltin compounds form solvated pentacoordinate species which have a direct effect on neural tissue. Toxicity is diminished both for dialkyltins and higher substitution.

It is obvious that particular care is required when using nitrile or azide compounds. Aromatic silatranes have a uniquely high level of toxicity. Most materials have not undergone toxicity testing. It is incumbent upon the user to take all precautions when handling these compounds, including the use of engineering controls and appropriate personal protective equipment.

Explosion Hazard

Azides in contact with heavy metals, particularly copper and lead, can yield unstable compounds capable of exploding. Reaction of azidosilanes with vinylchlorosilanes yields explosive compounds. Silanes containing both phenyl groups and hydrogens can disproportionate violently in the presence of aluminum halides. When heated, N-lithio-and sodio-silazanes can explode if exposed to air. Tetraalkylleads can explode when heated to decomposition.

Flammability Hazards

Any silicon, germanium or tin compound containing three or more hydrogens bound to the metal is potentially pyrophoric. Mixed chloroaminosilanes can ignite spontaneously on contact with protic materials including paper. All organosilanes and hydrogen containing silicon compounds are flammable. Silanes containing hydrogen and alkoxy substituents can rearrange in the presence of metal salts, amines and platinum catalysts to give pyrophoric products.

Eye Hazard

Eye contact with vapors of all silanes should be avoided. The following chemicals, while appearing to be relatively innocuous possess a unique ability to permeate corneal tissue and can cause blindness: trimethoxysilane, tetramethoxysilane, triethoxysilane.

Corrosivity Hazard

Since chlorine is labile when bound to silicon, exposure of a chlorosilane to water in any form or other protonic solvent will result in release of hydrogen chloride. All chlorosilanes are corrosive to any exposed portion of the human body as well as to many common materials of construction. Alkoxides of alkalai metals and alkalai earths are strongly basic and corrosive.

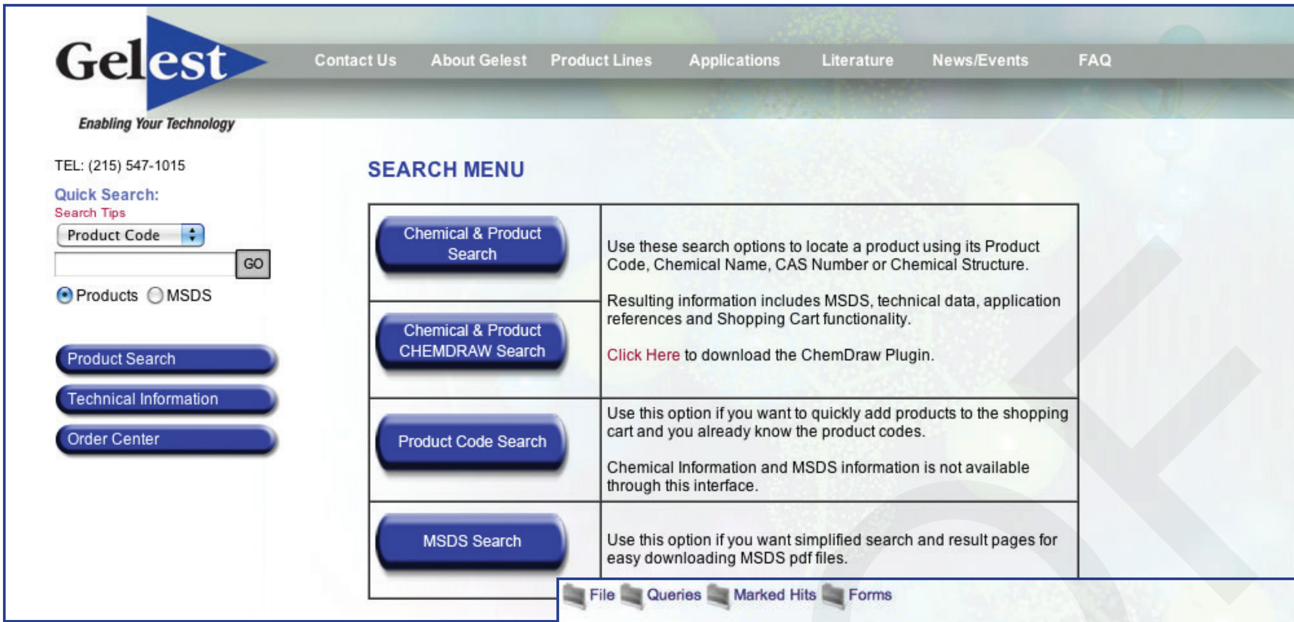
INFORMATION ON USING THE GELEST WEBSITE - www.gelest.com

The Gelest website is accessed through www.gelest.com. It provides options that allow one to:

- search for a specific compound by name or registry (CAS) number.
- obtain an MSDS for a compound.
- obtain available size information.
- register to order materials on the internet.
- obtain a list of compounds as a function of application.
- obtain a list of compounds containing a specific functionality.
- obtain a list of compounds containing certain linkages, groups or functionalities via the "Tanimoto Similarity" search which allows for searching by structure or substructure.
- access articles on the chemistry of the various types handled by Gelest.
- obtain titles to current publications in silicon chemistry.

As an example of a search:

1. Go to Product Search to obtain the screen as shown in figure 1.
2. Select Advanced Query to get figure 2 without structure.
3. Draw in the partial structure after selecting substructure from the dropdown box.
4. In the example shown in figure 2 with structure the substructure contains the tBu-Si-O-S linkage. The search will find all structures with this linkage.
5. The search provides the two structures shown in figure 3. Each structure, along with all available information, can be individually accessed as in figure 4.



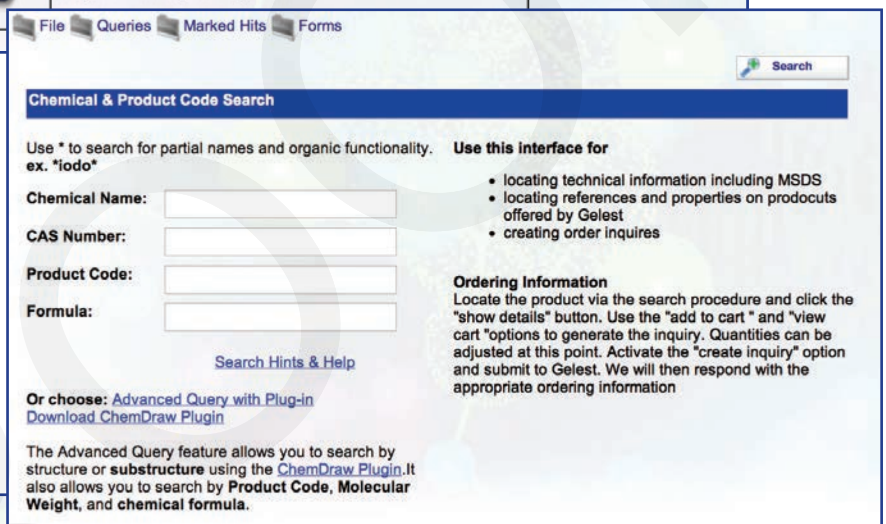
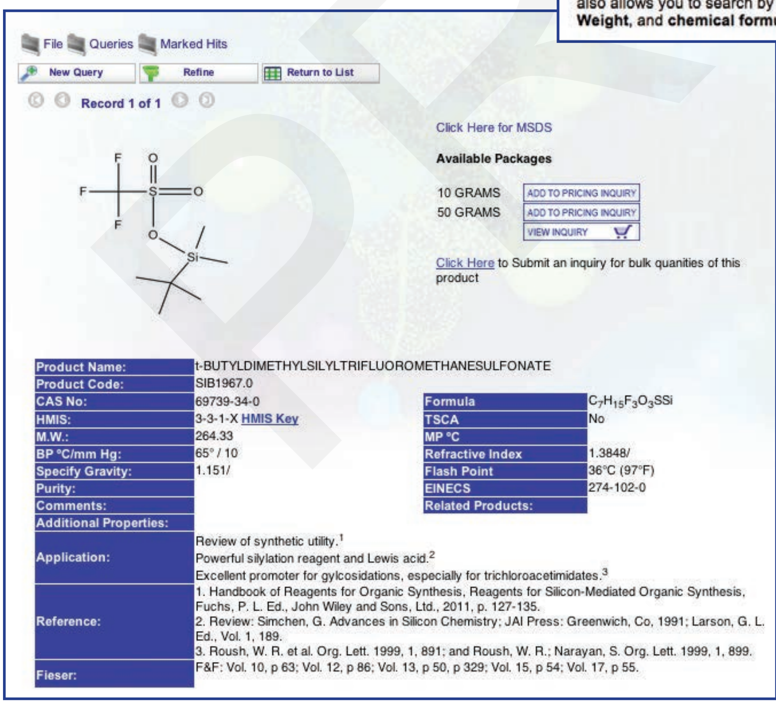
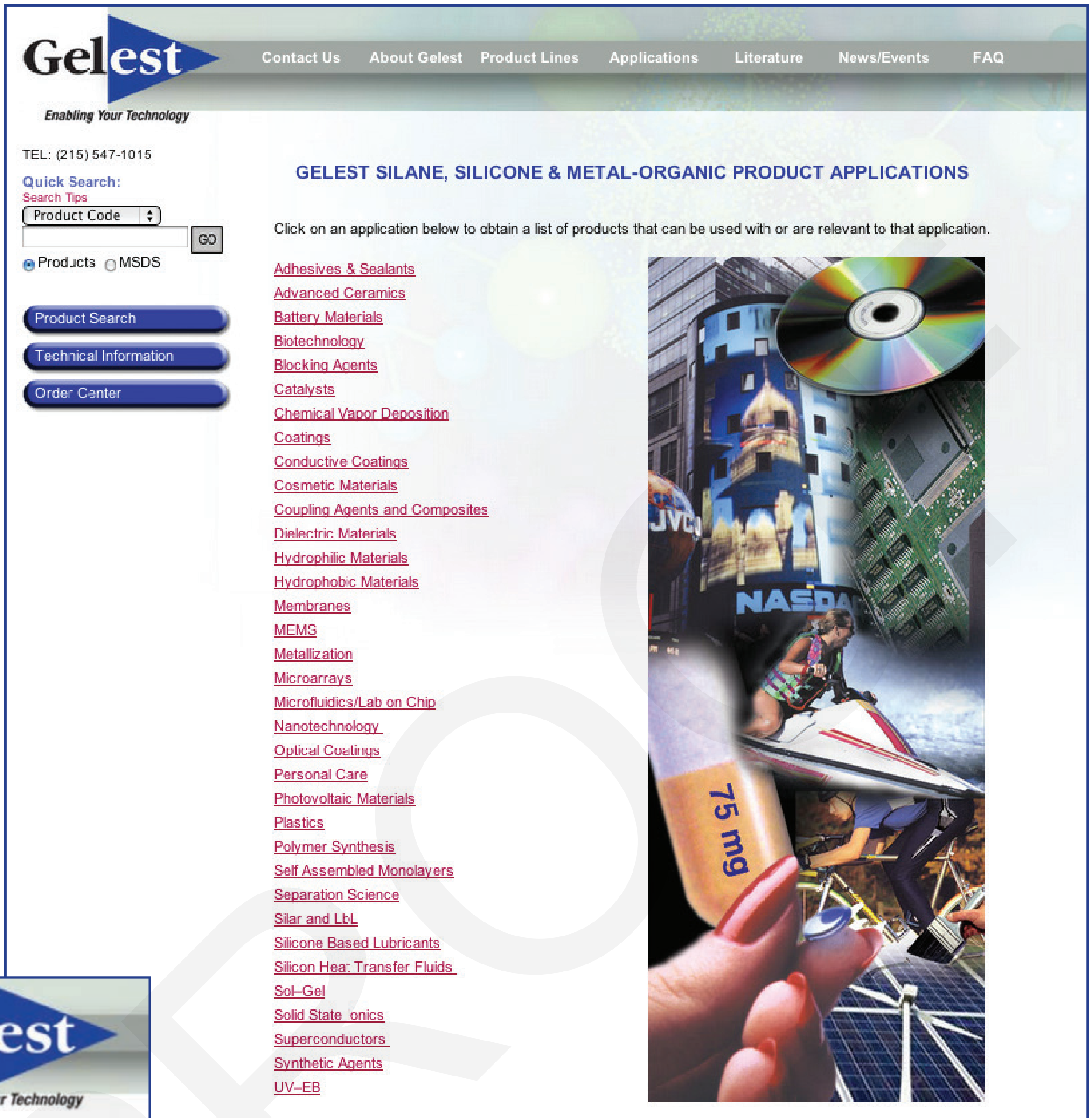


Figure 1

The product search feature will assist you in quickly locating technical information, references and properties on products offered by Gelest. If you are unable to locate a particular product of interest please send an email to our technical assistance service: **sales@gelest.com.**



The Advanced Query feature allows you to search by **structure or substructure** using the **ChemDraw Plugin**. It also allows you to search by **Product Code, Molecular Weight**, and **Chemical Formula.**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Separation Science
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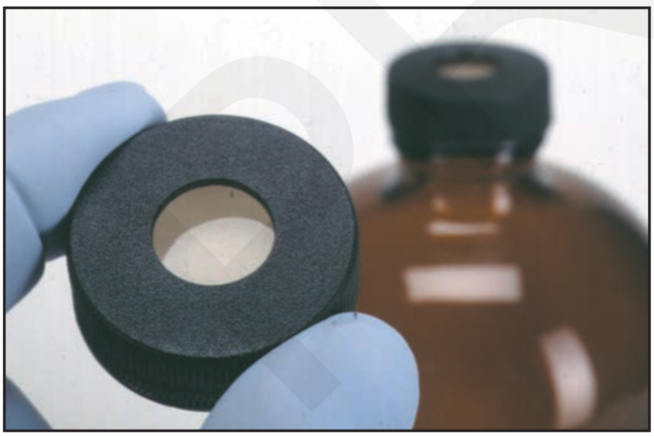
Special Closures for Glass Bottles

Our standard closures for bottles are conventional phenolic caps with polyethylene cone-seal liners. We offer several options to meet special packaging requirements.

Solid Fluoropolymer Caps

Improved storage stability, particularly color, can be achieved by utilizing a solid fluoropolymer cap with a PTFE liner.

Product Code	Fits	each
zCAP-T-38/439	2.5L and 4L bottles	inquire



Septum Seal Caps

Septum seal caps allow syringe dispensing of air-sensitive materials. The phenolic caps have a PTFE face on a silicone disc. (0.25mm PTFE/2.25mm silicone).

Product Code	Fits	each
zCAP-S-38/430	2.5L and 4L bottles	inquire
zCAP-S-33/400	1 qt.	inquire
zCAP-S-28/400	1 pt.	inquire
zCAP-S-22/400	4 oz.	inquire
zCAP-S-20/400	1 oz. and 2 oz.	inquire
zCAP-S-18/400	1/2 oz.	inquire

Low Pressure Disposable Cylinders

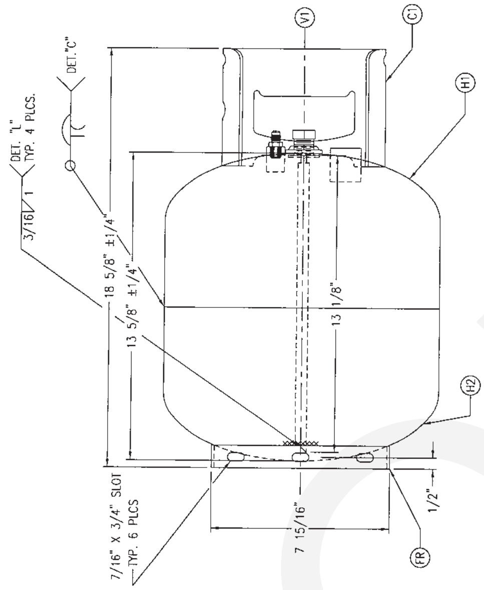
Gas Dispensing Cylinders
These cylinders are fabricated from carbon steel. Standard fittings provided for gas distribution are Nupro brass needle valves with 1/4″ Swagelok outlets. Cylinders are DOT specified and rated at 240 psi. Empty cylinders are shipped unassembled.

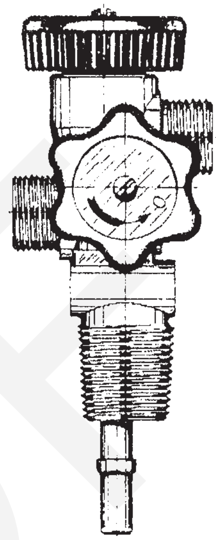
Product Code	Capacity	Nominal Tare	DOT Specification	each
zCYL-G-0280	280ml	0.44 kg	DOT-4B 240	inquire
zCYL-G-0900	900ml	0.95 kg	DOT-4B 420 ET	inquire
zCYL-G-2400	2400ml	1.70 kg	DOT-4B 300	inquire

Liquid Dispensing Cylinders
These cylinders are fabricated from carbon steel under the specifications listed above, but are fitted with a gas inlet and liquid eduction tube. The brass valves have 1/4” NPT outlets. Empty cylinders are shipped unassembled.

Product Code	Capacity	Nominal Tare	each
zCYL-L-0280	280ml	0.69 kg	inquire
zCYL-L-0900	900ml	1.21 kg	inquire
zCYL-L-2400	2400ml	1.96 kg	inquire

Bulk Cylinders

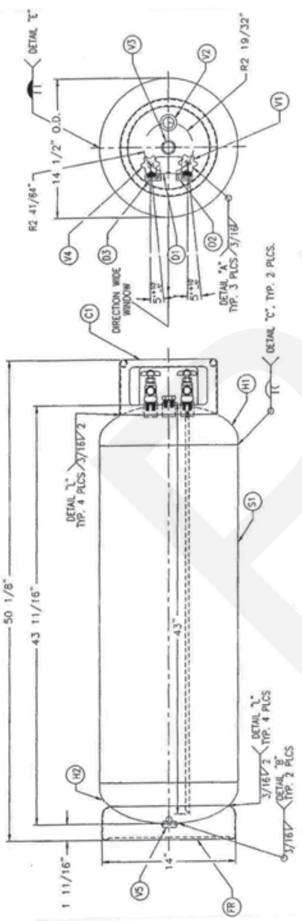


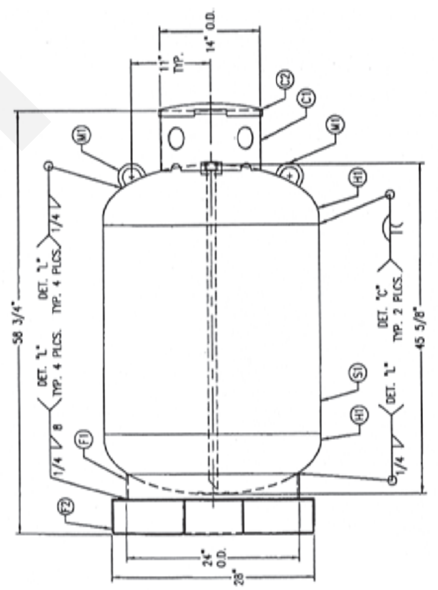


These carbon steel cylinders are for storing and dispensing bulk quantities of hazardous or air sensitive liquids and compressible gases. The cylinders meet the listed DOT specifications and pressure ratings. All cylinders are fitted for both liquid and gas dispensing. zCYL-B-022 is equipped with a dual port brass valve. zCYL-B-100 has two brass valves with CGA 660 connections. zCYL-B-225 & zCYL-B-450 have 1"NPT stainless ball valve (liquid) and a ¾" NPT stainless ball valve (vapor).

Product Code	Capacity	Nominal Tare	Pressure Rating	each
zCYL-B-022	21.5 liters	14.7 kg	4BA400 - 400 psi	inquire
zCYL-B-100*	100 liters	33.7 kg	4BW260 - 260 psi	inquire
zCYL-B-225	225 liters	96.2 kg	4BW240 - 240 psi	inquire
zCYL-B-450	450 liters	150.6 kg	4BW240 - 240 psi	inquire

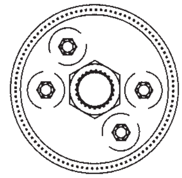
*Heavy duty version suitable for pyrophoric material available, please inquire

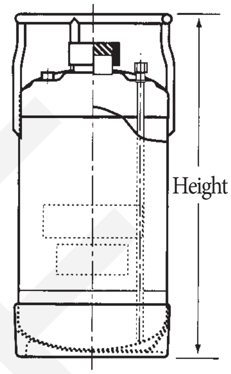




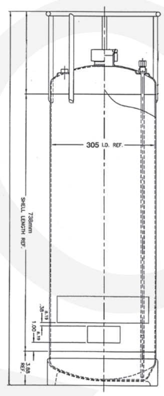
Stainless Steel Bulk Cylinders

Electropolished 316L stainless steel cylinders for storing and dispensing bulk quantities of corrosive or high purity liquids and compressible gases. Head configuration includes four ¼″ NPT pipe fittings and 2″ access port. The price includes two ¼″ stainless needle valves equipped ¼″ Swagelok fittings.

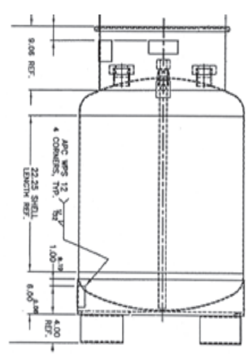
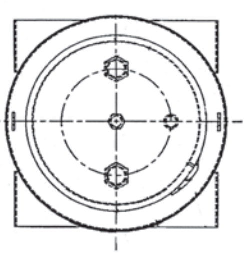





Product Code	Capacity	Pressure Rating	Nominal Tare	DOT Specifications	Diameter	Height	each
zCYL-S-004	3.8 liters	185 psi	4.5 kg	UNIAI/X1.8/1390	229mm	273mm	inquire
zCYL-S-019	19 liters	185 psi	9.6 kg	UNIAI/X1.2/1390	229mm	616mm	inquire

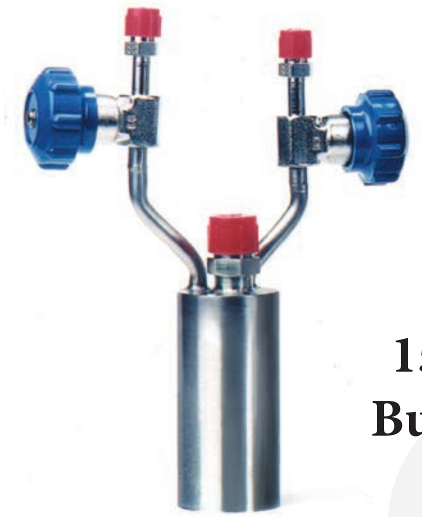

Product Code	Capacity	Pressure Rating	Nominal Tare	DOT Specifications	Diameter	Height	each
zCYL-S-060	60 liters	185 psi	24.8 kg	UNIAI/X1.2/1480	305mm	1070mm	inquire

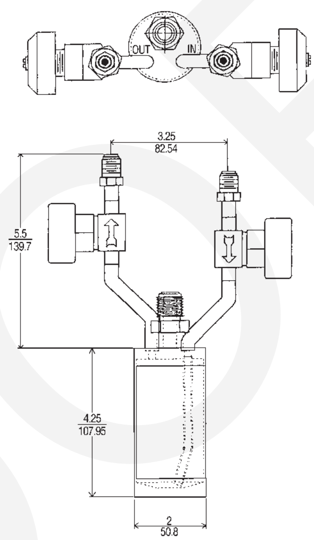
Product Code	Capacity	Pressure Rating	Nominal Tare	DOT Specifications	Diameter	Height	each
zCYL-S-209	209 liters	72 psi	70.8 kg	UNIAI/X1.8/640	610mm	1141mm	inquire

Bubblers - Special Delivery Systems

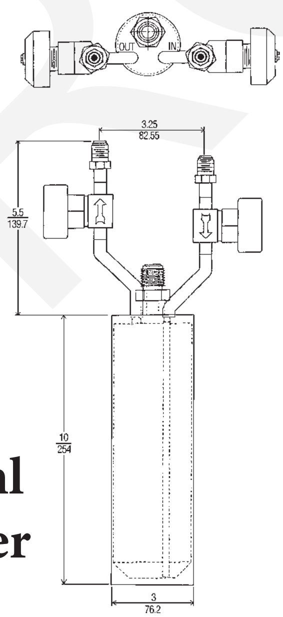
Bubblers are usually employed with special delivery control systems associated with chemical vapor deposition. They have both above liquid level access and dip tubes. In most applications the dip tube is used to sparge an inert carrier gas through the liquid allowing transport of the product as a vapor. Bubblers are fabricated from 316L stainless steel, rated at 260psi and equipped with high vacuum fittings. Bubblers ordered empty are shipped with VCR fittings detached. Bubbler ordered with chemicals have fittings and gaskets assembled. Valve connections are SS-4-VCR-3; Fillport is modified SS-8-VCR-1-8. They are manufactured to DOT specification DOT-4B 260.



150ml Bubbler

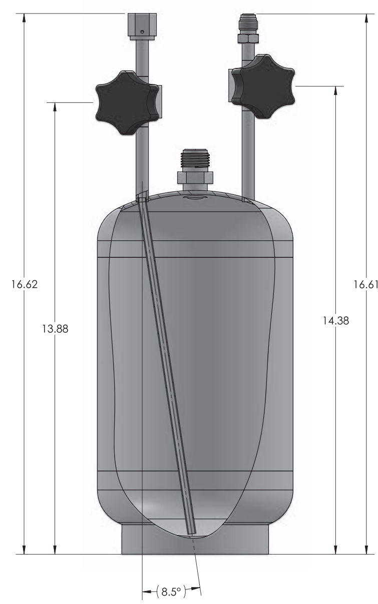


Product Code	Capacity	Nominal Tare	Price
zBUB-S-0150	150ml	1.05 kg	inquire



1000ml Bubbler

4000ml Bubbler



Product Code	Capacity	Nominal Tare	Price
zBUB-S-1000	1000ml	2.05 kg	inquire
zBUB-S-4000	4000ml	3.28 kg	inquire

Stainless Steel High Pressure Cylinders

420 ml

High pressure 304 stainless steel cylinders are utilized as sample cylinders or lecture-bottles for high purity and corrosive gases. Maximum pressure is 1800psi. They may be equipped with either CGA 350 (hydride and reducing gas) or CGA 330 (corrosive, typically chlorine or fluorine containing gas) valves. Cylinders are manufactured to DOT-3E 1800 specifications. Nominal tare with protective caps and plugs detached is 1.17 kg.

Product Code	Valve Type	Capacity	Each
zCYL-HPS-0420-35	CGA 350	420ml	inquire
zCYL-HPS-0420-33	CGA 330	420ml	inquire

Aluminum High Pressure Cylinders

High pressure aluminum alloy cylinders provide a high purity package for non-corrosive gases. They are nonmagnetic and lightweight (about 1/3 lighter than steel cylinders) and are manufactured to consistently higher weight and dimensional tolerances. Maximum pressure is 2000psi. Valves are stainless steel with CGA 350 connections. Aluminum alloy cylinders are suitable for silicon hydrides, germanium hydrides and other reducing gases.

Product Code	Capacity	Nominal Tare	DOT Specification	Each
zCYL-HPA-6000	6.0 liters	7.6 kg	DOT-3AL 2216	inquire
zCYL-HPA-29000	29 liters	22.7 kg	DOT-3AL 2015	inquire
zCYL-HPA-49000	49 liters	39.5 kg	DOT-3AL-2216	inquire

29 Liter

6.0 Liter

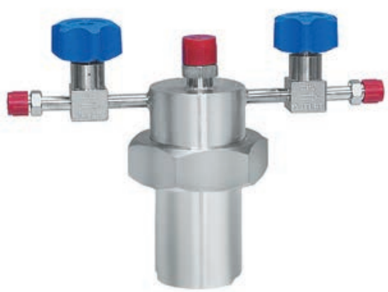
Mini-Cylinders

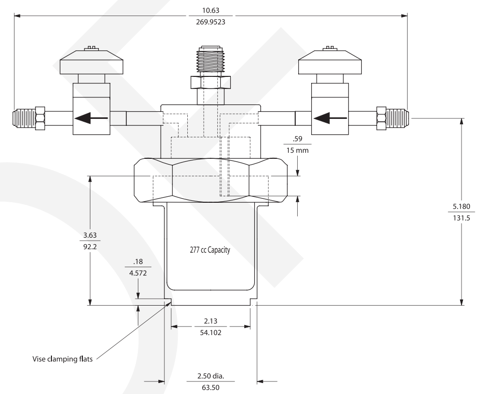
Product Code	Construction	Rating	Capacity	Nominal Tare*	Price
zCYL-HPS-0050	316 stainless	1000psig	50 mls	303.2g	inquire
zCYL-G-0025	carbon steel	350psig	25 mls	186.7g	inquire

*excluding caps

Sublimation-Entrainer

Sublimation-Entrainers provide delivery sources for high-vapor pressure solids utilized in ALD and CVD applications. The reservoir portion can be filled to level with solids. The domed head has a directed inlet for carrier gas and a side exit for delivery. The reservoir can be heated to moderate temperatures (150°C) to increase vapor pressure of solids and allow entrainment by carrier gases. An extra port is provided for evacuation or thermocouple access. Sublimation-entrainers are fabricated from 316L stainless steel and equipped with high vacuum fittings. Valve connections are SS-4-VCR-3. Auxilliary port is SS-8-VCR-1-8.





Product Code	Capacity	Nominal Tare	Price
zSUE-S-0275	275ml	2.80 kg	inquire

Stainless Steel Pails and Drums

Stainless steel pails and drums provide the the most cost-effective way to safely store and transport corrosive liquids. The closed-head pails have ¾″ and 2″ threaded bungs. They are manufactured to DOT specification UN1A1/X1.8/270.

19L (5 gallon)

208L (55 gallon)

Product Code	Capacity	Gauge	Nominal Tare	Each
zDR-S-019	19 liters	19	4.37 kg	inquire
zDR-S-208	208 liters	18	21.7 kg	inquire

Gelest

Silicon Compounds

Section 1-Silicon Chemistry Articles

Section 2-Silicon Compounds: Registry of Products and Properties

AN ORGANOSILICON CHEMISTRY PRIMER

Organosilanes are compounds containing a silicon to carbon bond. The chemistry of these compounds is generally similar to the chemistry of organic compounds. The silicon atom is more electropositive than carbon, leading to four primary distinctions.

1. Nucleophilic substitution at silicon is more facile than at carbon.
2. Bond energies with the electronegative elements oxygen, fluorine and chlorine are greater than with a carbon.
3. A silicon-carbon bond stabilizes a carbanion in the alpha position, and a carbocation in the beta position.

$$R_3Si{-}C^- \quad \text{and} \quad R_3Si{-}C{-}C^+$$

4. The Si-H bond is polarized with Si+ and H-, generally resulting in an anti-Markovnikov addition to olefins under catalytic conditions and the ability under limited conditions to transfer hydride.

Organosilanes are derived from elemental silicon. Silicon in turn is produced from silica or quartz.

$$SiO_2 + C \xrightarrow[\text{electric furnace}]{\Delta} Si + CO_2$$

Chlorosilanes are often intermediates in production of organosilanes.

$$Si + 2\,Cl_2 \xrightarrow{\Delta} SiCl_4$$

$$Si + 3\,HCl \xrightarrow{\Delta} HSiCl_3 + SiCl_4 + H_2$$

The chlorosilanes can be reacted either with Grignard reagents or alkali metal organics to give organic substitution. For example:

$$RMgCl + HSiCl_3 \longrightarrow RHSiCl_2 + MgCl_2$$

$$RLi + SiCl_4 \longrightarrow RSiCl_3 + LiCl$$

A more efficient route is through hydrosilylation of an olefin, which is catalyzed by such materials as chloroplatinic acid, di-t-butyl peroxide, and in limited instances amine complexes and aluminum chloride.

$$RCH{=}CH_2 + HSiCl_3 \xrightarrow{\text{catalyst}} RCH_2CH_2SiCl_3$$

The greatest quantities of organosilanes are methyl substituted. They are produced by a direct process.

$$MeCl + Si \xrightarrow[\Delta]{Cu} \left\{ \begin{array}{l} MeSiCl_3 \\ Me_2SiCl_2 \\ Me_3SiCl \\ \text{+ small amounts} \\ \text{of other products} \end{array} \right.$$

Chlorosilanes undergo several important reactions. Chlorine may be replaced with hydrogen either by treatment with hydride reducing agents or transfer of a hydride from other silyl hydrides.

$$2\,(C_6H_5)_2SiCl_2 + LiAlH_4 \xrightarrow{\text{THF}} 2\,(C_6H_5)_2SiH_2 + LiCl + AlCl_3$$

Chlorosilanes react with protic materials, forming alkoxysilanes with alcohols, aminosilanes with primary and secondary amines, and silanols with water.

$$CH_3CH_2SiCl_3 + 3\,ROH \longrightarrow CH_3CH_2Si(OR)_3 + 3\,HCl$$

$$Me_3SiCl + 2\,Me_2NH \longrightarrow Me_3SiNMe_2 + Me_2NH_2^+Cl^-$$

The reaction with water is particularly important in that it provides a basis for silicone manufacture. Dimethyldichlorosilane is difunctional. It reacts with water to form cyclic or straight chain polymers.

$$n\ Me_2SiCl_2 + n\ H_2O \longrightarrow n\ \{Me_2Si(OH)_2\} + 2n\ HCl$$

$$\{Me_2Si(OH)_2\} \downarrow \text{silicone polymers}$$

Alkoxysilanes (silane esters) undergo most of the reactions of chlorosilanes and are generally more convenient reagents. They are more resistant to hydrolysis. Increasing the size or steric bulk of the alkoxy group decreases reactivity. Like chlorosilanes, they yield siloxanes on hydrolysis, but the byproduct is alcohol rather than hydrogen chloride. They undergo exchange with hydroxyl containing materials under conditions similar to those for transesterification of carboxylic acid esters.

$$MeSi(OEt)_3 + 3\ nBuOH \xrightarrow{\text{catalyst}} MeSi(OnBu)_3 + 3\ EtOH$$

Alkoxysilanes undergo displacement of -OR on reaction with Grignard reagents, and reduction on treatment with metal hydrides.

Hydrogen bound to silicon can behave as a reducing agent. Triethylsilane and diphenylsilane are employed in the reduction of ketones and esters. Polymethylhydrosiloxane has similar properties.

$$R_2C{=}O + Et_3SiH + R'OH \longrightarrow R_2CHOR' + Et_3SiOH$$

Halogenoid substituted silanes exhibit unique properties. The halogenoids include isocyanate, isothiocyanate, azide and nitrile groups. The last two are of particular synthetic importance since they replace hydrazoic acid and hydrogen cyanide in many synthetic reactions.

Silylation is the replacement of the active hydrogen in a compound with a substituted silane group. The conspicuous applications are the preparation of blocked intermediates and derivatization for chromatography.

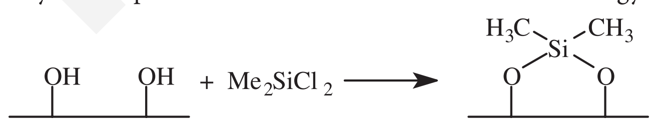
Surface synthesis and modification of a wide range of substrates may be accomplished with silanes. Deposition techniques include the preparation of silicon for semiconductors with silane, dichlorosilane, and trichlorosilane. Silicon carbide deposition is carried out at high temperature with methyltrichlorosilane. Silicon dioxide may be deposited from acyloxysilanes by a thermal process or by a hydrolytic process from esters.

$$H_2SiCl_2 \xrightarrow{\Delta} Si + 2HCl$$

$$CH_3SiCl_3 \xrightarrow{\Delta} SiC + 3\ HCl$$

$$(tBuO)_2Si(OAc)_2 \xrightarrow{\Delta} SiO_2 + 2\ tBuOAc$$

Utilization of organosilanes has been directed toward surface modification rather than synthesis. Dimethyldichlorosilane, dimethyldiethoxysilane, trimethylchlorosilane and hexamethyldisilazane are employed to reduce surface interaction of siliceous materials and aluminas. Fluorinated alkylsilanes provide surfaces with even lower surface energy.



Treatment of surfaces can be used to tailor surfaces with particular properties for chromatography, extraction, and exchange resin applications. Self-assembled monolayers of these materials have been employed in microcontact printing.

Silanes with reactive organic substitution are employed in thermoset and thermoplastic composites as coupling agents. Amine, olefin, methacrylate, mercaptan, epoxy and cationic functionalities are usually employed. Bonding may be directly through covalent bonds or by modification of filler affinity through introduction of hydrogen bonding or ionic interaction sites.

NAMING SILICON COMPOUNDS

Silane, SiH_4, is the simplest hydride and provides the basis of nomenclature for all silicon chemistry. Compounds are named as derivatives of silane with the substituents prefixed, e.g., trichlorosilane, $HSiCl_3$; disilane, H_3SiSiH_3; methyldichlorosilane, $CH_3SiH(Cl_2)$; methylsilane, CH_3SiH_3; diethylsilane, $(C_2H_5)_2SiH_2$; and triethylsilane, $(C_2H_5)_3SiH$. Two or more substituents are listed alphabetically with substituted organic moieties being named first, followed by simple organic fragments. Alkoxy substituents are named next, followed by acyloxy, halogen and pseudohalogen groups; for example, ethylmethylethoxysilane, $C_2H_5(CH_3)SiH(OC_2H_5)$, and (3-chloropropyl) methylchlorosilane, $ClCH_2CH_2CH_2SiH(CH_3)Cl$. Organosilanes have also been referred to as organosilicon hydrides and organohydrosilanes. This broad classification is based on comparison of the electronegativities of silicon and hydrogen. With systems containing silicon-silicon bonds, compounds are named as derivatives of disilane, trisilane etc.

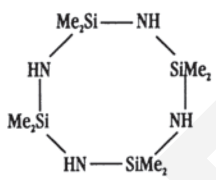
SiH_4 = silane

H_3SiSiH_3 = disilane

$H_3SiSiH_2SiH_3$ = trisilane (central Si bearing H above and H below as drawn)

Silazanes are named as disilazane, trisilazane and so forth depending on the number of silicon atoms in the structure.

$H_3SiNHSiH_2NHSiH_3$ = trisilazane



= 1,1,3,3,5,5,7,7-octamethylcyclo-tetrasilazane

Siloxanes are named in a similar fashion to the silazanes.

$H_3Si\text{-}O\text{-}SiH_3$ = disiloxane

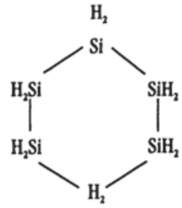
$Me_3Si\text{-}O\text{-}SiMe_3$ = hexamethyldisiloxane

$Me_3Si\text{-}O\text{-}SiMe_2\text{-}O\text{-}SiMe_2CH{=}CH_2$ = 1-vinylheptamethyltrisiloxane

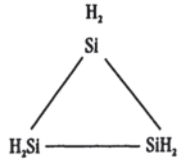
When the silicon group must be named as a unit the following general names are used:

H_3Si-	silyl
H_2Si-	silylene
H_3SiSiH_2-	disilanyl
H_3SiO-	Siloxanyl
Me_3Si-	trimethylsilyl
$tBuMe_2Si$-	tert-butyldimethylsilyl

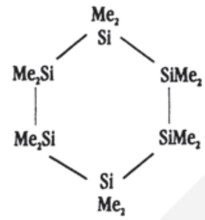
The cyclic silanes are named:



cyclohexasilane



cyclopropasilane



dodecamethylcyclohexasilane

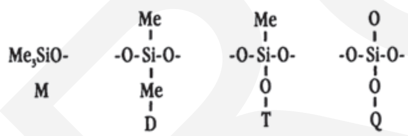
Hydroxy derivatives are named as silanols:

H_3SiOH	silanol
$H_2Si(OH)_2$	silane diol
$PhSi(OH)_3$	phenylsilane triol
Ph_3SiONa	sodium triphenylsilanolate

When the question of whether to use organic or organosilicon nomenclature arises, the tendency is to employ the organic nomenclature.

Me_3SiCH_2CN	α -trimethylsilylacetonitrile
$Me_3SiCHClCH_3$	1-trimethylsilyl-1-chloroethane or (1-chloroethyl)trimethylsilane
$Me_3SiCH(OH)CH_3$	1-trimethylsilylethanol
$PhCO_2SiEt_3$	triethylsilylbenzoate

A shorthand notation for the methylsiloxanes and polymethylsiloxanes. The various groups utilized in this format are:

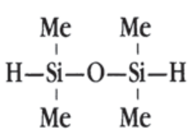


Examples are:

$Me_3Si\text{-}O\text{-}SiMe_3$	MM
$Me_3Si(OSiMe_2)_{10}OSiMe_3$	$MD_{10}M$
$(Me_3SiO)_3Si\text{-}O\text{-}SiMe_2\text{-}OSiMe_3$	M_3QDM

D_3

In cases where the substituent is not methyl a prime(′) designation is used. Thus tetramethyldisiloxane is



M′M′

Gelest

Enabling Your Technology

SILICON ESTERS

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Reprinted from
Kirk-Othmer Encyclopedia of Chemical Technology,
Fourth Edition, Volume 22, Pages 69-81
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Silicon Esters

Silicon esters are silicon compounds that contain an oxygen bridge from silicon to an organic group, ie, Si–OR. The earliest reported organic silicon compounds contain four oxygen bridges and are often named as derivatives of orthosilicic acid, $Si(OH)_4$. The most conspicuous material is tetraethyl orthosilicate [*78-10-4*], $Si(OC_2H_5)_4$. The advent of organosilanes that contain silicon–carbon bonds, Si–C, initiated an organic nomenclature by which compounds are named as alkoxy derivatives. For example $Si(OC_2H_5)_4$ becomes tetraethoxysilane. The compound $CH_3Si(OCH_3)_3$ is named methyltrimethoxysilane. Whereas the latter usage is preferred, the literature even in the mid-1990s, particularly in ceramics (qv) technology, contains the older terms. Acyloxysilanes, eg, tetraacetoxysilane, $Si(OOCCH_3)_4$, are also members of this class. The chemistry and applications of acyloxysilanes are significantly different from those of the alkoxysilanes.

Applications for tetraalkoxysilanes cover a broad range. These compounds are classified roughly according to whether the Si–OR bond is expected to remain intact or to be hydrolyzed in the final application. Applications in which the Si–OR bond is hydrolyzed include binders for foundry-mold sands used in invest- ment and thin-shell castings, binders for refractories (qv), resins, coatings (qv), sol–gel glasses, cross-linking agents, and adhesion promoters. Applications in which the Si–OR bond remains intact include heat-transfer and hydraulic fluids (qv). In general, the lower molecular weight compounds, eg, tetraethoxysilane and tetramethoxysilane, are used in reactive applications, whereas compounds such as tetra-2-ethylhexoxysilane are associated with mechanical applications. Methyl- and phenyltrialkoxysilanes are primarily used in the production of silicone resins and coatings. Longer-chain materials, eg, propyl-, isobutyl-, and octyltrialkoxysilanes, are used in hydrophobic coatings, primarily for masonry and concrete. The hydridoalkoxysilanes, triethoxysilane and trimethoxysilane, are intermediates for the production of organofunctional silanes. Organosilane esters in which there is a functional or reactive substitution of the organic radical are used as coupling agents. Tetraethoxysilane and its polymeric derivatives account for >75% of all production of nonfunctional silane esters.

Properties

The tetraalkoxysilanes possess excellent thermal stability and liquid behavior over a broad temperature range that widens with length and branching of the substituents. The physical properties of the silane esters, particularly the polymeric esters containing siloxane bonds, ie, Si–O–Si, are often likened to the silicone oils. These have low pour points and similar temperature–viscosity relationships. The alkoxysilanes generally have sweet, fruity odors that become less apparent as molecular weight increases. With the exception of tetramethoxysilane, trimethoxysilane, triethoxysilane, and a few closely related compounds that can be absorbed into corneal tissue, causing eye damage, the alkoxysilanes generally exhibit low levels of toxicity.

The physical properties of commercial alkoxysilanes are provided in Table 1. Two classes of silane esters have very distinct properties and are generally considered apart from alkoxysilanes. Silatranes are compounds derived from trialkanolamines and have silicon–nitrogen coordination. These are generally hydrolytically stable and have unique physiological properties (3). A second special class of monomeric esters are cyclic diesters of polyethyleneoxide glycols designated sila-crowns, which have application as catalysts (4). Neither silatranes nor sila-crowns are considered herein.

Aryloxy- and acyloxysilanes are often solids. The aryloxysilanes have excellent thermal stability. Acyloxy and mixed acyloxyalkoxysilanes have poor thermal stability. Thermal decomposition has been noted attemperatures as low as 110°C and is generally observed by 170°C.

The most significant difference between the alkoxysilanes and silicones is the susceptibility of the Si–OR bond to hydrolysis (see Silicon Compounds, Silicones). The simple alkoxysilanes are often operationally viewed as liquid sources of silicon dioxide (see Silica). The hydrolysis reaction, which yields polymers of silicic acid that can be dehydrated to silicon dioxide, is of considerable commercial importance. The stoichiometry for hydrolysis for tetraethoxysilane is

$$Si(OC_2H_5)_4 + 2\ H_2O \xrightarrow{\text{acid or base}} SiO_2 + 4\ C_2H_5OH$$

Table 1. Physical Properties of Silane Esters[a]

Compound	CAS Registry Number	Formula	Boiling point[b], °C	Melting point, °C	Density, g/cm³	Refractive index, n_D	ΔHvap, kJ/mol[c]	Viscosity, mm²/s (=cP)	Flash-point, °C	LD50 (oral, rat) mg/kg
Monoorganoalkoxysilanes										
methyltrimethoxysilane	[1185-55-3]	$CH_3Si(OCH_3)_3$	102–103		0.955	1.3646		0.5	8	
methyltriethoxysilane	[2031-67-6]	$CH_3Si(OC_2H_5)_3$	141–143		0.895	1.3832		0.6	23	12,500[d]
ethyltrimethoxysilane	[5314-55-6]	$C_2H_5Si(OCH_3)_3$	124–125		0.949	1.3838		0.5	27	
ethyltriethoxysilane	[78-07-8]	$C_2H_5Si(OC_2H_5)_3$	158–159		0.896	1.3955	32.6	0.7	40	13,720
propyltrimethoxysilane	[1067-25-0]	$C_3H_7Si(OCH_3)_3$	142		0.939	1.3880			34	7,420
propyltriethoxysilane	[141-57-1]	$C_3HSi(OC_2H_5)_3$	179–180		0.892	1.3956			57	
isobutyltrimethoxysilane	[18395-30-7]	$i\text{-}C_4H_9Si(OCH_3)_3$	154		0.933	1.3960			42	>2,000
pentyltriethoxysilane	[2761-24-2]	$C_5H_1Si(OC_2H_5)_3$	$95–6_{1.3}$		0.895	1.4059			68	
octyltriethoxysilane	[2943-75-1]	$C_8H_{17}Si(OC_2H_5)_3$	$98–9_{2}$	<−40	0.875	1.4160		1.9	100	
octadecyltrimethoxysilane	[3069-42-9]	$C_{18}H_{37}Si(OCH_3)_3$	$170_{0.1}$	13–17	0.885	1.4391			140	
octadecyltriethoxysilane	[112-04-9]	$C_{18}H_{37}Si(OC_2H_5)_3$	$165–9_{2}$	10–12	0.87	1.4386				>5,000
phenyltriethoxysilane	[780-69-8]	$C_6H_5Si(OC_2H_5)_3$	$112–3_{10}$		0.996	1.4718	47.7		96	2,830
Tetraorganoxysilanes and Polyorganoxysiloxanes										
tetramethoxysilane	[681-84-5]	$Si(OCH_3)_4$	121–122	2	1.032	1.3668	46.8	0.5	20	700
tetraethoxysilane	[78-10-4]	$Si(OC_2H_5)_4$	169	−85	0.934	1.3838	46.0	0.7	46	6,270
tetrapropoxysilane	[682-01-9]	$Si(O\text{-}n\text{-}C_3H_7)_4$	224–225	<−80	0.916	1.4012		1.7	95	
tetraisopropoxysilanee	[1992-48-9]	$Si(O\text{-}i\text{-}C_3H_7)_4$	185–186	<−22	0.887	1.3845	46.8	1.2	60	
tetrabutoxysilane	[4766-57-8]	$Si(O\text{-}n\text{-}C_4H_9)_4$	115_{4}	<−80	0.899	1.4128	61.9	2.3	110	
tetrakis(s-butoxy)silane	[5089-76-9]	$Si(O\text{-}sec\text{-}C_4H_9)_4$	87_{2}		0.885	1.4000		2.1[f]	104	
tetrakis(2-ethyl-butoxy)silane	[78-13-7]	$Si(OCH_2CH(C_2H_5)_2)_4$	$166–72_{0.27}$	<−70	0.892	1.4309		4.4[f]	116	22,130
tetrakis(2-ethyl-hexoxy)silane	[115-82-2]	$Si(OCH_2CH(C_2H_5)(C_4H_9))_4$	194_{1}	<−80	0.88	1.4388	70.6	6.8[f]	188	>22,000
tetrakis(2-methoxy-ethoxy)silane	[2157-45-1]	$Si(OCH_2CH_2OCH_3)_4$	$17–82_{10}$	<−70	1.079	1.4219		4.4	140	
tetraphenoxysilane	[1174-72-7]	$Si(OC_6H_5)_4$	$236–7_{0.13}$	48–49	1.141	1.5540[g]		6.6[h]		
hexaethoxydisiloxane	[2157-42-8]	$(C_2H_5O)_3SiOSi(OC_2H_5)_3$	230–232	0.998	1.3914					
ethylsilicate 40[i]	[18954-71-7]	$ca(OSi(OC_2H_5)_2)_{4\text{-}5}$	290–310	−90	1.05–1.06	1.3914		4–5	43	
Acyloxysilanes										
tetracetoxysilane	[5623-90-3]	$Si(OOCCH_3)_4$	$148_{0.8}$	110 sub	1.06	1.422				
methyltriacetoxysilane	[4253-34-3]	$CH_3Si(OOCCH_3)_3$	$87–8_{0.4}$	40	1.175	1.4083			85	
ethyltriacetoxysilane	[17689-77-9]	$C_2H_5Si(OOCCH_3)_3$	107_{1}	7–9	1.143	1.4123			106	
di-t-butoxydiacetoxysilane	[13170-23-5]	$(t\text{-}C_4H_9O)_2Si(OOCCH_3)_2$	$102_{0.7}$	−4	1.0196	1.404			95	

[a]Ref. 1. [b]Subscript denotes pressure, other than atmospheric, in kPa. To convert kPa to psi, multiply by 0.145. [c]To convert kJ to kcal, divide by 4.184. [d]Ref. 2. Value may be questionable. [e]Model compound; not of commercial significance. [f] At 38°C. [g]At 60°C. [h]At 55°C. [i]Nominal values; commercial values may vary. Properties given are for the average compound containing 40 wt % silicon dioxide.

Silicon dioxide never forms directly during hydrolysis. Intermediate ethoxy derivatives of silicic acid and polysilicates form as hydrolysis progresses. The polysilicates grow in molecular weight until most or all of the ethoxy groups are removed and a nonlinear network of Si–O–Si remains. The development of cyclic and cube structures containing 3–8 silicon atoms also occurs (5–7). A numerical modeling system for the hydrolysis of tetraethoxysilane has been developed (8). The viscosity of the solution increases until gelation or precipitation. Partially hydrolyzed materials of this type often contain more than enough silanols, Si–OH, to displace most of the remaining ethoxy groups in an acid- or base-catalyzed condensation. The stoichiometric equation for partial hydrolysis is

$$n\,\mathrm{Si(OC_2H_5)_4} + 2x\,\mathrm{H_2O} \xrightarrow{\text{acid or base}}$$

$$-\!\!\left(\mathrm{Si(OC_2H_5)_{4(1\text{-}x)}O_{2x}}\right)_{y}\!\!- + 4x\,\mathrm{ROH}$$

where x is the mol% partial hydrolysis. If the alkoxysilane is an organoalkoxysilane, eg, methyltriethoxysilane or phenyltriethoxysilane, the hydrolysis proceeds analogously to give the organosilsesquioxanes, $(RSiO_{1.5})_n$, instead of the dioxides, $(SiO_2)_n$. Likewise diorganodialkoxysilanes yield silanediols upon hydrolysis. Whereas the hydrolysis process is not usually considered to be an equilibrium reaction, the equilibrium constant for the reaction is $\sim 2 \times 10^{-3}$. The reversibility of the reaction only plays a significant role when the hydrolysis products are soluble (9).

Redistilled tetraethoxysilane containing less than 1 ppm chloride added to neutral $18 \times 10^6\ \Omega$ water purged with nitrogen in fluorocarbon bottles does not hydrolyze to a gel for over 6 months (10). Without special precautions, tetraethoxysilane hydrolyzes to a gel in ~10 d ; tetramethoxysilane hydrolyzes in ~2 d ; and tetra-n-butoxysilane in ~25 d . The hydrolysis reaction is catalyzed by acid or base. Acid-catalyzed hydrolysis generally proceeds more rapidly than base hydrolysis, and leads to more linear polymers than base hydrolysis. In contrast to base-catalyzed hydrolysis, there is a significant rate difference between the rate of hydrolysis of the first and second alkoxy groups in the presence of acid (see Table 1).

For binder preparation, dilute hydrochloric or acetic acids are preferred, because these facilitate formation of stable silanol condensation products. When more complete condensation or gelation is preferred, a wider range of catalysts, including moderately basic ones, is employed. These materials, which are often called hardeners or accelerators, include aqueous ammonia, ammonium carbonate, triethanolamine, calcium hydroxide, magnesium oxide, dicyclohexylamine, alcoholic ammonium acetate, and tributyltin oxide (11, 12).

Sol–Gel Process Technology and Chemistry

The complete hydrolysis of tetraalkoxysilanes under highly controlled conditions, usually without the presence of fillers, is associated with sol–gel technology (qv). Sol–gel is a method for preparing specialty metal oxide glasses and ceramics by hydrolyzing a chemical precursor or mixture of chemical precursors that pass sequentially through a solution state and a gel state before being dehydrated to a glass or ceramic. The use of sol–gel technology has increased dramatically since 1980. A variety of techniques have been developed to prepare fibers, microspheres, thin films (qv), fine powders, and monoliths. Applications for this technology include protective coatings, catalysts, piezoelectric devices, waveguides, lenses, high strength ceramics, superconductors, insulating materials, and nuclear waste encapsulation. The flexibility of sol–gel technology allows unique access to multicomponent oxide systems and low temperature process regimes. An excellent review of sol–gel chemistry is available (13).

Preparation of metal oxides by the sol–gel route proceeds through three basic steps: (*1*) partial hydrolysis of metal alkoxides to form reactive monomers; (*2*) the polycondensation of these monomers to form colloid-like oligomers (sol formation); and (*3*) additional hydrolysis to promote polymerization and crosslinking leading to a three-dimensional matrix (gel formation). Although presented herein sequentially, these reactions occur simultaneously after the initial processing stage.

Monomer formation or partial hydrolysis

$$\mathrm{Si\,(OC_2H_5)_4 + H_2O} \longrightarrow$$

$$\mathrm{(C_2H_5O)_3\,SiOH + C_2H_5OH}$$

Sol formation or polycondensation

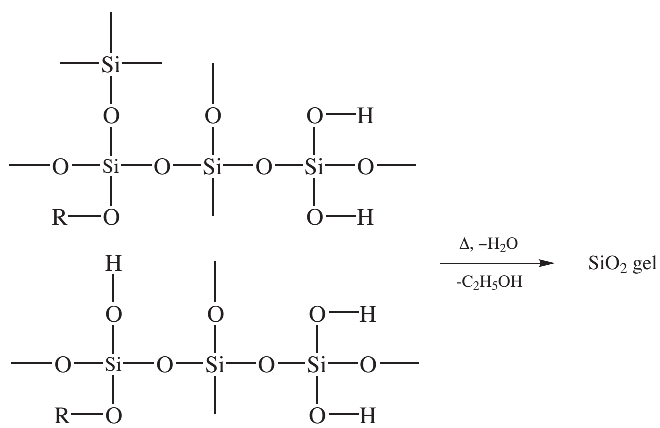
$$y\ \mathrm{(C_2H_5O)_3SiOH} \xrightarrow[\text{dimers}]{\text{monomers}}$$

$$\mathrm{(C_2H_5O)_3Si(OSi(OC_2H_5)_2)_{\mathit{n}}OH} + n\ \mathrm{C_2H_5OH}$$

Gelation or cross-linking

$$\mathrm{(C_2H_5O)_3Si(OSi(OC_2H_5)_2)_{\mathit{n}}OH} \xrightarrow{n\ \mathrm{H_2O}}$$

$$\mathrm{(C_2H_5O)_3Si(OSi(OC_2H_5)OH)_{\mathit{n}}OH} + n\ \mathrm{C_2H_5OH} \xrightarrow{-\mathrm{H_2O}}$$



where R is C_2H_5.

As polymerization and cross-linking progress, the viscosity of the sol gradually increases until the sol–gel transition point is reached. At this point the viscosity abruptly increases and gelation occurs. Further increases in cross-linking are promoted by drying and other dehydration methods. Maximum density is achieved in a process called densification in which the isolated gel is heated above its glass-transition temperature. The densification rate and transition (sintering) temperature are influenced primarily by the morphology and composition of the gel.

Nonhydrolytic methods for the formation of silicon dioxide from tetraalkoxysilanes have been reported (14, 15). Others have been reinvestigated (16):

$$2\ HCOOH + Si(OC_2H_5)_4 \longrightarrow SiO_2 + 2\ C_2H_5OH + 2\ HCOOC_2H_5$$

$$Si(OCH_2C_6H_5)_4 + SiCl_4 \longrightarrow SiO_2 + 4\ C_6H_5CH_2Cl$$

The Si–OR bond undergoes a variety of reactions apart from hydrolysis and condensation. In one of the more important aspects of reactivity, it is associated with the production of silicone intermediates and with cross-linking reactions for silicone room temperature vulcanizing materials (RTVs) (17). The reactivity of the Si–OR bond is in many cases analogous to the Si–Cl bond, except that the reactions are more sluggish. These reactions become increasingly more sluggish with greater bulk and steric screening of the alkoxy group. Reactions that have been reviewed (18–20) include the following:

$$-SiOR + R'MgCl \longrightarrow -SiR' + Mg(OR)Cl$$

$$-SiOR + HOSi \longrightarrow -Si-O-Si- + ROH$$

$$-SiOR + HOB \longrightarrow -SiOB- + ROH$$

$$-SiOR + (R'\overset{O}{\overset{\|}{C}})_2O \longrightarrow -SiO\overset{O}{\overset{\|}{C}}R' + R'\overset{O}{\overset{\|}{C}}OR$$

$$2-SiOR + R'CHO \xrightarrow{H_2SO} -Si-O-Si- + R'CH(OR)_2$$

$$-SiOR + ClSi \xrightarrow{catalyst} -Si-O-Si- + RCl$$

$$-SiOR + HON{=}R' \xrightarrow{catalyst} -Si-ON{=}R' + ROH$$

$$-SiOR + R'COCl \longrightarrow -SiCl + R'COOR$$

In comparison to the Si–OR bond, the Si–C bond can be considered essentially unreactive if the organic moiety is a simple unsubstituted hydrocarbon. If the organic moiety is substituted as in the case of a trialkoxysilane, the chemistry is more appropriately considered elsewhere (see Silicon Compounds, Silanes; Silicon Compounds, Silylating Agents).

Simple alkyl- and aryltrialkoxysilanes have three rather than four matrix coordinations in the polymeric hydrolysates, leading to less rigid structures than those derived from tetraalkoxysilanes. These and other changes in physical characteristics, e.g. wetting and partition properties, make these materials more appropriate in a variety of coating applications, where tetraalkoxysilanes are not acceptable. These materials are variously referred to as T-resins, organosilsesquioxanes, and ormosils, from the term organic modified silicas. Methylsilsesquioxanes are stable to 400°C. Phenylsilsesquioxanes are stable to 475°C.

Preparation

The principal method of silicon ester production is described by Von Ebelman's 1846 synthesis (21):

$$SiCl_4 + 4\ C_2H_5OH \longrightarrow Si(OC_2H_5)_4 + 4\ HCl$$

The reaction is generalized to

$$R_{(4-n)}SiCl_n + n\ R'OH \longrightarrow R_{(4-n)}Si\,(OR')_n + n\ HCl$$

Process considerations must not only take into account characteristics of the particular alcohol or phenol to be esterified, but also the self-propagating by-product reaction, which results in polymer formation.

$$ROH + HCl \longrightarrow RCl + H_2O$$
$$H_2O + SiCl_4 \longrightarrow [SiCl_2O] + 2\ HCl$$

Methods used to remove hydrogen chloride include the use of refluxing solvents or reaction mixtures, sparging dry air or nitrogen through the reaction mixture, and conducting the reaction in vapor phase or under applied vacuum. Amines can be employed as base-acceptors, but generally this is not practical commercially. In batch processes, the alcohol is always added to the chlorosilane. Continuous processes involve (1) pumping the alcohol and chlorosilane together in a mixing section, (2) introducing the chlorosilane vapor countercurrent to liquid alcohol, or (3) introducing chlorosilane vapor in a two-column reaction distillation scheme in which substoichiometric alcohol is introduced center-column to a chlorosilane, removing HCl and unreacted alcohol in the overhead, and in the second stage a slight excess of the alcohol is introduced center-column, recovering the excess overhead and removing product from the bottom. All processes provide a method for removal of by-product hydrogen chloride. The energy of activation for the reaction of ethanol with silicon tetrachloride in the vapor phase is 64.9 kJ/mol (15.5 kcal/mol) (22). The initial stages of the esterification processes are endothermic because the heat of evaporation of HCl cools the reaction mixture. In the last stages of esterification, the mixtures are usually heated during the final addition of alcohol. Tertiary alkoxides cannot be formed in this manner.

In the batch production of tetraethoxysilane from silicon tetrachloride, the initial reaction product contains at least 90 wt % tetraethoxysilane with a 28 wt % SiO_2 content. Distillation removes alcohol and high boiling impurities, and the distilled product contains at least 98% tetraethoxysilane and is called pure ethyl silicate. Partially hydrolyzed or polymeric versions where substantial portions have an average of 4–5 silicon atoms and 40 wt % SiO_2 or have an average of 5–8 silicon atoms and a 50 wt % SiO_2 content are referred to as ethylsilicate 40 and ethylsilicate 50, respectively. Ethylsilicate 50 has a branched structure with approximately 30–35% of all silicon atoms bonded to two others by oxygen bridges; 35–38% are bonded to three silicon atoms; and 12–16% are bonded to four silicon atoms. Model systems for hydrolyzed tetraethoxysilane which include cube as well as cyclic structures have been prepared (4).

Although known since the 1940s and 1950s (23, 24), catalyzed direct reactions of alcohols using silicon metal have become important commercial technology in the 1990s for production of lower esters. Patents have reported the reactions of methanol and ethanol with silicon in high boiling solvents, or in contained reaction products to give high yields of trialkoxysilanes and tetraalkoxysilanes (25, 26). It has been demonstrated that in the presence of a methoxy compound, where M is a metal, and under moderate pressure, substantial improvements in yield can be achieved (27).

$$\mathrm{Si + 4\,ROH \xrightarrow[Si(OR)_4]{Fe,\ CH_3OM} Si(OR)_4 + 2\,H_2}$$

The synthesis of triethoxysilane (28) and trimethoxysilane (29) has also been achieved by direct process. In 1980 there were no direct processes for the production of alkoxysilanes. In 1995 Silbond in Weston, Michigan, and Carboline in St. Louis, Missouri, operated processes for the production of tetraethoxysilane in the United States, and OSi/Witco announced start-up of a process to produce triethoxysilane and tetraethoxysilane in Termoli, Italy.

Apart from the direct action of an alcohol on a chlorosilane or silicon, the only other commercial method used to prepare alkoxysilanes is transesterification.

$$\mathrm{Si(OR)_4 + 4\,R'OH \underset{}{\overset{catalyst}{\rightleftharpoons}} Si(OR')_4 + 4\,ROH}$$

Transesterification, an equilibrium reaction, is practical only when the alcohol to be esterified has a high boiling point and the leaving alcohol can be removed by distillation. The most widely used catalysts are sodium alcoholates and organic titanates, although amines are also used (30, 31).

A provocative reaction of ethylene glycol directly with silicon dioxide that leads to a complex mixture of oligomeric and cyclic ester species has been reported (32). This reaction proceeds in the presence of sodium hydroxide or in the presence of high boiling tertiary amines (33).

Other preparative methods for alkoxysilanes, in approximate order of declining utility, are given by the following equations (34–40):

$$\mathrm{\equiv SiCl + (RO)_3CH \longrightarrow \equiv SiOR + RCl + RC(=O)H}$$

$$\mathrm{\equiv SiCl + NaOR \longrightarrow \equiv SiOR + NaCl}$$

$$\mathrm{\equiv SiH + HOR \xrightarrow{catalyst} \equiv SiOR + H_2}$$

$$\mathrm{\equiv SiCl + RCH\!\overset{O}{-\!-}\!CH_2 \longrightarrow \equiv SiOCH_2CH(Cl)R}$$

$$\mathrm{\equiv SiOH + HOR \longrightarrow \equiv SiOR + H_2O}$$

$$\mathrm{\equiv SiCl + CH_3NO_2 \longrightarrow \equiv SiOCH_3 + NO_2Cl}$$

$$\mathrm{\equiv SiSR + HOR \longrightarrow \equiv SiOR + H_2S}$$

The acyloxysilanes are produced by the reaction of an anhydride and a chlorosilane.

$$\mathrm{SiCl_4 + 4\,(RC(=O))_2O \longrightarrow Si(OC(=O)R)_4 + 4\,RC(=O)Cl}$$

The analogous reaction between anhydrides and alkoxysilanes also produces acyloxysilanes. The direct reaction of acids with chlorosilanes does not cleanly lead to full substitution. Commercial production of methyltriacetoxysilane directly from methyltrichlorosilane and acetic acid has been made possible by the addition of small amounts of acetic anhydride or EDTA, or acceptance of dimethyltetraacetoxydisiloxane in the final room temperature vulcanizing (RTV) application (41–43). A reaction that leads to the formation of acyloxysilanes is the interaction of acid chlorides with silylamides.

Toxicity

The alkoxysilanes generally have a low order of toxicity, which may be associated with their alcoholic products of hydrolysis. Notable exceptions are tetramethoxysilane and two hydridosilanes, trimethoxysilane and triethoxysilane. Triethoxymethoxysilane is the lowest member of the series in which the hazard is substantially reduced. Vapors of these materials may be absorbed directly into corneal tissue, causing blindness (44). The onset of corneal damage is noted by a scratchy feeling in the eyes, usually 2–4 h after exposure. The effects of exposure to the methoxysilanes are rarely reversible. This is a significant consideration for worker safety. Especially because of the pleasant minty or fruity fragrance, warnings of exposure to silicon esters are frequently ignored.

Uses

Precision Casting

The ethoxysilanes are used as binders in precision casting for investment and thin-shell processing (45–47). Ethylsilicate 40 and its partial hydrolysates are preponderant. In the investment process, 3–10% excess water is added to a prehydrolyzed silicate binder. This is mixed with refractory material. If the refractory material contains magnesium oxide or calcium hydroxide, gelation occurs in 40–60 min. If these additives are not present or an accelerated cure is required, catalysts are added to the binder prior to mixing with the refractory. In the thin-shell process, fusible patterns are dipped into slurries made of a refractory and ethylsilicate binder. Curing is accomplished by air drying or exposure to ammonia vapor. Ethanol from hydrolysis is either allowed to evaporate or is burned off before firing. The utilization of silicate esters has diminished since the 1980s, owing to their partial replacement by colloidal silicas.

Cements and Ceramics

Refractory cements and ceramics (qv) are prepared from slurries of silica, zirconia, alumina, or magnesia and a prehydrolyzed silicate (see Cement). Calcining at 1000°C yields cured refractory shapes (48, 49).

Glass Frosting

Deposition of silicon dioxide is used to impart a translucent coating on glass (qv) (50). The surfaces are either exposed to tetraethoxysilane or tetramethoxysilane under high moisture conditions, or the alkoxysilanes are ignited and the resulting powder is applied to the surface.

Paints and Coatings

Ethoxysilanes are used in high temperature, zinc-rich paints (see Paint) (51, 52). Methyl- and phenyltrialkoxysilanes are used to prepare abrasion-resistant coatings for plastics (53), particularly polycarbonate (54, 55), and dielectric coatings and seals for high voltage electrical components, including television tubes.

Sol–Gel Glasses and Ceramics

Although sol–gel is actually a process, not a product, several classes of materials are associated with the sol–gel process. Sol–gel-derived materials include fine powders, coatings and monoliths, and aerogels (qv). Sol–gel-derived powders are produced by the Stöber process (56) and variations of it. The products are used in catalysis and chromatography. Unmodified silica coatings are employed in the preparation of ion-free coatings on glass used in liquid crystal displays (LCDs), coatings for eyewear, and industrial and automotive plastic glazing. Small-diameter lenses and gradient index (GRIN) optics are in commercial development, as of 1996. Aerogels derived from tetraethoxysilane have extremely great potential as insulating materials. BASF has introduced a product based on this technology called Basogel.

Water Repellents

Protective and consolidating coatings for masonry and other applications are produced from methyl-, propyl-, isobutyl-, and octyltrialkoxysilanes (57). Applications for these materials are in two principal markets: vertical, i.e. buildings; and horizontal, i.e. bridge decks, parking garages, etc. Performance characteristics such as substrate penetration often make use of lower alkyltrialkoxysilanes, important where salt penetration is a concern. A water repellent based on isobutyltrimethoxysilane is marketed under the trade name of Chem-Trete by Hüls. The ability of longer alkyls to form stable emulsions makes them preferred for cost and safety (58). A product based on octyltriethoxysilane is marketed under the trade name Enviroseal by Harris Specialty Chemical.

Bonded Phases

Substrate-bond hydrocarbon coatings for high pressure liquid chromatography (HPLC) and flash chromatography are prepared from octyltrialkoxysilanes and other long-chain alkyltrialkoxysilanes (see Chromatography).

Hydraulic and Heat-Transfer Fluids

Hydraulic fluids (qv) for high altitude supersonic aircraft and thermal exchange applications including solar panels employ fluids such as tetrakis(2-ethylhexoxy)silane. These products have been marketed under the trade name Coolanol by Monsanto.

Silicone Room Temperature Vulcanizing Cross-Linking

Condensation-cured polydimethylsiloxanes contain terminal silanol groups which condense with the silanols produced by ambient moisture hydrolysis of acyloxysilanes. Methyltriacetoxysilane, ethyltriacetoxysilane, and tetraacetoxysilane are the most commonly used cross-linking agents.

Spin-On Glass

In microelectronic applications, films of silicon dioxide are deposited on silicon substrates by the application of a partially hydrolyzed solution of tetraethoxysilane or methyltriethoxysilane (59, 60). A product based on this technology is marketed under the name Accuspin by AlliedSignal.

Chemical Vapor Deposition

Chemical vapor deposition (CVD) of silicon dioxide from tetraethoxysilane assisted by the presence of oxygen and a plasma is an important technology for the deposition of pure and modified dielectrics for microelectronics (61). An alternative method for the deposition of silicon dioxide utilizes di-*t*-butoxydiacetoxysilane (62).

Bibliography

"Silicon Esters and Ethers" under "Silicon Compounds" in *ECT* 1st ed., Vol. 12, pp. 371–372, by E. G. Rochow, Harvard University; in *ECT* 2nd ed., Vol. 18, pp. 216–221, by A. R. Anderson, Anderson Development Co.; in *ECT* 3rd ed., Vol. 20, pp. 912–921, by B. Arkles, Petrarch Systems, Inc.

Related Articles

Silicon Compounds, Silanes; Silicones; Heat-Exchange Technology; Paint

References

1. B. Arkles, *Silicon, Germanium, Tin, and Lead Compounds: A Survey of Properties and Chemistry*, Gelest, Inc., Tullytown, Pa., 1995.
2. N. Sax and R. Lewis, *Dangerous Properties of Industrial Materials*, Van Nostrand Reinhold Co., Inc., New York, 1989.
3. M. G. Voronkov, in G. Bendz and I. Lindqvist, eds., *Biochemistry of Silicon and Related Problems*, Plenum Publishing Corp., New York, 1977, p. 395.
4. B. Arkles, R. Anderson, and K. King, *Organometallics* **2**, 454 (1983).
5. J. F. Brown Jr., *J. Am. Chem. Soc.* **87**, 4317 (1965).
6. P. Cagle and co-workers, in B. Zelinski and co-workers, eds., *Better Ceramics Through Chemistry IV, MRS Proc. 180*, 1990, p. 961.
7. F. Feher, D. Newman, and J. Walzer, *J. Am. Chem. Soc.* **111**, 1741 (1989).
8. B. D. Kay and R. A. Assink, *J. Non Cryst. Sol.* **104**, 112 (1988).
9. B. Arkles, J. Steinmetz, J. Zazyczny, and P. Mehta in K. L. Mittal, ed., *Silanes & Other Coupling Agents*, VSP, 1993, p. 91.
10. Technical data, Gelest, Inc., Tullytown, Pa., 1992.
11. U.S. Pat. 2,550,923 (May 1, 1951), C. Shaw, J. E. Hocksford, and W. E. Smith (to Shaw and Langish-Smith); U.S. Pat. 2,795,022 (June 11, 1957), N. Shaw (to Shaw Process).
12. H. G. Emblem and T. R. Turger, *Trans. Br. Ceram. Soc.* **78**(5), 1979.
13. C. J. Brinker, G. W. Scherer, *Sol-Gel Science*, Academic Press, Orlando, Fla., 1990.
14. U.S. Pat. 4,950,779 (Aug. 21, 1990), J. H. Wengrovius and V. M. VanValkenburgh (to General Electric).
15. U.S. Pat. 5,441,718 (Aug. 15, 1995), K. Sharp (to E. I. du Pont de Nemours & Co., Inc.).
16. S. Acosta and co-workers, in S. Acosta and co-workers, *Better Ceramics Through Chemistry VI, MRS Proc. 346*, 1994, p. 43.
17. E. L. Warrick, O. R. Pierce, K. E. Polmanteer, and J. C. Saam, *Rubber Chem. Tech. Revs.* **52**, 437 (1979).
18. B. Arkles, in G. Silverman and P. Rackita, eds., *Grignard Reagents*, Marcel Dekker, New York, 1996, p. 667.
19. R. C. Mehrotra, V. D. Gupta, and G. Srivastiva, *Rev. Silicon, Germanium, Tin Lead Comp.* **1**, 299 (1975).
20. M. G. Voronkov, V. P. Mileshevich, and Yu. A. Yuzhelevski, *The Siloxane Bond*, Plenum Publishing Corp., New York,1978.
21. J. Von Ebelman, *Ann. Chem.* **57**, 319 (1846).
22. V. G. Ukhtomshii, *Izv. Vyssh. Ucheb. Zaved. Khim. Khim. Tekhnol.*, **19**(7), 146 (1976).
23. U.S. Pat. 2,473,260 (June 26, 1946), E. G. Rochow (to General Electric).
24. U.S. Pat. 3,072,700 (Jan. 8, 1963), N. de Wit (to Union Carbide).
25. B. Kanner and K. M. Lewis, in K. M. Lewis and D. G. Rethwisch, eds., *Catalyzed Direct Reactions of Silicon*, Elsevier Science, Inc., New York, 1993, p. 39.
26. U.S. Pat. 4,323,690 (Apr. 6, 1982), J. F. Montle, H. J. Markowsi, P. D. Lodewyck, and D. F. Schneider (to Carboline).
27. U.S. Pat. 4,113,761 (Sept. 12, 1978), G. Kreuzberg, A. Lenz, and W. Rogher (to Dynamit Nobel).
28. Jpn. Kokai Tokkyo Koho 80 28,929 (Feb. 29, 1980), S. Suzuki, T. Imaki, and T. Yamamura (to Mitsubishi).
29. U.S. Pat. 5,084,590 (Jan. 28, 1992), J. S. Ritscher and T. E. Childress (to Union Carbide).
30. P. D. George and J. R. Ladd, *J. Am. Chem. Soc.* **75**, 987 (1953).
31. H. Steimann, G. Tschernko, and H. Hamann, *Z. Chem.* **17**, 89 (1977).
32. R. M. Laine, *Nature* **353**, 640 (1991).
33. R. M. Laine, *Chem. Mat.* **6**, 2177 (1994).
34. L. M. Shore, *J. Am. Chem. Soc.* **76**, 1390 (1959).
35. U.S. Pat. 2,381,137 (May 14, 1942), W. I. Patnode and R. O. Sauer (to General Electric).
36. D. Seyferth and E. G. Rochow, *J. Org. Chem.* **20**, 250 (1955).
37. V. Day, W. Klemperer, V. Mainz, and D. Millar, *J. Am. Chem. Soc.* **107**, 8262 (1985).
38. A. Weiss and G. Reiff, *Z. Anorg. Allg. Chem.* **311**, 151 (1961).
39. M. E. Havill, I. Jofee, and H. W. Post, *J. Org. Chem.* **13**, 280 (1948).
40. U.S. Pats. 2,569,455 and 2,459,746 (1949), J. B. Culbertson, H. D. Erasmus, and F. M. Fowler (to Union Carbide).
41. U.S. Pat. 3,9784,198 (Aug. 10, 1976), B. Ashby (to General Electric).
42. U.S. Pat. 4,329,484, L. P. Peterson (to General Electric).

43. U.S. Pat. 4,332,956 (June 1, 1982), L. A. Tolentino (to General Electric).

44. H. F. Smith, *The Effect of Tetramethylorthosilicate on the Eyes*, Carbide and Carbon Chemicals Industrial Fellowship 274-1, Mellon Institute, Pittsburgh, Pa.

45. A. Dunlop, *Foundry Trade J.* **75**, 107 (1945).

46. A. E. Focke, *Met. Prog.* **49**, 489 (1945).

47. U.S. Pat. 2,678,282 (May 11, 1954), C. Jones (to Pilkington Bros. Ltd.).

48. H. G. Emblem and I. R. Walters, *J. Appl. Chem., Biotechnol.* **27**, 618 (1977).

49. U.S. Pat. 2,678,282 (May 11, 1954), C. Jones (to Pilkington Bros. Ltd.).

50. U.S. Pat. 2,596,896 (Mar. 20, 1951), M. Pipken (to General Electric).

51. U.S. Pat. 3,056,684 (Oct. 11, 1962), S. L. Lopata (to Carboline).

52. D. M. Berger, *Met. Finishing* **72**(4), 27 (1979).

53. U.S. Pat. 4,197,230 (Apr. 8, 1980), R. H. Baney and L. A. Harris (to Dow Corning).

54. U.S. Pat. 4,495,360 (Jan. 22, 1985), B. T. Anthony (to General Electric).

55. U.S. Pat. 4,491,508 (Jan. 1, 1985), D. R. Olson and K. K. Webb (to General Electric).

56. W. Stöber and co-workers, *J. Coll. Interface Sci.* **26**, 62 (1968).

57. U.S. Pat. 2,916,461 (Dec. 8, 1959), K. W. Krantz (to General Electric).

58. U.S. Pat. 4,648,904 (Mar. 10, 1987), R. Depasquale and M. Wilson (to SCM).

59. U.S. Pat. 3,915,766 (Oct. 28, 1975), G. F. Pollack and J. G. Fish (to Texas Instruments).

60. U.S. Pat. 4,103,065 (July 25, 1978), D. Gagnon (to Owens-Illinois).

61. S. Fisher and co-workers, *Solid State Technol.*, 55 (Sept. 1993).

62. G. Smolinsky and R. Dean, *Mat. Lett.* **4**, 256 (1986).

Polysilanes: Dehydrocoupling of Hydrosilanes

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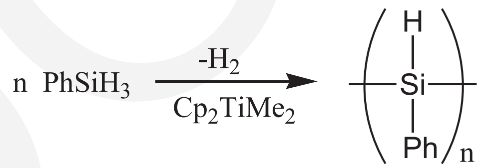
Introduction

Organic polymers mainly consist of carbon (group 14) atoms linked together or separated by heteroatoms such as oxygen or nitrogen.[1] Most of them seldom decompose in nature and tend to and burn with the release of toxic chemicals, leading to serious environmental pollution and fatal damage. Furthermore, the availability of raw materials for organic polymers is limited by the expected shortage of petroleum/coal natural resources.[2] Main group metal-containing and transition metal-containing inorganic polymers have been heavily reviewed by many authors[3] and are beyond the scope of this article. Main group metalloid-containing inorganic polymers possessing unusual properties are made up of mainly boron (group 13), silicon/germanium/tin (group 14), phosphorous (group 15), and sulfur (group 16) atoms, which do not originate from petroleum/coal resources.[1b,2] In particular, silicon-based polymers exhibit quite unusual properties as advanced specialty materials.[4]

For the heavier elements in group 14 the formation of D-D bonds to produce a long chain polymer has proven to be difficult because stable unsaturated D=D species, analogues of vinyl compounds, can be prepared only in the combination with sterically bulky substituents, which deter their polymerization.[1,4-6] Wurtz-type coupling of dichlorosilanes using an alkali metal dispersion has widely been used in industry, but is very problematic. As an alternative, dehydrocoupling of hydrosilanes to polysilanes is a useful synthetic route. Hydrosilanes possess an Si-H bond (bond energy of 320 kJ/mole) that is more reactive than the C-H bond of hydrocarbons (bond energy of 416 kJ/mol).[7] This article mainly describes some of the recent advances that have been made by us with respect to silicon-based polymers prepared by the dehydrocoupling of hydrosilanes.

Linear-Selective Dehydrocoupling of Hydrosilanes to Polysilanes

Polysilanes are used for many applications in ceramics/composites, photoelectronics, photoresistors, and nonlinear optics.[8,9] The peculiar optoelectronic properties of polysilanes are due to sigma-conjugation of the silicon atoms in the polymer chain, varying with the molecular weight, conformation, and substituents of the polymer.[10a] Wurtz-type coupling of dihalosilanes with an alkali metal dispersion in toluene or xylene at reflux temperature has some serious problems: (1) intolerance of certain reducible functional groups, (2) lack of reproducibility from the heterogeneous reaction medium, and (3) limitations in control of the stereochemistry and molecular weight distribution. Some improvements have been made by tuning several factors under ultrasonic activation.[10b] As an alternative, the catalytic dehydrocoupling of hydrosilanes, mediated by transition metal group 4 metallocene such as dimethyltitanocene or dimethylzirconocene, was first reported by Harrod and coworkers (eq. 1).



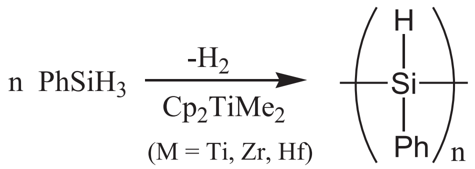
(1)

The dehydrocoupling of hydrosilanes generally produces a mixture of linear polysilanes and cyclic oligosilanes, leading to the decrease of polymer molecular weights and improper molecular weight distribution. Several studies to improve the situation were made with great efforts by many researchers worldwide.[11-13] For the selective production of linear polysilane the careful design of new group 4 metallocene-based catalyst systems is important with proper tuning of other factors such as addition rate/order of reagents, reaction temperature, among others.[12a] Linear (high molecular weight) polysilanes can be used as precursors for making functional polysilanes by introducing useful functional groups on the silicon atoms of linear polysilane backbone. The Tilley group reported the synthesis of high molecular weight polyphenylsilanes with number-average molecular weight (M_n) of *ca*. 5300 and 4700 g/mol through the careful control of the reaction conditions of the phenylsilane dehydrocoupling using zirconocene-based catalysts.[12a,14] The Tanaka[15] and Harrod[16] groups also prepared polyphenylsilanes with M_n of *ca*. 4600 and 7300 g/mol, respectively, from the dehydrocoupling of phenylsilane by using the zirconocene-based combination catalysts of

$[Me_2N(CH_2)_3\text{-}H_4C_5](Me_5C_5)ZrCl_2/2MeLi$ and
$Cp(Me_5C_5)ZrCl_2/2n\text{-}BuLi/(C_6F_5)_3B$, respectively.

A comprehensive survey of the catalytic dehydrocoupling of hydrosilanes under the influence of a wide range of early and late transition metal complexes was recently provided by Corey.[13b]

Woo and co-workers recently developed a facile, highly linear-selective dehydrocoupling catalyst system of phenylsilane: Cp'_2MCl_2/Hydride ($Cp' = C_5H_5$ or C_5Me_5; M = Ti, Zr, Hf; Hydride = Red-Al, Selectride, Super Hydride) combination catalysts (eq. 2).[11, 17]


(2)

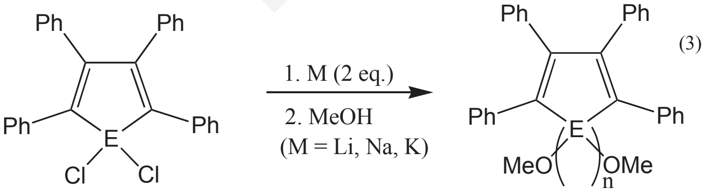
Woo's in-situ catalyst system of Cp'_2MCl_2/Hydride is different from the catalyst systems using Cp'_2MCl_2/2RLi of Corey, Tanaka, and Harrod. True catalytic species in the dehydrocoupling of hydrosilanes could be a metallocene-based hydride according to the sigma-bond metathesis mechanism.[12,13b] Inorganic hydrides effectively can produce a metallocene hydride by Cl/H metathesis between inorganic hydride and metallocene dichloride whereas two alkyllithiums produce a metallocene hydride *via* a complex process (*e.g.*, reductive elimination of metallocene alkyls or reaction with hydrosilane after Cl/R metathesis). No appreciable induction period is observed for the Cp'_2MCl_2/Hydride combination catalyst. For Cp'_2TiCl_2/Hydride combination catalyst the molecular weight distributions measured from the GPC traces were bimodal, indicating the presence of linear polysilanes and cyclic oligosilanes. The formation of cyclic oligosilanes can be estimated by integration of the GPC peaks. The peaks corresponding to SiH in the ^{1}H NMR spectrum can visually be separated as linear polysilane (δ 4.2 ~ 4.8 ppm range) and cyclic oligosilane (δ 4.9 ~ 5.3 ppm range). The formation of the cyclic oligosilanes can be also estimated by integration of the ^{1}H NMR peaks, and is used as a means of cross-checking the cyclic/linear ratio. Woo *et al.* also examined the other group 4 metallocene-based combination catalysts for the dehydrocoupling of phenylsilane under various reaction conditions. The dehydrocoupling of phenylsilane with Cp'_2MCl_2/Red-Al (M = Zr, Hf) combination catalysts rapidly produces mainly linear polyphenylsilanes. The linear selectivity increases in the order: Cp_2Ti (64%) < Cp_2Zr (92%) < $Cp(C_5Me_5)Zr$ (95%) < Cp_2Hf (99%) < $Cp(C_5Me_5)Hf$ (<99%).[17b] The higher linear-selectivity of the hafnocene relative to the zirconocene is likely due to the lower intrinsic dehydrocoupling activity (originating from stronger Hf-H and Hf-Si bond strengths). The lower linear-selectivity of titanocene relative to zirconocene and hafnocene is due probably to the combined effect of greater intrinsic dehydrocoupling activity (stemming from much weaker Ti-H and Ti-Si bond strengths) and much smaller atomic size (overriding steric crowding around the metal center) of Ti.[18] The change in linear selectivity is more pronounced than in other catalytic combination systems: Cp_2TiCl_2/2MeLi (55%) < Cp_2ZrCl_2/2MeLi (75%), Cp_2TiCl_2/2*n*-BuLi (75%) < $Cp(C_5Me_5)ZrCl_2$/2*n*-BuLi (80%) < Cp_2HfCl_2/2MeLi (85%).[16,18] The coordinating environment around the metal center of the Cp_2MCl_2/Red-Al combination catalysts could be different from other catalytic systems such as Cp_2MCl_2/2R'Li.[14,15,18,20] Red (or Vitride; sodium bis(2-methoxyethoxy)aluminum hydride; $Na[H_2Al(OCH_2CH_2OMe)_2]$, soluble in toluene and commercially available) will be stoichiometrically converted into $Na[Cl_2Al(OCH_2CH_2OMe)_2]$ after reacting with dichloro-metallocene. The coordinating structure of the present catalytic system could be similar to the zwitterionic structure in the Cp_2ZrCl_2/2*n*-BuLi/$(C_6F_5)_3B$ catalytic system.[16,19] The $Na[Cl_2Al(OCH_2CH_2OMe)_2]$ moiety may influence by simply coordinating to the metal through an H, Cl-bridge or H, OMe-bridge between the group 4 metal and Al metal. The favorable steric demands imposed by the Cp ring and cocatalyst moiety could prevent the formation of the inactive dimer of metallocene hydride and could suppress the cyclic oligomer formation by chain scission reaction as well, leading to greater chain elongation.[15, 16] However, an overriding steric demand results in low dehydrocoupling activity. The order of dehydrocoupling activity for the various zirconocenes turned out to be the same as the sequence of Tilley[12] and Harrod[16]: $(C_5Me_5)_2Zr$ << Cp_2Zr < $Cp(C_5Me_5)Zr$. The $(C_5Me_5)_2ZrCl_2$/Red-Al combination catalyst thus slowly produces a mixture of dimer, trimer, and tetramer. In addition, the order of linear-selectivity for the dehydrocoupling of phenylsilane catalyzed by hydrides with Cp_2ZrCl_2 was found to be Super Hydride (82%) < N-Selectride (88%) < Red-Al (92%).[17c] The dehydrocoupling of $PhCH_2SiH_3$ yields only low-molecular weight oligomers since an alkylsilane is generally less reactive than an arylsilane.[20] The molecular weights of polymers increase with higher catalyst concentration (1 mol% *versus* 5 mol%), but it is little affected by longer reaction times (1 day *versus* 5 days).[17b] As expected, linear selectivity and molecular weights decrease with adding solvent and with heating, which was similarly observed in other catalytic systems.[12a,16] The reason could be because dilution and heating could hamper the tight coordination of the $Na[Cl_2Al(OCH_2CH_2OMe)_2]$ moiety to the metal center. The proper coordination of the aluminium moiety to the catalyst center should be necessary for the linear selectivity. Linear selectivity and molecular weights decrease drastically by adding 4 Å molecular sieve (MS 4Å). The interaction of $Na[Cl_2Al(OCH_2CH_2OMe)_2]$ moiety with MS 4Å might prevent the close coordination of $Na[Cl_2Al(OCH_2CH_2OMe)_2]$ moiety to the metal center.[17b] An exact molar ratio of Red-Al to dichlorometallocene is necessary to replace both chlorines to attain high reactivity. The inactivity observed for higher molar ratios of Red-Al to dichlorometallocene could be attributed to over-complexation of Red-Al moieties to the metal, blocking the empty coordination site necessary for the dehydrocoupling of silane.[18] The poor activity is observed for lower molar ratios of Red-Al to dichlorometallocene. All the experimental results described above firmly suggest that better catalysts affording higher linear-selectivity and higher-molecular-weight polymer can be properly designed by tuning the steric and electronic character of the catalyst environment, including metal, ligand and co-catalyst moieties.

It is interesting to note that the dehydrocoupling of *p*-fluorophenylsilane using Cp_2ZrCl_2/Red-Al produced soluble armophous polysilane (*ca.* 75%) and sparingly-soluble crystalline polysilane (*ca.* 25%) in toluene and chloroform. The two polysilanes are soluble in THF and pyridine. In comparison, the dehydrocoupling of *p*-fluorophenylsilane using Cp_2TiCl_2/Red-Al gives soluble polysilane only.[17c] The crystalline polysilane may have interactions[17b] in the polymer molecules either between Si and F or between the F and the phenyl ring. Molecular Orbial calculations favors the first of these interactions.

Linear high molecular weight polysilanes can be used as precursors for making functional polysilanes by introducing functional groups on the linear polysilane. The Si-H bonds in the backbone chain of poly(hydrophenylsilane) are transformed to Si-Cl bonds using a mild chlorinating reagent, CCl_4. The Si-Cl bonds in the poly(chlorophenylsilane) can be replaced by various nucleophiles such as cyclopropyl, epoxy, aziridinyl, pyridyl, bipyridyl, phosphinyl, poly(ethylene oxide), thiol, etc. to give new functional polymers which can be used for applications in sensors, ion-exchange resins, batteries, drug delivery, metal nanomaterials preparation, etc.[17e]

Homodehydrocoupling and Codehydrocoupling of 1,1-Dihydrotetraphenylsilole and 1,1-Dihydrotetraphenylgermole to Electroluminescent Polymers

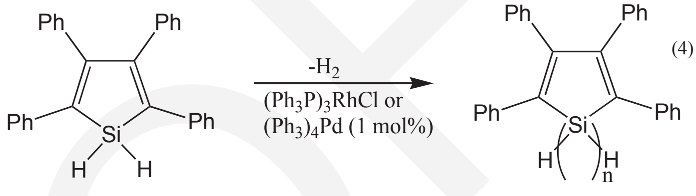
Polysilanes[21-23] having low oxidation potentials and a high-lying HOMO display interesting optoelectronic properties due to sigma-conjugation along the silicon backbone chain in the polymer.[10,24] Siloles (silacyclopentadienes), with low reduction potential and low-lying LUMO's, have attracted considerable attention because of their unusual electronic properties.[25, 26] They can be used as electron-transporting materials in devices.[27] A silole does not luminesce in diluted solution but does luminesce in concentrated solution, implying that polysiloles could exhibit different luminescent behavior from that of monomeric siloles.[25] Polysiloles, which are expected to have hybrid properties of polysilanes and siloles by nature in the structure, can be prepared by 1,1- or 2,5-coupling reactions of siloles using various synthetic coupling methods.[28] Electroluminescent poly(silole-*co*-silane) s have also been synthesized in several laboratories.[29] West *et al.* reported the synthesis of polysiloles and polygermole (M_w *ca.* 5200-5700 g/mol) that have methoxy end groups in 30-37% yield by heterogeneous Wurtz 1,1-dehydrocoupling of 1,1-dichlorotetraphenylsilole with 2.0 equivalents of Li, Na, K metal in refluxing THF for 3 days (eq. 3).[28a]



E = Si, Ge

Tamao and collaborators had earlier reported the Wurtz coupling synthesis of polysiloles.[28d]

As an alternative to the Wurtz coupling of 1,1-dichlorosilole, the homogeneous dehydrocoupling methodology was demonstrated in Tanaka's earlier report of the dehydrocoupling synthesis of poly(dibenzosilole).[30a] Trogler and co-workers recently reported the 1,1-dehydrocoupling of 1,1-dihydrotetraphenylsilole (**1**) to an electroluminescent polysilole (**2**) (M_w *ca.* 4000-6000 g/mol), having hydrogen end groups, in high yield 80-90% yield using 1 mol% of the late transition metal complexes $[(Ph_3P)_3RhCl$ and $(Ph_3P)_4Pd]$ as catalysts (eq. 4).[29b,30b]



1 **2**

Similarly, Woo and co-workers prepared **2** (M_w *ca.* 5500-6200 g/mol) in > 95% yield by dehydrocoupling of **1** using $[RhCl(COD)_2]_2$ and $Pt(PMe_3)_4$ as catalyst (eq. 5).[31]

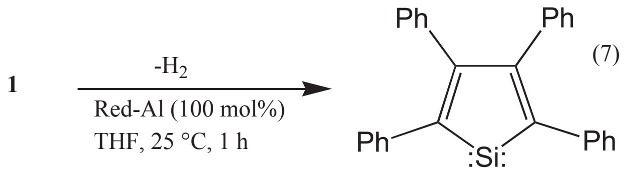
$$\mathbf{1} \xrightarrow[\text{[RhCl(cod)}_2]_2 \text{ or } Pt(PMe_3)_4 \text{ (1 mol\%)}]{-H_2} \mathbf{2} \qquad (5)$$

The same authors also synthesized poly(tetraphenylgermole) (M_w *ca.* 5800-6500 g/mol) in > 92% yield by dehydrocoupling of 1,1-dihydrotetraphenylgermole using the same catalysts. The UV-vis spectrum of poly(tetraphenylgermole) shows an absorption at 377 nm, which is assignable to both the σ-σ^* transition of the Ge-Ge backbone chain and π-π^* transition of the germole ring. The polygermole is intensively photoluminescent, emitting green light at 487 nm.[31] The hydrogen end groups of the polysiloles and polygermoles are then transformed to other useful functional groups by various chemical reactions in usual manner.[31]

As an alternative to the heterogeneous Wurtz reductive coupling of dichlorosilole and the homogeneous late-transition-metal-complex-catalyzed dehydrocouplig of **1**, Woo *et al.* also synthesized **2** in high yield by homogeneous dehydrocoupling of **1** under mild conditions, catalyzed with inorganic hydrides such as Selectrides $\{MB[CH(CH_3)C_2H_5]_3H$; M = Li, Na, K}, Red-Al $\{Na[H_2Al(OCH_2CH_2OCH_3)_2]\}$, and Super-Hydride $[LiB(C_2H_5)_3H]$ as shown in eq. 6.[32a,b]

$$\mathbf{1} \xrightarrow[\text{< 50 mol\% of hydride, THF, 25 °C, 24 h}]{-H_2} \mathbf{2} \qquad (6)$$

Dehydrocoupling of **1** catalyzed by < 50mol% (*i.e.*, M-H/Si-H ≤ 0.5) of Red-Al yielded **2** as light yellow powders. Polymers with molecular weights (M_w) of 4600 and 4100 g/mol were isolated in 86% and 78% yields when 15 mol% and 50 mol% of Red-Al were used, respectively. Polymer yields and molecular weights when 15 mol% of Red-Al was used were higher compared to polymers obtained when 50 mol% of Red-Al was used. Products from the reaction of **1** with 15 mol%. 25 mol%, and 50 mol% Red-Al were separated by preparative GPC and were characterized by NMR spectroscopy. Shorter oligomers such as silole dimer or trimer were not found in products. However, when 100 mol% of Red-Al (*i.e.*, M-H/Si-H = 1) was used, the formation of silole dianion **3**[33] was observed without forming **2** (eq. 7).



In a similar manner, the dehydrocoupling of **1** using 15 mol% of Selectrides and Super-Hydride at 25 °C for 24 hours produces **2** in 77-78% isolated yield. The molecular weight (M_w) and polydispersity index (PDI) of all the polysiloles are in the range of 4300-5800 g/mol and 1.1-1.2, respectively. Polymerization yield and polymer molecular weight increased in the order: L-Selectride < N-Selectride < K-Selectride. This trend appears to be closely related to the ionic character of the Selectrides. The polymerization yields were almost equal for Red-Al, K-Selectride, and Super-Hydride, but the molecular weight increased in the order: Red-Al < K-Selectride < Super-Hydride. Like the polysiloles prepared by West and co-workers,[28a] these polysiloles have a characteristic UV absorption around 300 nm, assigned to the σ-σ* transition of the Si-Si backbone chain. They are photoluminescent, emitting green light at 520 nm when the excitation is at 330 nm. These polysiloles are strongly electroluminescent around 520 nm. The similar dehydrocoupling of 1,1-dihydrotetraphenylgermole with the hydrides produced polygermole in high yield. Furthermore the *co*-dehydrocoupling of **1** and 1,1-dihydrotetraphenylgermole (with varying the mixing mole ratio) with the hydrides produced poly(silole-*co*-germole)s in high yield.[31]

For the dehydrocoupling reaction of **1** to **2**, K-Selectride and Super-Hydride were the most active catalysts examined. **2** also can be prepared in high yield directly from the reaction of 1,1-dichlorotetraphenylsilole instead of **1** in the presence of < 1.5 equiv of Red-Al (instead of < 0.5 equiv).[32c] Unlike in the case of late-transition-metal-complex-catalyzed dehydrocoupling (generally proceeded by oxidative addition/reductive elimination processes),[30,31] catalysis for the conversion of **1** to **2** by early transition metallocenes, Cp_2MCl_2/Red-Al (M = Ti, Zr, Hf)[17] is ineffective in the dehydrocoupling of **1** because **1** is sterically demanding, considering that steric effect is a dominant factor in the four-centered transition state in the sigma-bond metathesis mechanism.[12] The Woo group proposed a mechanism involving the preferential attack of a hydride ion on either the silicon atom or silole ring of **1** to form an activated anionic intermediate such as a pentacoordinated sigma-complex or pi-complex (Figure 1).[32]

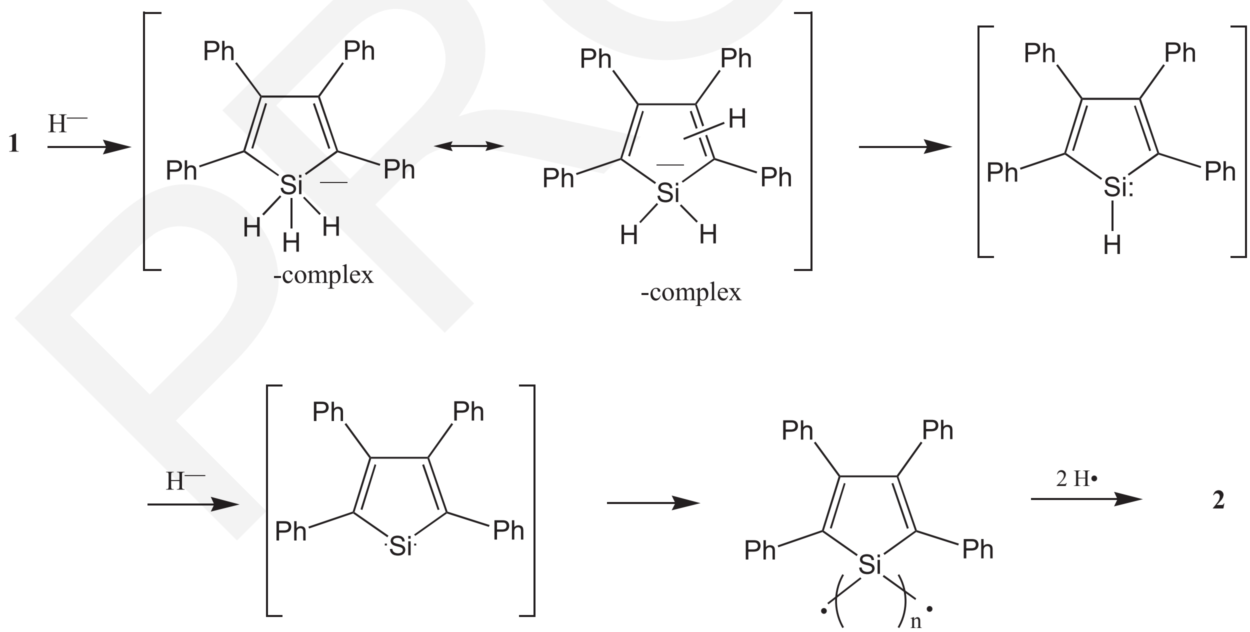


Figure 1. Possible mechanism for the formation of polysilole **2** from the dehydrocoupling of **1**.

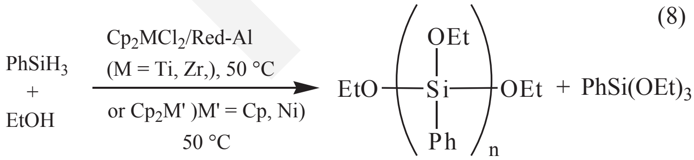
The activated anionic intermediate could lose both a dihydrogen molecule and a hydride ion (this hydride may participate again in the catalytic cycle) sequentially to form a silylene type of silole. If the activated anionic intermediate accepts another hydride ion, a silole dianion **3** will be formed by losing two dihydrogen molecules. The silylene type of silole will then either self-couple or keep inserting into the Si-H bond of **1**, forming **2**. For the homodehydrocoupling of 1,1-dihydrogermole to polygermole or *co*-dehydrocoupling of 1,1-dihydrogermole with 1,1-dihydrosilole to poly(silole-*co*-germole)s the same mechanism in Figure 1 should be applied.

Si-O/Si-Si Dehydrocoupling of Hydrosilane with Alcohol to Poly(alkoxysilane)s

A wide range of catalysts (e.g., acids, bases, and homogeneous/heterogeneous transition metal catalysts) have been used for the Si-O dehydrocoupling of alcohols with silanes.[13a,34,35a] The Si-O dehydrocoupling of bis-hydrosilanes with diols, catalyzed by rhodium complex, yielding polysiloxanes was reported.[35b,c] The Si-S dehydrocoupling of hydrosilanes with dithiols to produce polysilathianes was also reported.[35d] Si-Si dehydrocoupling of hydrosilanes with late transition metal complex catalysts produces a mixture of oligomers along with significant amounts of disproportionated by-products.[13b] Harrod *et al.* reviewed the recent dehydrocoupling of hydrosilanes with alcohols.[11] The transition metal complexes of group VIII (Ni, Co, Rh, Pd, Ir, Pt, etc.) have been extensively used in the catalytic dehydrocoupling of hydrosilanes with various nucleophilic reagents.[36] A recent survey written by Corey on the catalytic dehydrocoupling of hydrosilanes in the presence of a range of early and late transition metal complexes has appeared.[13b]

Numerous studies were reported either on the alcoholysis of hydrosilanes (i.e., Si-O coupling) or on the dehydropolymerization of silanes (i.e., Si-Si coupling) under the influence of various transition metal complex catalysts.[13,34,35a-c,36] Poly(alkoxysilane)s can be used as important precursors for preparing interesting polysilane-siloxane hybrids by sol-gel methods in the presence of an acid/base catalyst in the reverse micellar environment.[37a] Woo and co-workers first described the combinative Si-Si/Si-O dehydrocoupling reaction of hydrosilanes with alcohols (1:1.5 mole ratio) at 50 °C, catalyzed by Cp_2MCl_2/Red-Al (M = Ti, Zr) and Cp_2M' (M = Co, Ni), producing poly(alkoxysilane)s in one-pot in high yield (eq. 8).

(8)



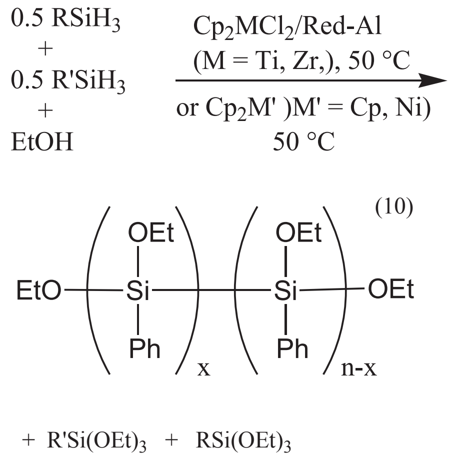
The hydrosilanes include p-$C_6H_4SiH_3$ (X = H, CH_3, OCH_3, F), $PhCH_2SiH_3$, and $(PhSiH_2)_2$. The alcohols include MeOH, EtOH, *i*-PrOH, PhOH, and $CF_3(CF_2)_2CH_2OH$. The weight average molecular weights (M_w) of the resulting poly(alkoxysilane)s ranged from 600 to 8000 g/mol. However, Cp_2M' (M′ = Co, Ni) have no catalytic activity toward Si-Si dehydrocoupling of primary hydrosilanes in an inert atmosphere (e.g., dry N_2 or Ar gas atmosphere).[37b] Interestingly, the dehydrocoupling reactions of phenylsilane with ethanol (1:1.5 mole ratio) using Cp_2HfCl_2/Red-Al, and phenylsilane with ethanol (1:3 mole ratio) using Cp_2TiCl_2/Red-Al gave only triethoxyphenylsilane as product (eq. 9a-b).[38]

$$PhSiH_3 + 1.5\ EtOH \xrightarrow[50\ ^\circ C]{Cp_2HfCl_2/Red\text{-}Al} PhSi(OEt)_3 \quad (9a)$$

$$PhSiH_3 + 3.0\ EtOH \xrightarrow[50\ ^\circ C]{Cp_2TiCl_2/Red\text{-}Al} PhSi(OEt)_3 \quad (9b)$$

Similarly, the combinative Si-Si/Si-O dehydrocoupling reactions of mixed hydrosilanes with alcohols (two different hydrosilanes were used in the same mole ratio; 0.5:0.5:1.5 mole ratio) at 50 °C, catalyzed by Cp_2MCl_2/Red-Al (M = Ti, Zr) and Cp_2M' (M′ = Co, Ni), producing co-poly(alkoxysilane)s in one-pot in high yield (eq. 10) were reported.[37a]

(10)

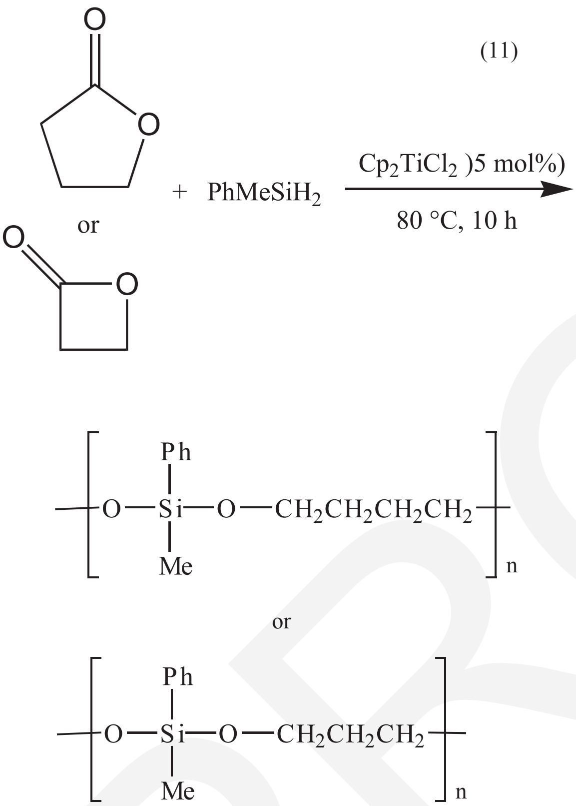


In a similar manner, Woo and co-workers performed the combinative Si-Si/Si-O dehydrocoupling reactions of hydrosilanes with mixed alcohols (two different alcohols were used in the same mole ratio; 1:0.75:0.75 mole ratio) at 50 °C, catalyzed by Cp_2MCl_2/Red-Al (M = Ti, Zr) and Cp_2M' (M′ = Co, Ni), producing copoly(alkoxysilane)s in one-pot in high yield.[37a] The bonding characters [mixing interaction between σ (silicon) orbital and n (oxygen) orbital] of Si-O bonds in poly(dialkoxysilylene)s were studied in detail using various levels of molecular orbital calculations.[37c]

Ring-Opening/Dehydrocoupling of Hydrosilane and Lactone

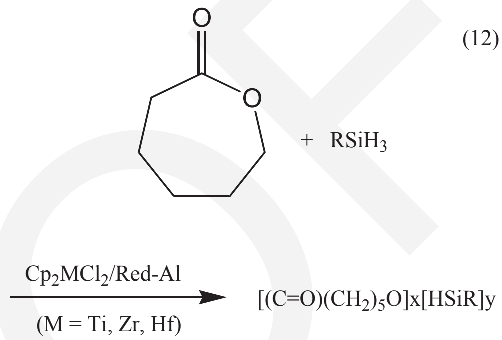
Harrod and coworkers first reported the reductive ring-opening/dehydrocoupling copolymerization of b- and g-butyrolactones (four- and five membered cyclic esters) and a secondary hydrosilane $PhMeSiH_2$ using Cp_2TiMe_2 catalyst to give polysiloxane type copolymers, $[OSiPhMeO(CH_2)_4]_n$ and $[OSiPhMeO(CH_2)_2(CH)CH_3]_n$, respectively, which have the regularly alternating structure of reduced lactone (i.e., dialkoxyolefinic unit) and silylene moieties without ester functional groups in the polymer chain (eq. 11).[39]

(11)



In contrast, Woo and coworkers first reported the non-reductive ring-opening/dehydrocoupling copolymerization of e–caprolactone (**1**, a seven-membered cyclic ester) with various primary hydrosilanes ($RSiH_3$: phenylsilane, *p*-tolylsilane, benzylsilane, *p*-methylbenzylsilane, and phenethylsilane) and secondary hydrosilanes ($RR'SiH_2$: phenylmethylsilane and diphenylsilane) using Cp_2MCl_2/Red-Al (M = Ti, Zr, Hf) catalysts to produce random poly(caprolactone-*co*-silane)s without appreciable reduction of ester functional groups in the polymer chain (eq. 12).[40]

(12)



Red-Al is used as a catalyst to synthesize the syndiotactic polyester by the ring-opening polymerization of L-lactide to poly(L-lactide) which is an interesting biocompatible polymer.[41] Thus, it is interesting to note that the same reactions yield different products depending on the type of lactone and catalyst.

Summary

Hydrosilanes possessing reactive Si-H bond are used in synthesizing various types of polysilanes by dehydrocoupling under the influence of various organometallic promoters.[42] Catalytic Si-Si/Si-O coupling of hydrosilanes with hydrosilanes, alcohols, and lactones to silicon-based polymers are described in this article as selective examples of our recent research developments. These silicon-containing polymers can be used as precursors to prepare useful functional materials for fabricating electronic devices. Extensive further studies, versatile applications and commercial productions are currently in progress.

References

1. (a) Odian, G. *Principles of Polymerization*, 3rd ed.; John Wiley & Sons: New York, 1991. (b) Allcock, H. R.; Lampe, F. W. *Contemporary Polymer Chemistry*, 2nd ed.; Prentice-Hall Inc.: New York, 1990; Chapter 9.
2. (a) *Inorganic and Organometallic Polymers II*; Wisian-Neilson, P., H.R. Allcock, H. R., Wynne, K. J., Eds.; ACS Symposium Series 572; American Chemical Society: Washington, D.C., 1994. (b) *Design, Activation, and Transformation of Organometallics into Common and Exotic Materials*; Laine, R. M., Ed.; NATO ASI Series E, no. 141; Martinus Nijhof: Amsterdam, 1988. (c) Gates, D. P. *Annu. Rep. Prog. Chem., Sect. A* **2003**, *99*, 453.
3. (a) Ciardelli, F.; Tsuchida, E.; Wohrle, D. *Macromolecule-Metal Complexes*; Springer-Verlag: Berlin, 1996. (b) Pittman, Jr., C. U.; Carraher, Jr., C. E.; Zeldin, M.; Sheats, J.; Culbertson, B. M. *Metal-Containing Polymeric Materials*; Plenum Press: New York, 1996.
4. (a) *Silicon in Polymer Synthesis*; Kricheldorf, E. R., Ed.; Springer-Verlag: Berlin, 1996. (b) *Silicon-containing Polymers*; Jones, R. G., Ed.; The Royal Society of Chemistry: Cambridge, 1995.
5. (a) Regitz, M.; Binger, P. *Angew. Chem. Int. Ed.* **1988**, *27*, 1484. (b) West, R. *Angew. Chem. Int. Ed.* **1987**, *26*, 1201.
6. Sakamoto, K; Yoshida, M.; Sakurai, H. *Macromolecules* **1990**, *23*, 4494.
7. (a) Walsh, R. *Acc. Chem. Res.* **1981**, *14*, 246. (b) Dewar, M. J. S. *Organometallics* **1986**, *5*, 375. (c) Jackson, R. A. *J. Organomet. Chem.* **1979**, *166*, 17.
8. West, R. *J. Organomet. Chem.* **1986**, *300*, 327.
9. *Silicon-Based Polymer Science*; Ziegler, J. M., Fearon, F. W. G., Eds.; Advances in Chemistry Series 224; American Chemical Society: Washington, D.C., 1990.
10. (a) Miller, R. D.; Michl, J. *Chem. Rev.* **1989**, *89*, 1359 and references cited therein. (b) Matyjaszewski, K.; Chen, Y. L.; Kim, H. K. in *Inorganic and Organometallic Polymers*; Zeldin, M., Wynne, K. J., Allcock, H. R., Eds.; ACS Symposium Series 360; American Chemical Society: Washington D. C., 1988; p 78.
11. Gauvin, F.; Harrod, J. F.; Woo, H.-G. *Adv. Organomet. Chem.* **1998**, *42*, 363 and references cited therein.
12. (a) Tilley, T. D. *Acc. Chem. Res.* **1993**, *26*, 22 and references cited therein. (b) Tilley, T. D. *Comments Inorg. Chem.* **1990**, *10*, 37.
13. (a) Corey, J. Y. *Adv. Silicon Chem*. **1991**, *1*, 327 and references cited therein. (b) Corey, J. Y. *Adv. Organomet. Chem*. **2004**, *51*, 1 and references cited therein.
14. Banovetz, J. P.; Stein, R. M.; Waymouth, R. M. *Organometallics* **1991**, *10*, 3430.
15. Choi, N.; Onozawa, S.-Y.; Sakakura, T.; Tanaka, M. *Organometallics* **1997**, *16*, 2765.
16. Dioumaev, V. K.; Harrod, J. F. *Organometallics* **1994**, *13*, 1548.
17. (a) Woo, H.-G.; Kim, S.-Y.; Han, M. K.; Cho, E. J.; Jung, I. N. *Organometallics* **1995**, *14*, 2415. (b) Woo, H.-G.; Song, S.-J. *Chem. Lett.* **1999**, 457. (c) Woo, H.-G.; Kim, B.-H., manuscript in preparation. (d) Resel, R.; Leising, G.; Lunzer, F.; Marschner, C. *Polymer* **1998**, *39*, 5257. (e) Woo, H.-G.; Kim, B.-H., manuscript in preparation.
18. Li, H.; Gauvin, F.; Harrod, J. F. *Organometallics* **1993**, *12*, 575.
19. Dioumaev, V. K.; Harrod, J. F. *Organometallics* **1996**, *15*, 3859.
20. Campbell, W. H.; Hilty, T. K.; Yurga, L. *Organometallics* **1989**, *8*, 2615.
21. (a) Aitken, C.; Harrod, J. F.; Gill, U. S. *Can. J. Chem.* **1987**, *65*, 1804. (b) Harrod, J. F.; Yun, S. S. *Organometallics* **1987**, *6*, 1381. (c) Aitken, C.; Barry, J.-P; Gauvin, F.; Harrod, J. F.; Malek, A.; Rousseau, D. *Organometallics* **1989**, *8*, 1732. (d) Harrod, J. F.; Ziegler, T.; Tschinke, V. *Organometallics* **1990**, *9*, 897. (e) Woo, H.-G.; Harrod, J. F.; Henique, J.; Samuel, E. *Organometallics* **1993**, *12*, 2883. (f) Britten, J.; Mu, Y.; Harrod, J. F.; Polowin, J.; Baird, M. C.; Samuel, E. *Organometallics* **1993**, *12*, 2672.
22. (a) Woo, H.-G.; Tilley, T. D. *J. Am. Chem. Soc.* **1989**, *111*, 3757. (b) H.-G. Woo, H.-G.; Tilley, T. D. *J. Am. Chem. Soc.* **1989**, *111*, 8043. (c) Woo, H.-G.; Walzer, J. F.; Tilley, T. D. *Macromolecules* **1991**, *24*, 6863. (d) Woo, H.-G.; Heyn, R. H.; Tilley, T. D. *J. Am. Chem. Soc.* **1992**, *114*, 5698. (e) Woo, H.-G.; Walzer, J. F.; Tilley, T. D. *J. Am. Chem. Soc.* **1992**, *114*, 7047. (f) Banovetz, J. P.; Suzuki, H.; Waymouth, R. M. *Organometallics* **1993**, *12*, 4700. (g) Imori, T.; Woo, H.-G.; Walzer, J. F.; Tilley, T. D. *Chem. Mater.* **1993**, *5*, 1487. (h) Corey, J. Y.; Huhmann, J. L.; Zhu, X.-H. *Organometallics* **1993**, *12*, 1121.
23. (a) Woo, H.-G.; Kim, S.-Y.; Kim, W.-G.; Cho, E. J.; Yeon, S. H.; Jung, I. N. *Bull. Korean Chem. Soc.* **1995**, *16*, 1109. (b) Woo, H.-G.; Song, S.-J.; Han, M.-K.; Cho, E. J.; Jung, I. N. *Bull. Korean Chem. Soc.* **1995**, *16*, 1242. (c) Woo, H.-G.; Song, S.-J. *Bull. Korean Chem. Soc.* **1996**, *17*, 494. (d) Woo, H.-G.; Song, S.-J. *Bull. Korean Chem. Soc.* **1996**, *17*, 1040. (e) Woo, H.-G.; Kim, B.-H.; Song, S.-J.; Han, M.-K.; Kim, S.-Y.; Kim, J.-H.; Lee, J. S. *Bull. Korean Chem. Soc.* **2000**, *21*, 935.
24. West, R. in *Comprehensive Organometallic Chemistry II*; Davis, A. G., Ed.; Pergamon Press: Oxford, 1995; pp 77-110.
25. Luo, J.; Xie, Z.; Lam, J. W. Y.; Cheng, L.; Chen, H.; Qiu, C.; Kwok, H. S.; Zhan, X.; Liu, Y.; Zhu, D.; Tang, B. Z. *J. Chem. Soc., Chem. Commun*. **2001**, 1740.
26. (a) Sohn, H.; Woo, H.-G.; Powell, D. R. *J. Chem. Soc., Chem. Commun.* **2000**, 697. (b) Woo, H.-G.; Kim, B.-H.; Sohn, H. *Chem. Lett*. **2000**, 544.
27. Tamao, K.; Uchida, M.; Izumizawa, T.; Furukawa, K.; Yamaguchi, S. *J. Am. Chem. Soc.* **1996**, *118*, 11974.

28. (a) Sohn, H.; Huddleston, R. R.; Powell, D. R.; West, R. *J. Am. Chem. Soc.* **1999**, *121*, 2935. (b) Tamao, K.; Yamaguchi, S. *Pure Appl. Chem.* **1996**, *68*, 139. (c) Yamaguchi, S.; Tamao, K. *J. Chem. Soc., Dalton Trans.* **1998**, 3693. (d) Yamaguchi, S.; Jin, R.-Z.; Tamao, K. *J. Am. Chem. Soc.* **1999**, *121*, 2937. (e) Kanno, K.; Ichinohe, M.; Kabuto, C.; Kira, M. *Chem. Lett.* **1998**, 99.
29. (a) Sanji, T.; Sakai, T.; Kabuto, C.; Sakurai, H. *J. Am. Chem. Soc.* **1998**, *120*, 4552. (b) Sohn, H.; Sailor, M. J.; Magde, D.; Trogler, W. C. *J. Am. Chem. Soc.* **2003**, *125*, 3821. (c) Woo, H.-G.; Kim, B.-H.; Song, S.-J., manuscript in preparation.
30. (a) Chauhan, B. P. S.; Shimizu, T.; Tanaka, M. *Chem. Lett.* **1997**, 785. (b) Trogler, W. C.; Sohn, H.; Liu, S.; Toal, S. *Abstracts of Papers* (225th ACS National Meeting, New Orleans, March 23-27, 2003), INOR-746.
31. Kim, B.-H.; Cho, M.-S.; Kong, J.-I.; Woo,H.-G.., manuscript in preparation.
32. Kim, B.-H.; Woo, H.-G. *Organometallics* **2002**, *21*, 2796. (b) Woo, H.-G.; Song, S.-J.; Kim, B.-H.; Yun, S. S. *Mol. Cryst. Liq. Cryst.* **2000**, *349*. 87. (c) Kim, B.-H.; Cho, M.-S.; Kong, J.-I.; Woo, H.-G.; Lee, S.-W.; Lee, C.-J. *Mol. Cryst. Liq. Cryst.* **2004**, *425*, 243.
33. (a) Hong, J.-H.; Boudjouk, P. *J. Am. Chem. Soc.* **1993**, *115*, 5883. (b) Hong, J.-H.; Boudjouk, P.; Castellino, S. *Organometallics* **1994**, *13*, 3387. (c) West, R.; Sohn, H.; Bankwitz, U.; Calabrese, J.; Apeloig, Y.; Mueller, T. *J. Am. Chem. Soc.* **1995**, *117*, 11608.
34. (a) Lukevics, E.; Dzintara, M. *J. Organomet. Chem.* **1985**, *295*, 265. (b) Pitt, C. G. *Homoatomic Rings, Chains, and Macromolecules of Main-Group Elements*; Rheingold, A. L., Ed.; Elsevier Scientific Publishing Company: Amsterdam, 1977; p 203.
35. (a) Bedard, T. C.; Corey, J. Y. *J. Organomet. Chem.* **1992**, *428*, 315. (b) Li, Y.; Kawakami, Y. *Macromolecules* **1999**, *32*, 6871. (c) Zhang, R.; Mark, J. E.; Pinhas, A. R. *Macromolecules* **2000**, *33*, 3508. (d) Baruah, J. B.; Osakada, K.; Yamamoto, T. *Organometallics* **1996**, *15*, 456.
36. (a) Sommer, L. H.; Lyons, J. E. *J. Organomet. Chem.* **1967**, *89*, 1521. (b) Corriu, R. J. P.; Moreau, J. J. *J. Chem. Soc., Chem. Commun.* **1973**, 38. (c) Ojima, I.; Kogure, T.; Nihonyanagi, M.; Kono, H.; Inaba, S.; Nagai, Y. *Chem. Lett.* **1973**, 501.
37. (a) Kim, B.-H.; Park, S.-H.; Kim, M.-S.; Woo, H.-G., manuscript in preparation. (b) Kim, B.-H.; Woo, H.-G., manuscript in preparation. (c) Koe, J. R.; Motonaga, M.; Fujiki, M.; West, R. *Macromolecules* **2001**, *34*, 706.
38. Kim, B.-H.; Cho, M.-S.; Kim, M.-A.; Woo, H.-G. *J. Organomet. Chem.* **2003**, *685*, 93.
39. Shu, R.; Harrod, J. F.; Lebuis, A. M. *Can. J. Chem.* **2002**, *80*, 489.
40. Kim, B.-H.; Woo, H.-G.; Kim, W.; Li, H. *J. Chem. Tech. & Biotech.* **2006**, *81*, 746.
41. Li, H.; Wang, C.; Bai, F.; Yue, J.; Woo, H.-G. *Organometallics* **2004**, *23*, 1411.

42. H. G. Woo is indebted to the Korea Research Foundation (Grant Number KRF-2006-C00095) for its generous support of his research reported herein.

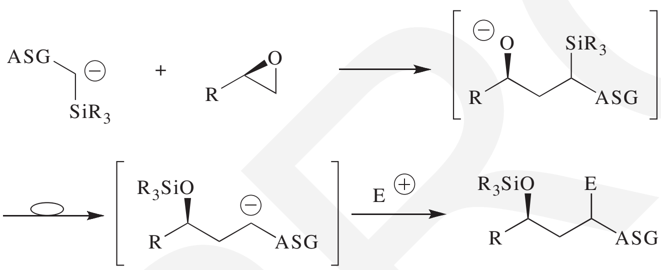
Silicon-Based Anion Relay Chemistry

By Gerald L Larson

Introduction

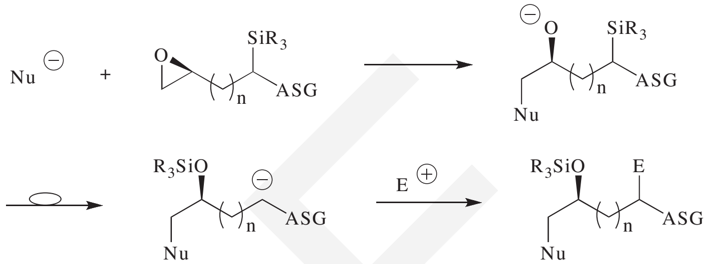
The Brook rearrangement, in which a suitably positioned silyl group can be induced to migrate in an intramolecular fashion to an oxyanion with concomitant generation of a carbanion, can be used for the synthesis of small molecules in a number of ways.[1,2] Whereas the original Brook rearrangement, initially employing α-hydroxyorganosilanes, involved a 1,2-shift to generate an α-silyloxycarbanion, this highly-useful concept has been expanded over the years to include more distant silyl shifts. In particular, the Smith group at the University of Pennsylvania, based on some early work of Tietze[3] and Schaumann,[4] has taken this concept to an impressive level in what they have termed Anion Relay Chemistry (ARC). The applications of ARC have been carried out *via* two general classes, namely Type I ARC and Type II ARC. In Type I ARC, an α-silyl carbanion is treated with a suitable electrophilic substrate such as an epoxide or aldehyde to generate a trialkylsilyl-containing oxyanion, which under suitable conditions relocates the silyl group to the oxygen with the generation of a carbanion at the original nucleophilic site in the process. This path, wherein an electrophile is introduced in the first step and a second electrophile is introduced in the second step, is illustrated schematically in Scheme 1.

Scheme 1: Type I Anion Relay Chemistry



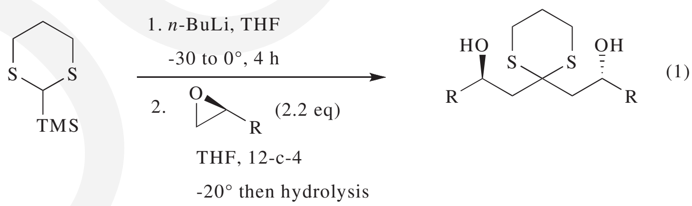
The Type II ARC process features a silicon-containing electrophile capable of reacting with a nucleophile to generate an oxyanion and thereby establish the foundation for carbon to oxygen silicon migration. This process permits introduction of various nucleophiles and in turn, migration of the organosilyl group from carbon to oxygen to generate a carbanion capable of trapping an electrophile. Clearly, the ability to incorporate a nucleophile, a linchpin, and an electrophile presents the synthetic chemist with a range of options, which are illustrated in Scheme 2. Combinations of the Type I ARC and Type II ARC approaches can provide methods for the integration of a wide variety of functionalities with a very high degree of regio- and stereoselectivity. Thus, these synthons can be employed in the exploitation of three-component (nucleophile, linchpin, and electrophile) Diversity-Oriented Synthesis (DOS). The purpose of this mini-review is to present a number of examples that illustrate the potential utility of the ARC protocols.[5]

Scheme 2: Type II Anion Relay Chemistry



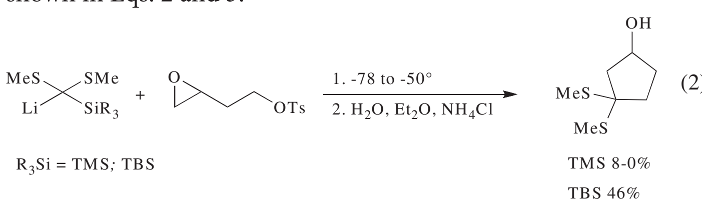
Anion Relay Chemistry of Type I

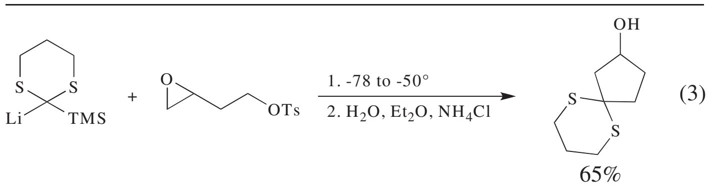
Tietze *et al* were the first to report the use of lithiated 2-trimethylsilyl-1,3-dithiane with epoxides in conjunction with a 1,4-rearrangement of the TMS group from carbon to oxygen resulting in the α-lithiodithiane, which then reacted with a second equivalent of the epoxide to lead to homo-coupled β,β'-dihydroxy ketones. Activation for the trimethylsilyl group migration was brought about *via* the addition of 12-crown-6 as a promoter (Eq. 1).[3]



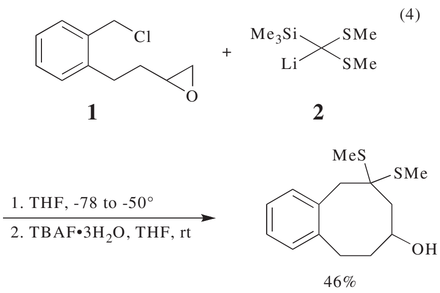
R (% yield) Ph (65); 4-ClC$_6$H$_4$ (41); 4-MeC$_6$H$_4$ (54); 4-MeOC$_6$H$_4$ (63); Me (89)

In that same year, Schaumann and coworkers employed a similar approach to generate functionalized cyclopentanols as shown in Eqs. 2 and 3.[4]

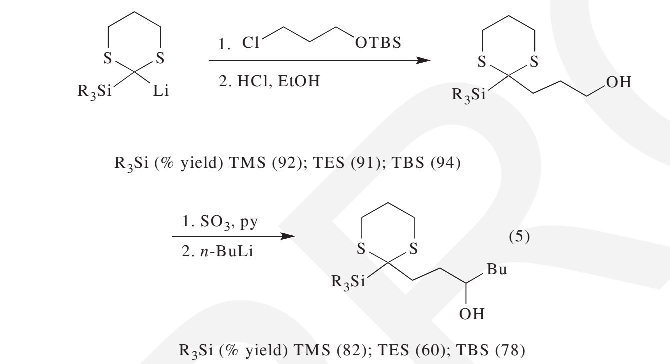


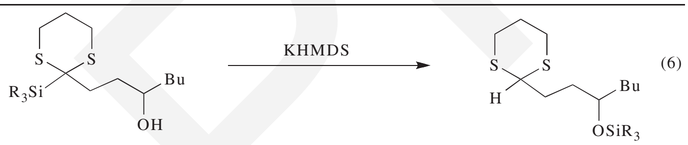


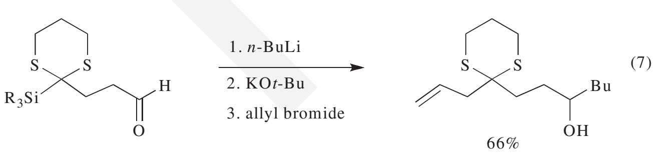
A Type I approach to benzannulated cyclooctanols, again using a dithiane Anion Stabilizing Group (ASG), was subsequently reported. In this case the α-silylated lithium reagent **2** is reacted with epoxide **1** and the rearranged carbanion cyclized *via* intramolecular substitution at the benzyl chloride (Eq. 4).[6]



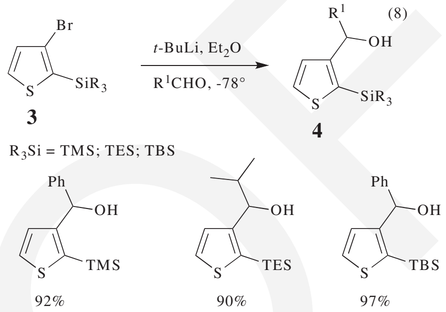
It has been demonstrated in Type I ARC that a [1,5]-Brook rearrangement is possible. Crossover experiments by the Smith group confirmed the intramolecular nature of the rearrangement, which presumably occurs *via* a 6-membered silicate transition state.[6] The ASG in this study was the dithiane group, and the best conditions for the Brook rearrangement employed potassium hexamethyldisilazide (KHMDS) in THF, which provided the O-silylated rearranged product in better than 95% yield, irrespective of the steric bulk of the trialkylsilyl group; however, the rates for the more hindered silanes were slower. Alternatively, the initial lithium alkoxide formed from the reaction of *n*-butyllithium with an aldehyde can be treated with potassium *tert*-butoxide to initiate the rearrangement. The resultant carbanion can then be trapped with a suitable electrophile (Eqs. 5-7).[7] A similar study aimed at a [1,6]-Brook rearrangement proved to be intermolecular in nature and led to a predominance of protiodesilylation in addition to the desired silyl ether intermediate.

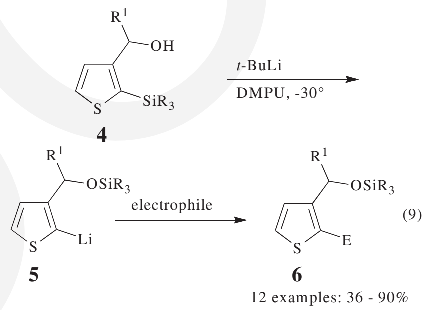


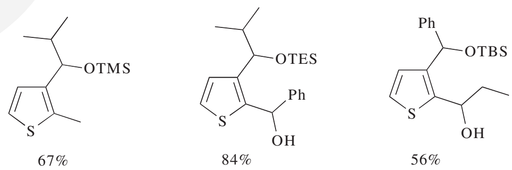


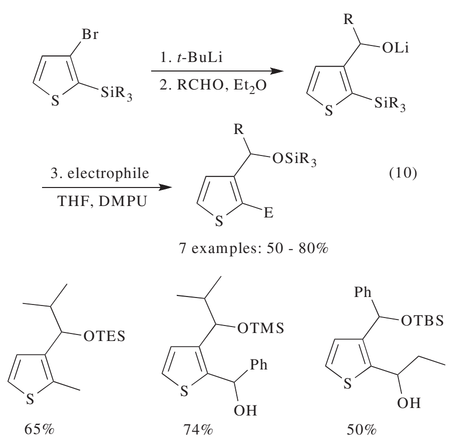


A three-component Type I approach to 2,3-disubstituted thiophenes has been reported. This useful sequence starts with 2-trialkylsilyl-3-bromothiophene **3**, prepared in high yield in a single step from 3-bromothiophene. Thus, metal-halogen exchange of **3** generates not the more common α-silyl carbanion, but rather a β-silyl carbanion. The reaction of this lithium reagent with an aldehyde led to the thienylmethyl alcohol derivative **4**. The lithium salt of **4** did not result in the migration of the silyl group to give **5** even when activated with the addition of TMEDA, 12-crown-4 or HMPA. Fortunately, the use of NaHMDS or KHMDS or *t*-BuLi in the presence of DMPU gave a nearly quantitative conversion of the C-silyl to the O-silyl intermediate, electrophilic substitution of which produced the 2,3-disubstituted thiophene **6**. Overall yields of this three-component DOS sequence were modest to good (Eqs. 8-10). The sequence can also be carried out in a one-pot protocol with comparable yields.[8]



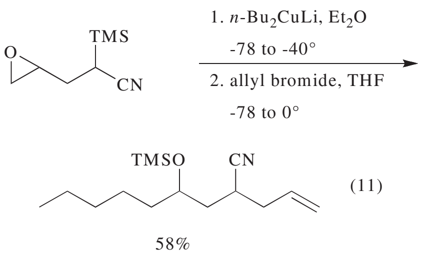




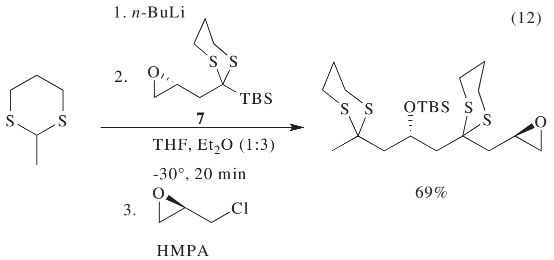


Anion Relay Chemistry of Type II

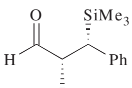
It has been shown that the nitrile group is a suitable ASG for Type II ARC protocols as shown in Eq. 11.[9]



The silylated epoxy dithiane **7** serves as an excellent Type II reagent as a lead into β-hydroxydiketone derivatives. (Eq. 12).[10] In this instance a dithiane nucleophile is initially introduced and an electrophile is added after the rearrangement.



With the ultimate goal of utilizing a three-component, Type II ARC tactic for the construction of non-racemic, biologically active natural products, the chiral, non-racemic linchpins **8** – **18** were prepared and studied as to their diastereoselectivity in ARC transformations.



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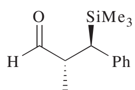

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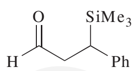

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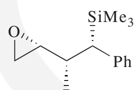

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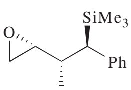

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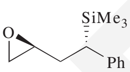

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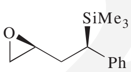

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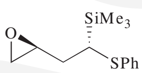

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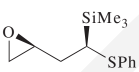

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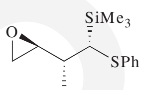

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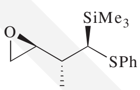
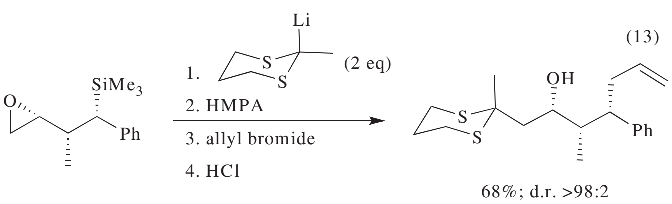
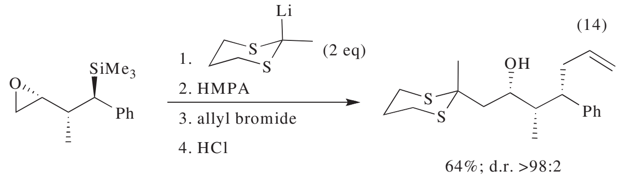
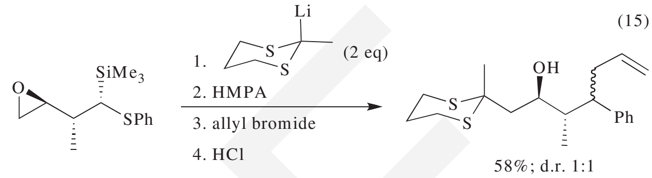


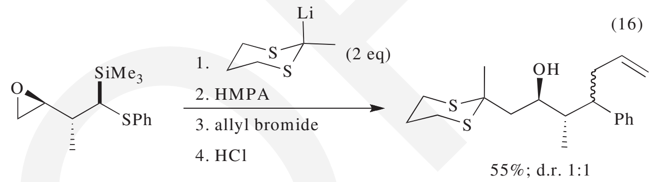
18

In general, it was found that the α-phenylsilyl derivatives **8** – **14** showed excellent diastereotopic ratios (Eqs. 13 and 14), whereas the α-silylthiophenyl systems **15** - **18** gave ratios ranging from 1:4 to 1:1 (Eqs. 15 and 16). The high selectivity is attributed to a minimization of the A[1,3] strain that is available to the α-phenyllithium reagent, but not the α-thiophenyllithium intermediate.[11]

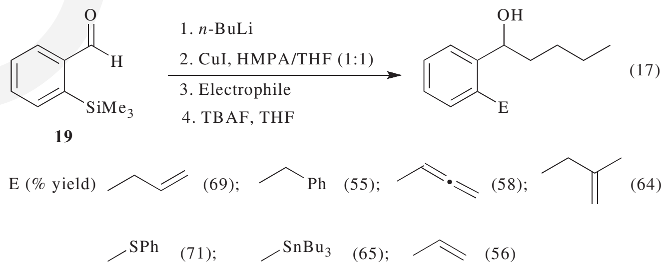




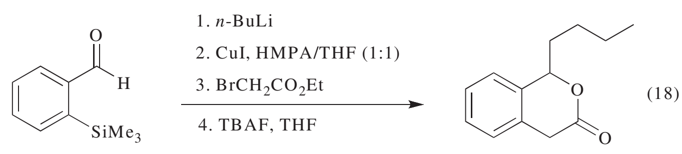




One of the intriguing and highly useful discoveries in ARC has been that an sp^2 carbanion can be generated in the Brook process. This has been shown in the thiophene linchpin chemistry illustrated in Eqs. 9 and 10, as well as in Eq. 12 above. In a similar manner, *o*-trimethylsilylbenzaldehyde **19** can be used as a bifunctional linchpin (aldehyde and aryl ring, in this case), for Type II ARC. With this substrate, the aldehyde is converted into an oxyanion to set up the silyl migration, thereby rendering the *ortho*-position of the aryl group the site for subsequent reactivity (Eq. 17).[12]

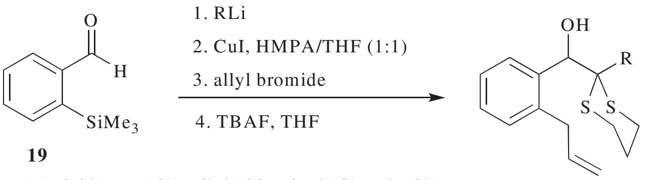


Thus, reaction of **19** with *n*-butyllithium followed by the addition of CuI and HMPA to bring about the silyl group migration and then an electrophile to give the cross-coupling chemistry followed by deprotection of the silyl ether gives rise to the corresponding *o*-substituted benzyl alcohol. An sp^2-sp^2 cross-coupling of the intermediate organocopper reagent with the promotional assistance of $Pd(PPh_3)_4$ permits the regioselective introduction of the vinyl group in 56% yield. The choice of solvent system and a full equivalent of copper(I) iodide proved crucial in the success of the reaction. Trapping with ethyl α-bromoacetate results in the benzolactone **20** (Eq. 18).



19 **20**

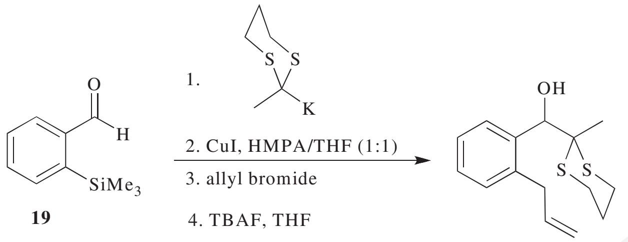
This three-component linchpin coupling sequence allows for the introduction of various nucleophiles as well as the electrophile shown above. Thus, when trapped with allyl bromide as the electrophile a number of carbon nucleophiles resulted in the generation of different *o*-allylated benzyl alcohol derivatives (Eq. 19). Use of the metalated dithiane provides the mask α-hydroxyketone moiety (Eq. 20). An iterative approach using this concept illustrates the potential for variations on this theme as exemplified in Eq. 21.



(19)

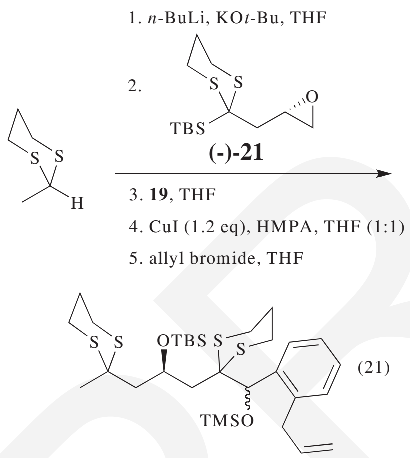
19

R (% yield) Me (68); allyl (66); vinyl (68); Ph (60) (78%)



(20)

19 (78%)

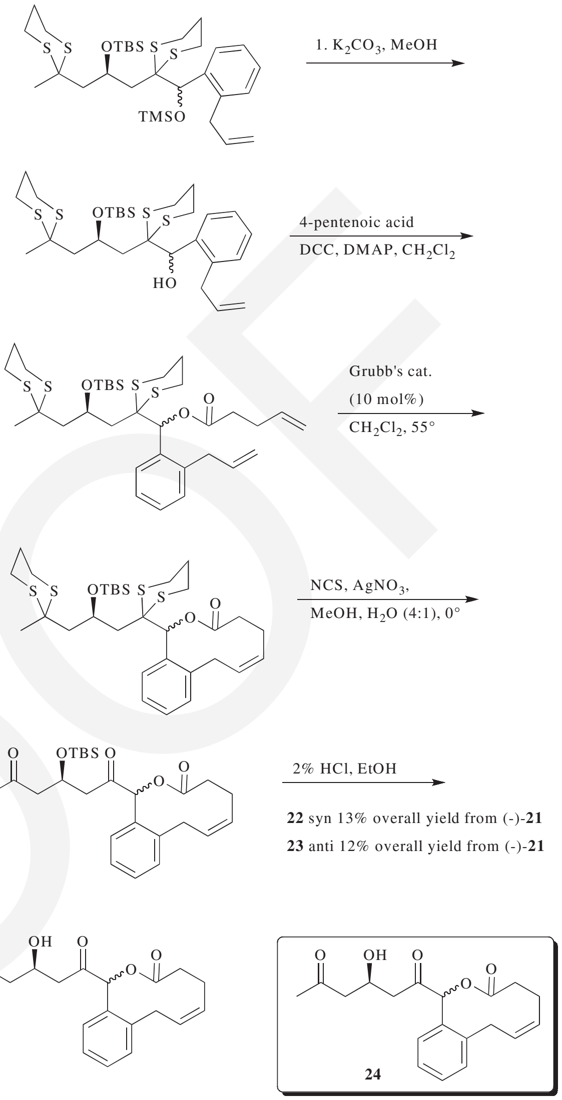


(21)

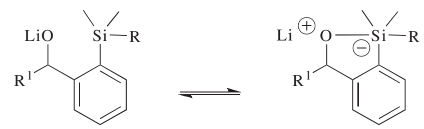
63%; syn:anti 1.25:1

As a further extension of this chemistry, chemoselective deprotection of the TMS ether, esterification with 4-pentenoic acid, ring-closing metathesis,[13] conversion of the dithianes to carbonyls[14] and deprotection of the TBS ether provided the highly-substituted macrocycles **22** and **23** in 6 steps from (-)-**21** in 13% and 12% overall yields, respectively. To illustrate the generality of this high-yielding sequence all 12 stereoisomers **22** and **23** of the 10-membered macrocycles resulting from the use of 4-pentenoic acid and 2-methyl-4-pentenoic acid as well as the 12 stereoisomers of the saturated macrocycle **24** were prepared (Scheme 3).

Scheme 3

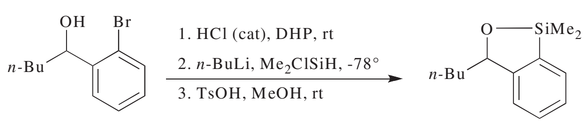


Based on the assumption that the lithium salt of the *o*-silylated benzyl alcohol **25** is in equilibrium with the corresponding cyclic silicate **26** (Eq. 22), oxasilacycles **27**, **28**, and **29** (Eqs. 23, 24 and 25) were prepared to investigate whether these compounds could provide access to the same reaction coordinate.



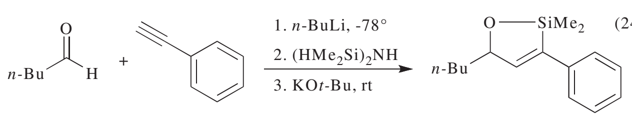
(22)

25 **26**

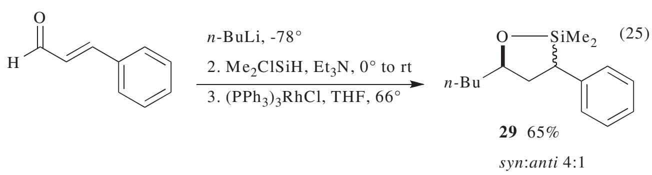


(23)

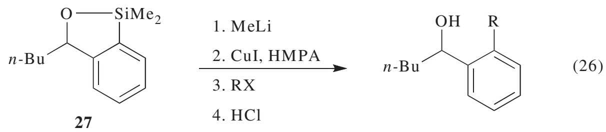
27 62%



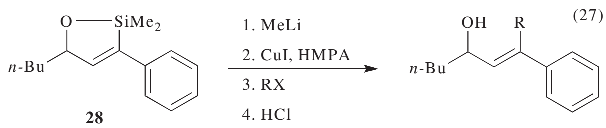
(24)



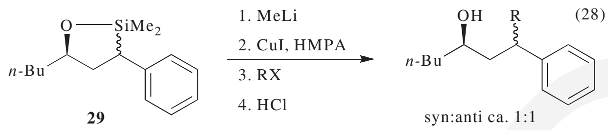
Indeed, it was observed that these key synthons permit preparation of *o*-alkyl benzyl alcohols (Eqs. 26, 27 and 28).[15]



RX (% yield) allyl bromide (68%); benzyl bromide (74%); methyl iodide (78%); PhI (65%)



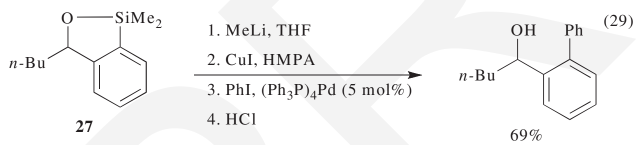
RX (% yield) allyl bromide (67%); benzyl bromide (61%); methyl iodide (59%); PhI (64%)

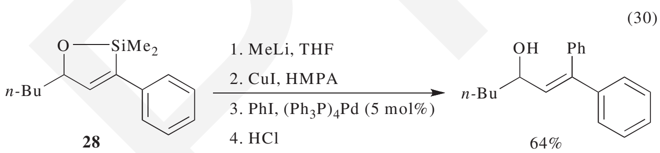


RX (% yield) allyl bromide (79%); benzyl bromide (64%); benzophenone (62%)

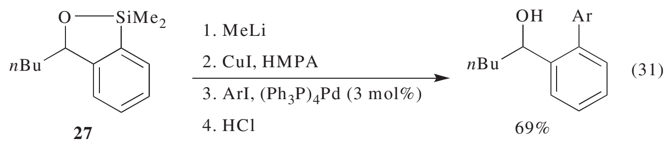
Type II Anion Relay Chemistry with Cross-Coupling Bond Formation

In addition to trapping aliphatic and carbonyl electrophiles, substrates **26** and **27** can be employed in the Type II ARC protocol with cross-coupling of the intermediate aryl or vinyl copper species when catalyzed by $(Ph_3P)_4Pd$ (Eqs. 29 and 30).[15]

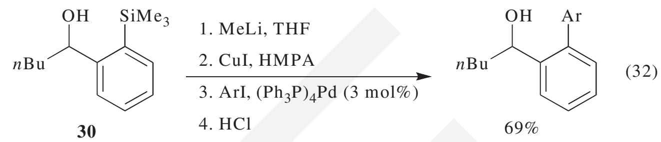




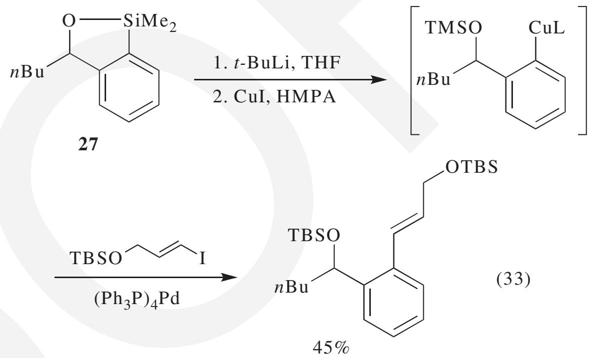
Taking advantage of the ability to use ARC for the generation of aryl species as the ASG, the Smith group was able to use 1-oxa-2-silacyclopentenes **27** and **28** in combination with addition of a nucleophile to the silyl group, to bring about the migration of the silyl group and, ultimately, cross-coupling the resulting aryl anion with suitable aryl and vinyl electrophilic partners. The cross-coupling steps were only carried out with aryl and vinyl iodides and were catalyzed by the addition of either $PdCl_2/Ph_3P$ or $(Ph_3P)_4Pd$ (Eqs. 31, 32, and 33).



ArI (% yield) 4-$MeOC_6H_4I$ (55); 4-NCC_6H_4I (69); 4-$O_2NC_6H_4I$ (57)

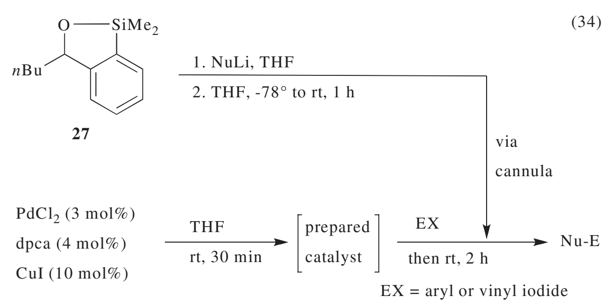


ArI (% yield) 4-$MeOC_6H_4I$ (50); 4-NCC_6H_4I (60); 4-$O_2NC_6H_4I$ (64)

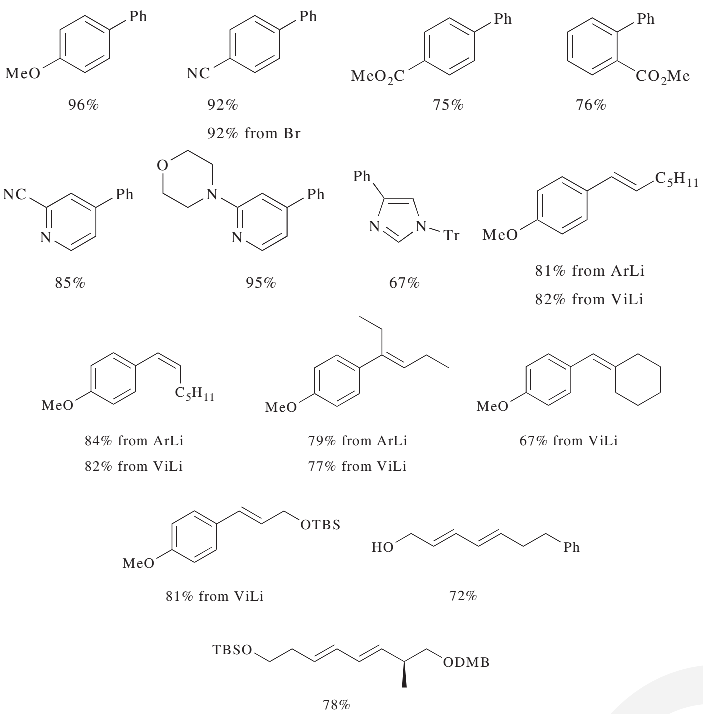


The overall yields are modest, but nevertheless highly useful when DOS is considered. The same outcome can be reached starting with the *o*-trimethylsilylbenzyl alcohol **30** confirming that the identical products can be synthesized from distinctly different starting materials, strongly suggesting the involvement of the same reactive intermediates (cf., **25**, **26**) in each reaction.[16]

In addition to the incorporation of the *o*-benzyl alcohol unit into the synthetic scheme, the intermediate **27** represents a system similar to that used by Hiyama in the intermolecular cross-coupling of aryl and vinyl moieties.[17] In this sequence the nucleophilic aryl or vinyl partner comes from the organolithium reagent and, therefore, accomplishes the cross-coupling of an organolithium reagent with an aryl or vinyl halide. Thus, reaction of **27** with a suitable nucleophile such as phenyllithium followed by the cross-coupling protocol gives the intermolecular cross-coupled product. When a polar solvent such as DMSO was employed, silyl migration occurred and the principle cross-coupling product was that with the benzyl alcohol partner (Scheme 4).



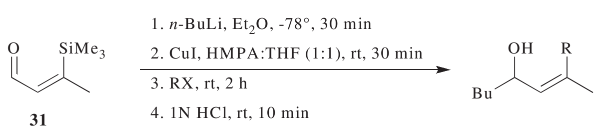
Scheme 4



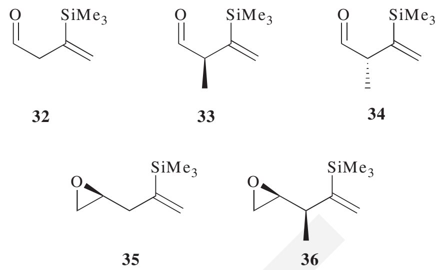
However, when the lower-polarity THF was employed the product was that of the intermolecular cross-coupling reaction. The success of this chemistry was highly dependent on the mode of addition, which involved pre-formation of the catalyst system and careful addition of a mixture of **27** and the aryllithium reagent at low temperature.[16] Most importantly, these results confirm that the adduct of the "transfer reagent" **27** and organolithium in the intermolecular cross-coupling is analogous to the Negishi organozinc, Kumada organomagnesium, Suzuki organoboron, or Stille organotin reagents, but without, in some cases (Suzuki, Stille, and Hiyama), the need to synthesize and isolate the coupling partner prior to cross-coupling. Moreover, the silicon transfer agent **27** can be recovered and reused.

The combination of the ARC and cross-coupling was extended to include vinyl systems utilizing the β-trimethylsilylcrotonaldehyde **31** as a synthon for the exploratory work. As with the aryl cross-coupling reactions shown in Eq. 35, the addition of a catalytic amount of $(Ph_3P)_4Pd$ was employed to bring about the sp^2-sp^2 cross-coupling step. This chemistry was extended to include the 3-trimethylsilylbut-3-enal **32**, and the related chiral synthons **33** and **34**. A further extension of this ARC/cross-coupling chemistry was employed using the chiral epoxides **34** and **35** where the epoxide group is the oxyanion source for the subsequent Brook rearrangement.[18]

(35)



R (% yield) allyl (65); Bn (66); PhS (68); Bu_3Sn (63)



Applications of ARC to the Synthesis of Natural Products

The three-component ARC reaction of 2-triethylsilyldithiane, (R)-propylene oxide, and **37** served to provide an early intermediate in the synthesis of cryptocarya triacetate (7 steps; 23% overall yield), cryptocaryolone (8 steps; 18% overall yield), and cryptocaryolone diacetate (9 steps; 18% overall yield). This compares with earlier syntheses of these natural products in 13, 14, and 15 steps, respectively.[19]

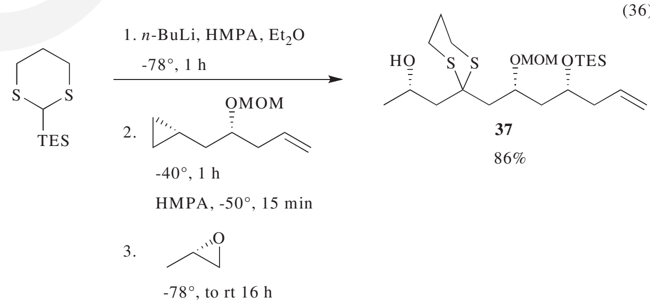
Cryptocarya diacetate

Cryptocarya triacetate

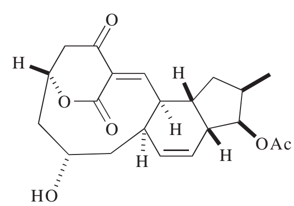
Cryptocaryolone

Cryptocaryolone diacetate

(36)

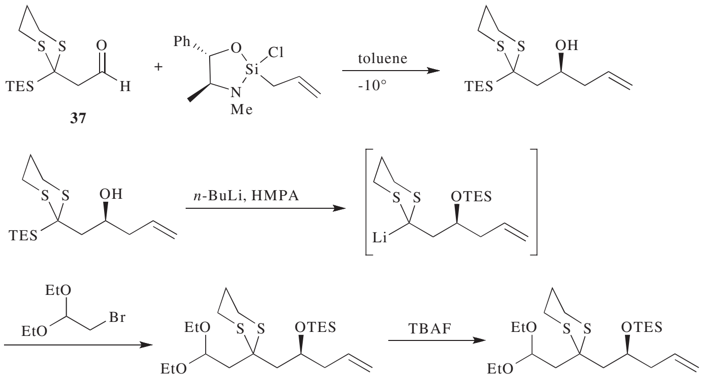


Asymmetric allylation of β-triethylsilylpropynal **38** with Leighton's reagent[20] provided the γ-silyl alcohol in 74% yield and 77% ee. This served as a linchpin for the construction of the lower portion of an early intermediate in a formal synthesis of (-)-cochleamycin A (Scheme 5).[21]



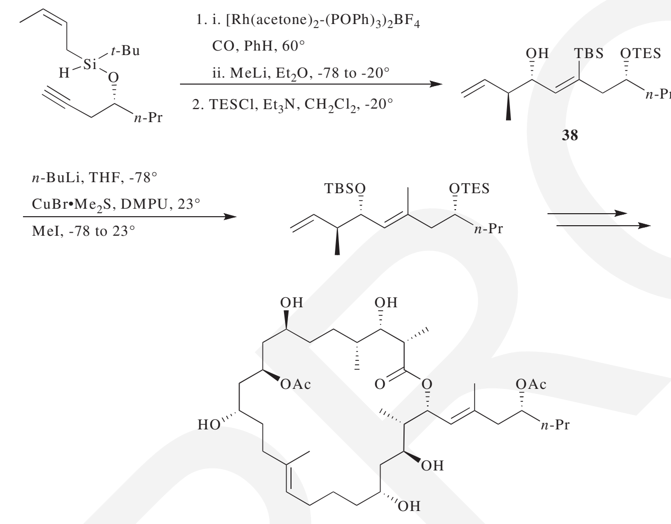
(-)-Cochleamycin A

Scheme 5



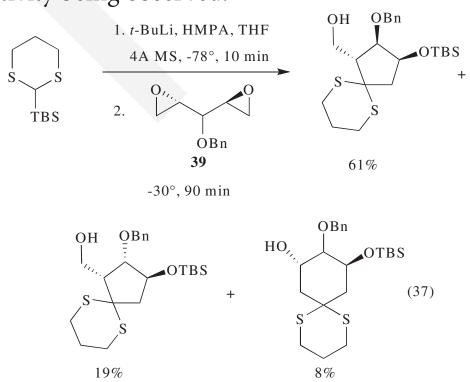
The Leighton group exploited the Brook rearrangement to accomplish the formation of a trisubstituted olefin in their 2006 synthesis of dolabelide B (Scheme 6). Allylic alcohol **38**, formed via a Rh-catalyzed tandem silylformylation-crotylsilylation and chemoselective TES protection, was treated with *n*-BuLi followed by introduction of $CuBr{\cdot}Me_2S$ and DMPU to initiate silicon migration.[22,23] The resulting vinyl copper intermediate was quenched with MeI to complete the *E*-olefin in 92% yield.

Scheme 6

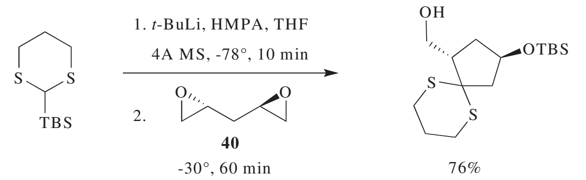


Dolabelide B

The diepoxy linchpins **39** and **40** were used in the tandem linchpin cyclization to carbafuranose sugars with modest stereoselectivity being observed.[24]

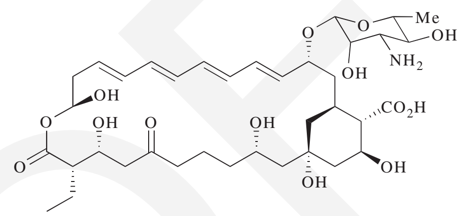


(37)

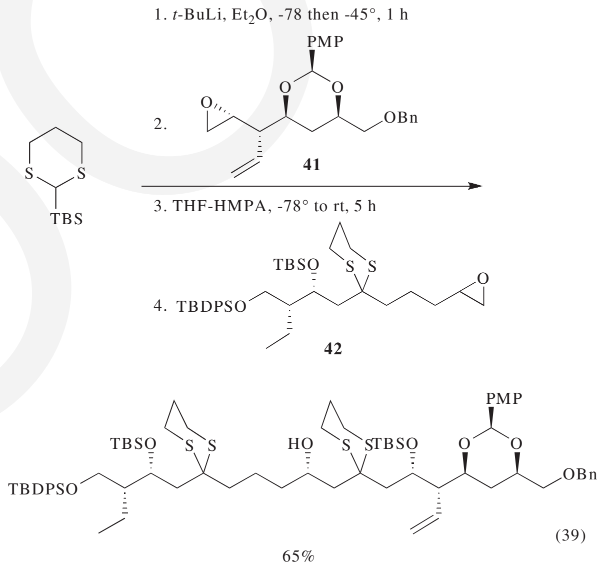


(38)

The reaction of epoxide **41** with 2-*tert*-butyldimethylsilyldithiane followed by a 1,4-Brook rearrangement and further iteration *via* reaction with epoxide **42** provided an efficient entry to the southern half of the natural product (+)-rimocidin.[25]



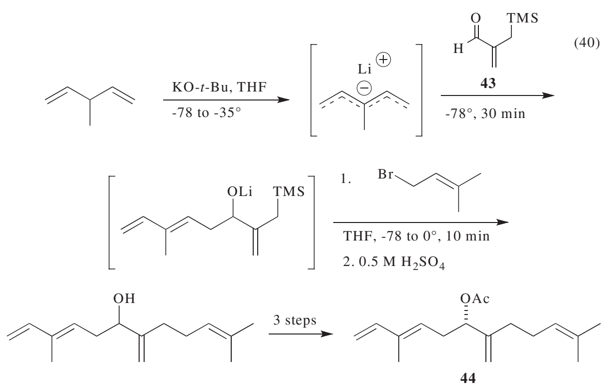
(+)-Rimocidin



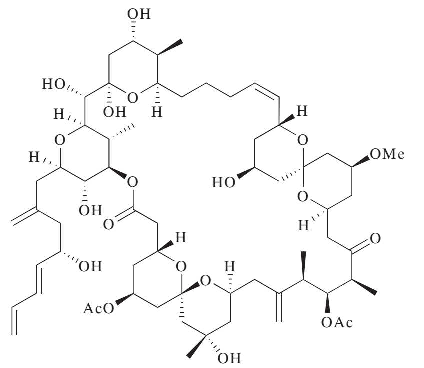
(39)

ARC also served extremely well in the synthesis of a cytotoxic gorgonian sesquiterpene **44** through the simple linchpin **43**; 3-methylpentadienyllithium was employed as the nucleophile with methallyl bromide as the electrophile in this short three-component ARC approach.[8]

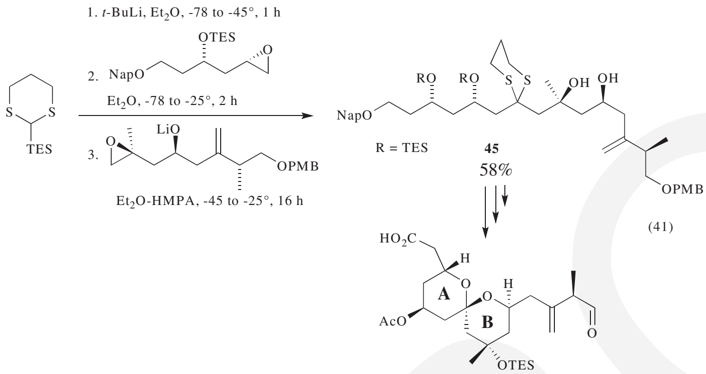
(40)

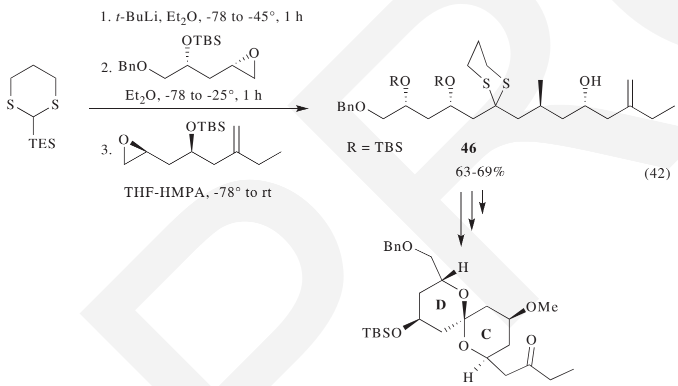


Equally significant, the dithiane multicomponent linchpin strategy (Type I ARC) was successfully employed in the construction of the AB and CD spiroketals of (+)-spongistatin 1.[26] Thus, intermediate **45** was converted to the spiro A and B structure and intermediate **46** to the spiro C and D portion.

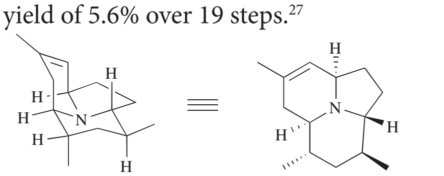


Spongistatin 1

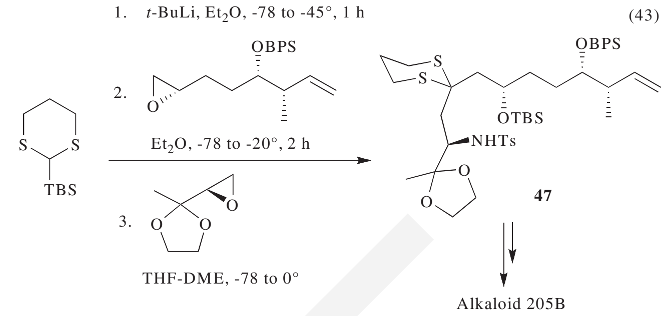




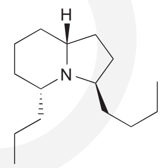
A Type I dithiane three-component linchpin coupling approach has also been used in the synthesis of the neotropical poison-frog alkaloid (-)-205B. Starting from the simple TBS-substituted dithiane in a two-step, single-pot reaction intermediate **47** was prepared in 53% yield. This was carried on to the alkaloid in an overall yield of 5.6% over 19 steps.[27]



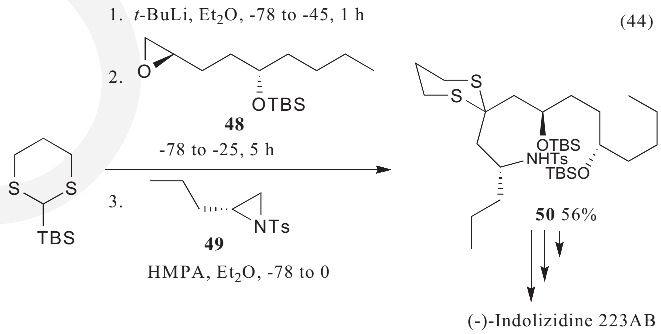
Alkaloid (-)-205B



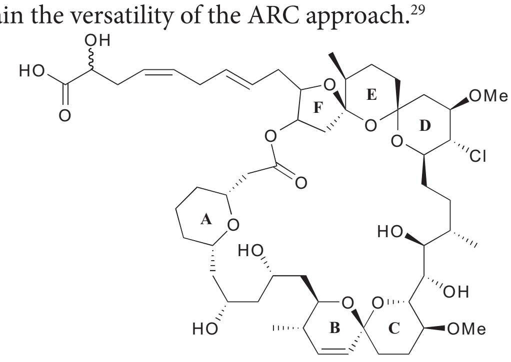
A similar approach was employed in a short and efficient synthesis of (-)-indolizine 223AB. In this synthesis, *tert*-butyldimethylsilyldithiane is the Type I linchpin with epoxide **48** and aziridine **49** as the first and second electrophiles, respectively. The three-step single pot reaction sequence provided the desired intermediate **50** in 56% yield (Eq. 44). The thusly formed intermediate, **50**, was converted to (-)-indolizidine 223AB in 4 steps with an overall yield of the longest (10-step) sequence of 10%.[28]



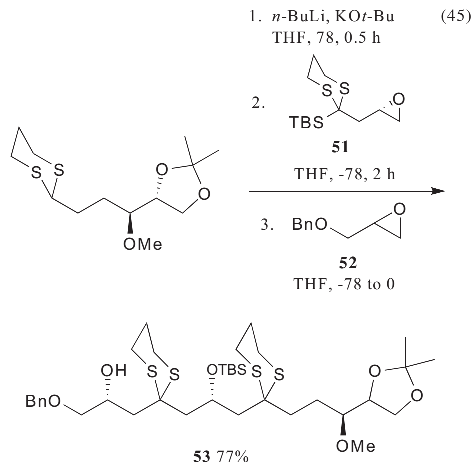
Indolizidine 223AB



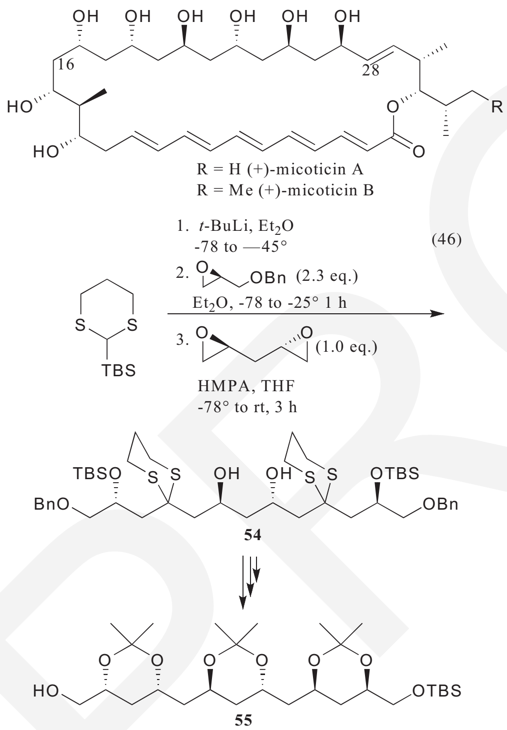
A three-component, Type II ARC route to the southern portion of the spirastrellolides also proved to be highly successful. In this event the linchpin was the epoxy silyldithiane **51** and the electrophile the chiral epoxide **52**. The result of this three-step single pot sequence was **53** formed in 77% yield, demonstrating once again the versatility of the ARC approach.[29]



Spirastrellolide A

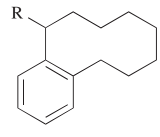


A five-component synthesis of the C(16-28) fragment of mycoticins A and B was accomplished in 59% yield. The thusly generated key intermediate **54** was converted to the substructure **55** via conversion of the dithiane groups to the carbonyl, selective reduction and formation of the acetonides.[30]



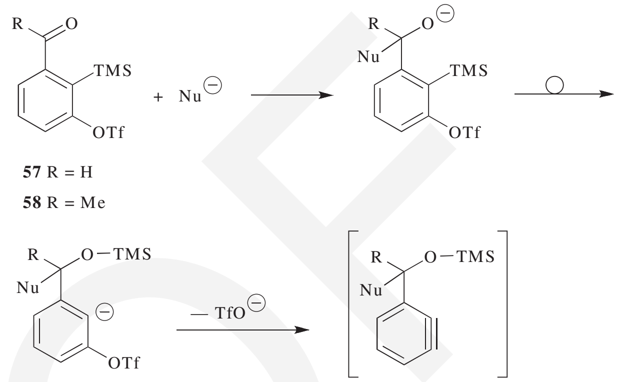
ARC Leading to An Organofunctional Benzyne Intermediate

As a potential route to the preparation of the interesting and important macrocycles represented by example **56**, the Smith group embarked on DOS study of a Type II linchpin that could accept a nucleophile and rearrange with the formation of a benzyne intermediate, which could then lead to the macrocyclic portion of the molecule (Scheme 7).[31]

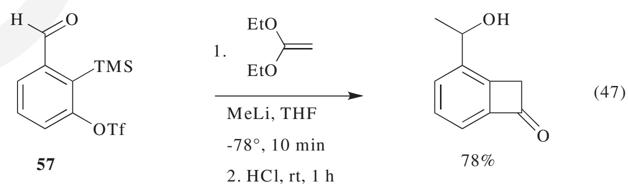


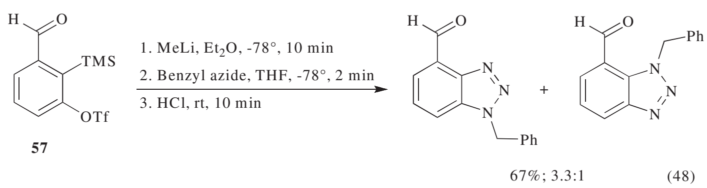
56

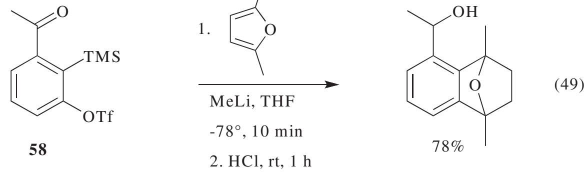
Scheme 7



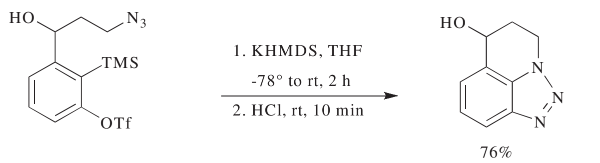
The key organosilyl substrates employed in this study were 2-trimethylsilyl-3-triflatobenzaldehyde **57** and 2-trimethylsilyl-3-triflatoacetophenone **58**. The concept is illustrated in Scheme 6, wherein the benzylic alkoxide can be generated *via* nucleophilic attack. Addition to the proximal silyl group with accompanying loss of the triflate anion leads to formation of the benzyne intermediate. Initial studies with intermolecular reactions employing **56** or **57** as the linchpin revealed excellent conversion to and trapping of the benzyne intermediate with ketene diethylketal (Eq. 47), benzyl azide (Eq. 48), and 2,5-dimethylfuran (Eq. 49).



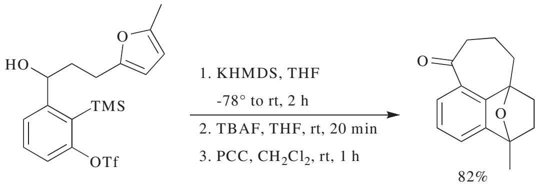




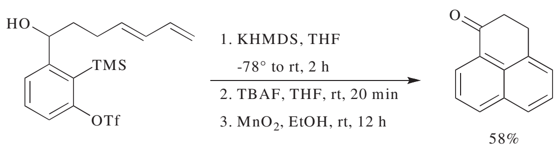
Intramolecular trapping of the benzyne intermediates also proved possible as shown in Eqs. 50, 51 and 52. With relation to the ARC method, it should be noted that the use of the fluoride-promoted benzyne formation using *o*-(trimethylsilyl)phenyltriflate as a precursor is well established.[32]



(50)

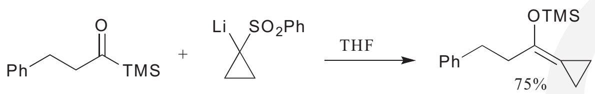


(51)

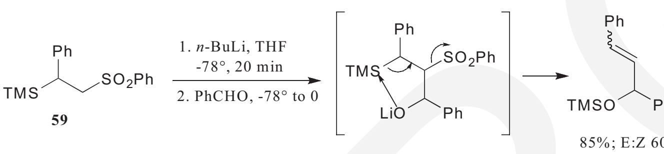


(52)

Similar approaches, in which silyl migration leads to an anion with a β-leaving group and subsequent generation of a multiple bond, have been used for the generation of olefins from loss of a leaving group in α-substituted acylsilanes (Eq. 53)[33] and the phenylsulfonyl group from **59** (Eq. 54).[34] Another related example involves the opening of epoxide **60** (Eq. 55) and subsequent reactivity.[35]



(53)



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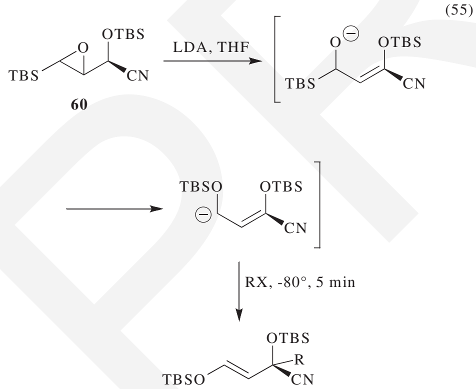
(54)



(55)

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References

1. Brook, A. G. *Silicon Compounds: Silanes and Silicones*, Arkles, B. and Larson, G. Eds. Gelest, Inc. Morrisville, PA **2008**, 58.
2. Brook, A. G. *Acc. Chem. Res.* **1974**, *7*, 77.
3. Tietze, L. F.; Geissler, H.; Gewert, J. A.; Jakobi, U. *Synlett* **1994**, 511.
4. Fischer, M.-R.; Kirschning, A.; Michel, T.; Schaumann, E. *Angew. Chem. Int. Ed.* **1994**, *33,* 217.
5. For a review on applications towards total syntheses consult: Smith, A. B., III; Wuest, W. M. *Chem. Commun.* **2008**, 5883.
6. Genrich, F.; Schaumann, E. *Tetrahedron Lett.* **2009**, *50,* 6187.
7. Smith, A. B., III; Xian, M.; Kim, W.-S.; Kim, D.-S. *J. Am. Chem. Soc.* **2006**, *128*, 12368.
8. Devarie-Baez, N. O.; Shuhler, B. J.; Wang, H.; Xian, M. *Org. Lett.* **2007**, *9*, 4655.
9. Smith, A. B., III; Kim, D.-S.; Xian, M. *Org. Lett.* **2007**, *9*, 3307.
10. Smith, A. B., III; Xian, M. *J. Am. Chem. Soc.* **2006**, *128*, 66.
11. Smith, A. B., III; Tong, R. *Org. Lett.* **2010**, *12*, 1260.
12. Smith, A. B., III; Kim, W.-S.; Wuest, W. M. *Angew. Chem. Int. Ed.* **2008**, *47*, 7082.
13. Grubbs, R. H. *Tetrahedron*, **2004**, *60*, 7117.
14. Corey, E. J.; Erickson, B. W. *J. Org. Chem.* **1971**, *36*, 3553.
15. Smith, A. B., III; Tong, R.; Kim, W.-S.; Maio, W. A. *Angew. Chem. Int. Ed.* **2011**, *50*, 8904.
16. Smith, A. B., III; Hoye, A. T.; Martinez-Solorio, D.; Kim, W.-S.; Tong, R. *J. Am. Chem. Soc.* **2012**, *134*, 4533.
17. Nakao, Y.; Takeda, M.; Matsumoto, T.; Hiyama, T. *Angew. Chem. Int. Ed.* 2010, 49, 4447 and references therein.
18. Smith, A. B., III; Kim, W.-S.; Tong, R. *Org. Lett.* **2010**, *12*, 588.
19. Wang, X.; Wang, W.; Zheng, H.; Su, Y.; Jiang, T.; He, Y.; She, X. *Org. Lett.* **2009**, *11*, 3136.
20. Kinnaird, J. W. A.; Ng, P. Y.; Kubota, K.; Wang, X.; Leighton, J. L. *J. Am. Chem. Soc.* **2002**, *124*, 7920.
21. Mukherjee, S.; Lee, D. *Org. Lett.* **2009**, *11*, 2916.
22. Zacuto, M. J.; O'Malley, S. J.; Leighton, J. L. *J. Am. Chem. Soc.* **2002**, *124*, 7890.
23. Zacuto, M. J.; O'Malley, S. J.; Leighton, J. L. *Tetrahedron* **2003**, *59*, 8889.
24. Leung, L. M. H.; Gibson, V.; Linclau, B. *J. Org. Chem.* **2008**, *73*, 9197.
25. Smith, A. B., III; Foley, M. A.; Dong, S.; Orbin, A. *J. Org. Chem.* **2009**, *74*, 5987.
26. Smith, A. B., III; Doughty, V. A.; Lin, Q.; Zhuang, L.; McBriar, M. D.; Boldi, A. M.; Moser, W. H.; Murase, N.; Nakayama, K.; Sobukawa, M. *Angew. Chem. Int. Ed.* **2001,** *40,* 191.
27. 27. Smith, A. B. III; Kim, D.-S. *Org. Lett.* **2005**, *7*, 3247.
28. Smith A. B., III; Kim, D.-S. *J. Org. Chem.* **2006**, *71*, 2547.
29. Smith, A. B., III; Kim, D.-S. *Org. Lett.* **2007,** *9*, 3311.
30. Smith, A. B., III; Pitram, S. M. *Org. Lett.* **1999**, *1*, 2001.
31. Smith, A. B., III; Kim, W.-S. *Proc. Nat. Acad. Sci.* **2011**, *108*, 6787.
32. Reich, H. J.; Holtan, R. C.; Bolm, C. *J. Am. Chem. Soc.* **1990**, *112*, 5609.
33. Menichetti, S.; Stirling, C.J. M. *J. Chem. Soc., Perkin Trans. 1* **2002**, 28.
34. Takeda, K.; Kawanishi, E.; Sasaki, M.; Takahashi, Y.; Yamaguchi, K. *Org. Lett.* **2002**, *4*, 1511.
35. Snowden, T. S., *Handbook of Reagents for Organic Synthesis: Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed. John Wiley and Sons, **2011**, 697.

Bioactive Organosilanes

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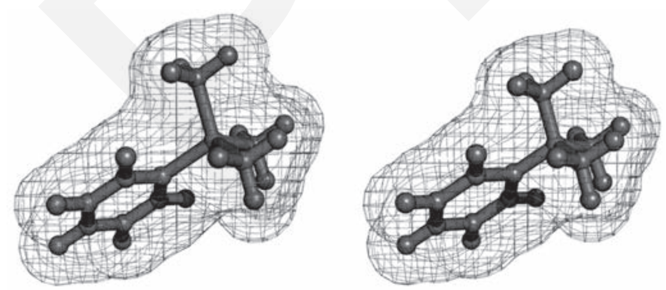
Organosilanes, which are entirely man made, are best known as inert, biologically compatible substances. Of course, like their carbon analogs, biologically active organosilanes can be devised and discovered. The close analogy between carbon and silicon properties has intrigued chemists for decades. Highly successful fungicidal and insecticidal crop protectants with a central silicon atom are established commercial products (see Figure 2), but organosilanes remain a largely untapped resource as pharmaceuticals. The vast array of organosilane intermediates currently available, coupled with increasingly powerful synthetic methods for organosilane construction, has led to a renaissance in bioactive organosilane research. This brief review will describe some of the historical highlights of the search for bioactivity in organosilanes and contemporary advances. Additional information can be found in earlier reviews, which began to appear as early as 1967.[1-9]

Silicon and its organic derivatives have no intrinsic toxicity,[10,11] and as the element structurally and chemically most similar to carbon it is not surprising that the pursuit of silicon-based pharmaceuticals has a substantial history. Organosilicon chemistry is, in many ways, easier than all-carbon chemistry, particularly when considering sterically congested systems.

Substitution of a molecule's carbon atom by silicon is the most subtle alteration possible. Organosilanes, in comparison with the corresponding carbon compounds, are slightly larger: the Si–C bond is 20% longer than a C–C bond and a trimethylsilyl group has a volume that is about 20% larger than a *tert*-butyl group.[12] Organosilanes are generally more lipophilic than the corresponding carbon structure, although this may not be true for the rather polar silanols. The octanol–water partition has been measured for several analogous structures such as trimethylsilyl and *tert*-butyl benzenes (Figure 1, see also Figure 6).[7]



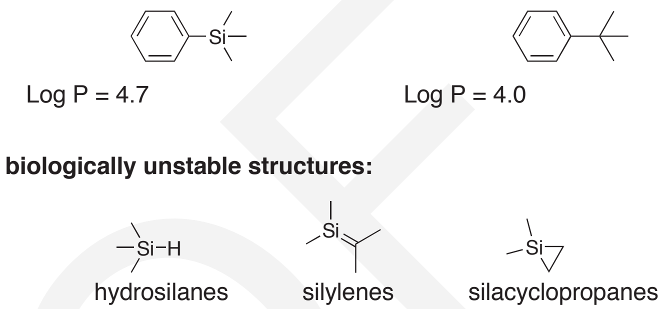


Figure 1. Comparisons of Si and C structures.

Not all silicon structures can be directly translated into carbon compounds, and vise versa (see Figure 7), especially when considering application in an aqueous, oxygen-rich environment. For example, Si–H bonds are rapidly oxidized *in vivo*.[13] Double bonds to silicon are extremely unstable under almost all conditions,[14,15] and silicon in a three-membered ring can be reactive with water and air.[16,17]

Use of silicon in bioactive molecules has been most successful in the agricultural chemical industry, where regulatory issues are perhaps less arduous than the pharmaceutical arena. Two organosilanes are successful commercial products, the fungicide flusilazole **1** and the insecticide silafluofen **2**.[18],[19] The performance of these products under field conditions underscores the environmental and metabolic stability of organosilanes. In both cases, closely related carbon-based structures are known.[20,21]

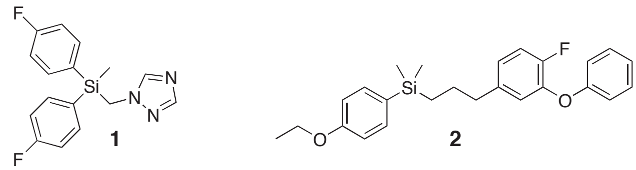


Figure 2. Commercial crop protection chemicals, fungicide flusilazole **1**[18] and insecticide silafluofen **2**.[19]

Clinical Trials of Organosilanes

Clinical trials have been conducted with organosilanes for a number of diseases, some of which are shown in Figure 3. Additional examples can be found in Figures 5 and 13. Organosilane derivatives of the topoisomerase inhibitor campothecin, in which a trialkylsilyl group provides a lipophilic anchor at C-7, have proven to be effective anticancer agents.[22,23] Karenitecin **3** has undergone successful Phase II clinical trials as a treatment for metastatic melanoma.[24]

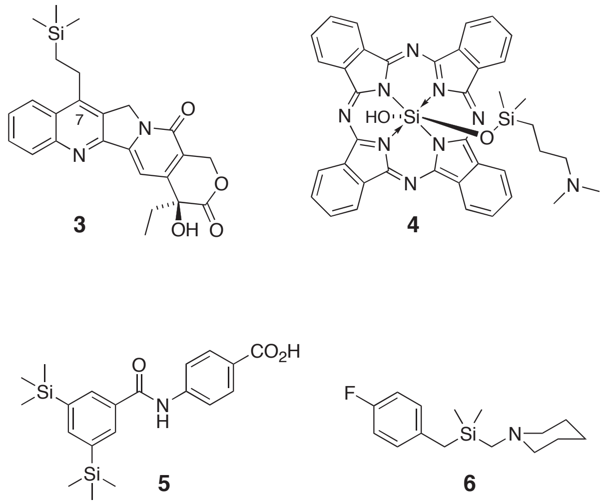


Figure 3. Organosilanes that have undergone clinical trials.

The phthalocyanine **4** (Pc 4), incorporating a siloxane with both tetra- and hexavalent silicon atoms, is a singlet oxygen generator when exposed to visible light and oxygen. With a propensity to target cancer cells, Pc 4 has proven to be very effective in clinical trials. The cellular site(s) of interaction of **4** have been suggested.[25,26]

Bis-trimethylsilylbenzamide **5** (TAC-101) is an anticancer treatment that is selective for the retinoic acid-alpha receptor. Phase I/II studies have shown good efficacy.[27] More recent studies have found **5** to have angiogenesis effects,[28] and potential application as a treatment for autoimmune disease[29] as well as dementia.[30]

Silperisone **6** is a centrally acting muscle relaxant that acts on the sodium channel. A better separation of voluntary and involuntary muscle control was found for **6** relative to its non-silicon based analogs.[31]

Approaches to Organosilane Drug Discovery

There are two fundamentally different approaches to identifying bioactive organosilanes, design and random screening. Design of a molecule requires knowledge of the chemical details of a biological process, or a bioactive chemical structure as a starting point. This approach has a prominent intellectual component at the beginning of the discovery process. Conservative modification of a known bioactive structure, such as substitution of a quaternary carbon with silicon, has a high probability for success. In contrast, random screening of organosilanes in a biological screen of interest generally has a low probability for success and relies entirely on chance for a discovery of significance. Random screening can, however, lead to a quantum leap in structural novelty that is beyond the analogy design process.

Bioactive Organosilanes Without Carbon Analogy

A number of interesting organosilanes with biological activity have been discovered that do not have analogous carbon structures, Figure 4. The *cis*-1,3-diphenyl cyclotetrasiloxane **7**, cisobitan, was discovered to have estrogenic activity, subsequently determined to be consistent with its metabolism to **8**.[32] Diphenylsilanediol **9** was found to have anticonvulsant activity and was tested in pre-clinical trials as a potential treatment for epilepsy.[33]

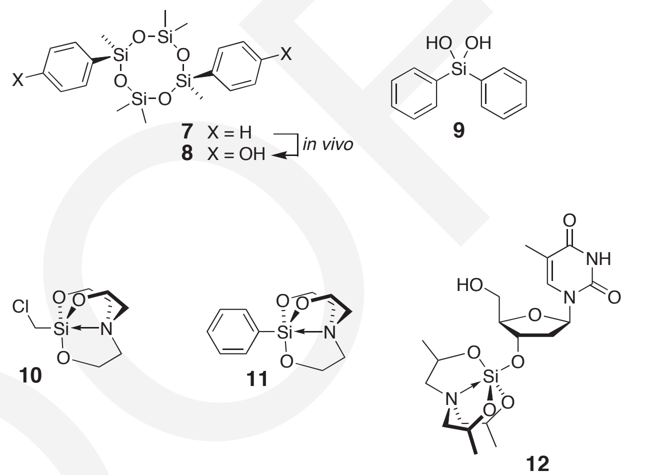


Figure 4. Bioactive organosilanes without carbon analogy.

The silatranes with their pentavalent silicon (**10–12**), easily prepared from trichlorosilanes and triethanolamine, have been extensively studied.[34] The chloromethyl derivative **10** has a multitude of attributes, especially healing, promotion of hair growth, and antitumor effects.[35] Successful wound healing studies in man have been reported. In contrast, phenylsilatrane **11** has affinity for the picrotoninin receptor and is therefore quite toxic, with potential use as a rodenticide. Recently, the silatrane-substituted thymidine **12** was discovered to have anticancer properties against a number of cell lines. The optimal stereochemistry for the three methyl substituents of the tricyclic silatrane group has not been established.[36]

Early Examples of the Silicon-for-Carbon Substitution Strategy

The recognition that a trimethylsilyl group could substitute for a *tert*-butyl group was tested more than 40 years ago with insecticide **14**.[37] Carbamates **13**[38] and **14** are both excellent inhibitors of acetylcholine esterase, a traditional insecticide / nerve agent target. As insecticides, **13** and **14** are very similar.[37] More recently trifluoromethyl ketone **15**,[39] a reversible inhibitor of acetylcholine esterase, was the starting point for development of the trimethylsilyl analogue **16** (zifrosilone).[40] Ketone **10** advanced to clinical trials as a potential treatment for Alzheimer's disease.[41]

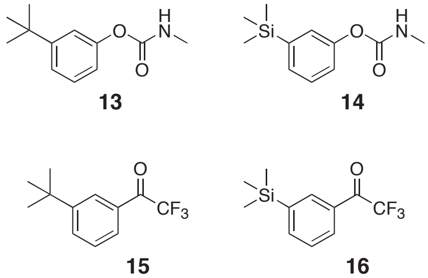


Figure 5. Trimethylsilyl and *tert*-butyl group interchange creates novel insecticides and pharmaceuticals. Zifrosilone **16** entered clinical trials as a treatment for Alzheimer's disease.

An early and notable design failure was the use of a silane as a less persistent analog of DDT **17**. Replacement of the central carbon of **17** with silicon to give **18** resulted in a substance without insecticidal activity. The lack of toxicity with **18** was subsequently understood to be a result of the larger overall size of the molecule.[42]

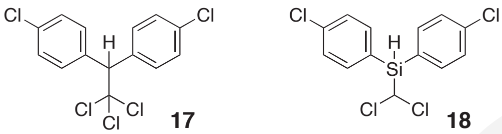


Figure 6. DDT analog **18** was inactive.

A study of barbiturate analogs with trimethylsilylmethyl and *tert*-amyl groups found that in mice the silane **19** had a faster onset and longer duration of action than carbon equivalent **20**. Evaluation of these structures included measurement of their partitioning between chloroform and pH 7.4 phosphate buffer, and silane **19** was found to be significantly more lipophilic than the *tert*-amyl **20**.[43]

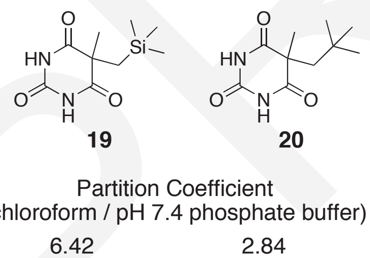


Figure 7. Barbiturate analogs.

Organosilane Analogs—The Silicon Switch Approach with Quaternary Carbons

The recognition that substitution of a quaternary carbon with a silicon atom will yield a product that is subtly different, yet an entirely new intellectual property entity,[44] has led to a substantial exploration of this concept. In addition to the examples in Figures 2, 3 and 5, Figure 8 illustrates a recently reported structure in which two carbons of the retinoid agonist Bexarotene **22** have been exchanged for silicon to give **21**. A rather significant conformational change for the nonaromatic ring accompanies this substitution, but the two are nearly identical in their pharmacology.[45]

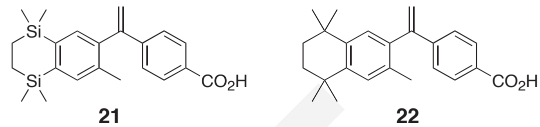


Figure 8. Double silicon switch in silicon analog **21** of the retinoid antagonist bexarotene **22.**[45]

Organosilane Analogs—Silicon Substitution for Methylene Group Carbon

Replacement of a carbon bearing hydrogens with silicon requires additional substitution because the Si–H bond is readily oxidized.[13] This type of alteration can be used to block sites of metabolism, however the substantial steric bulk change is potentially problematic. This substitution was explored in the context of the estradiol skeleton, Figure 9, where silicon at C-6 in **23** was expected to prevent metabolic oxidation at this position, and enhance the duration of activity. Unfortunately, this substitution was found to eliminate the hormonal activity of estradiol **24**.[46,47]

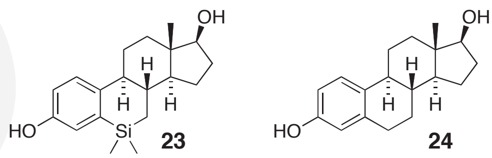


Figure 9. Substitution of C-6 of estradiol **24** by a dimethylsilyl group.

Naturally occurring polyamines such as spermine **25** are associated with anticancer properties, attributed to both intrinsic antioxidative effects and their ability to chelate reactive oxygen-producing metals. These properties are enhanced when spermine **25** is altered to include a dimethylsilyl group **26**. The enhanced lipophilicity of the silane also increases the association of the polyamine with phospholipid monolayers.[48-50]

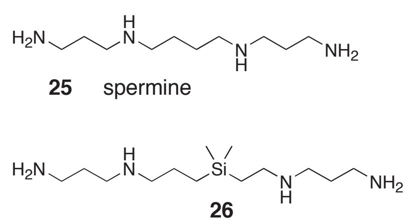


Figure 10. Insertion of a dimethylsilyl group into a polyamine leads to anticancer agent **26** with *in vitro* activity.

Replacement of a methylene group by a dimethylsilyl group in the amino acid proline **28**, yielding **27**, has led to a range of applications. This substitution does not significantly change the conformation of the five-membered ring, nor does it lead to altered polypeptide conformations. The silicon substitution does endow derivatives with enhanced lipophilicity, measured for Fmoc derivatives **29** and **30**, and a resistance to degradation.[51] A substance P analog incorporating sila-proline **27** was potent and had enhanced resistance to proteases.[52] Incorporation of **27** in proline-rich cell-penetrating peptides did not change secondary structure, and enhanced cellular uptake.[53]

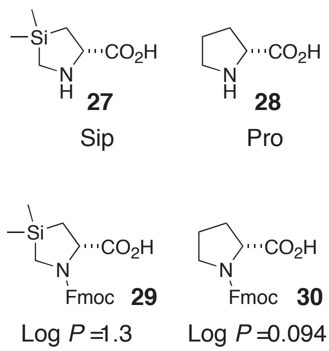


Figure 11. Silaproline (Sip) **27**. Substitution in polypeptides leads to higher lipophilicity with retention of biological activity.

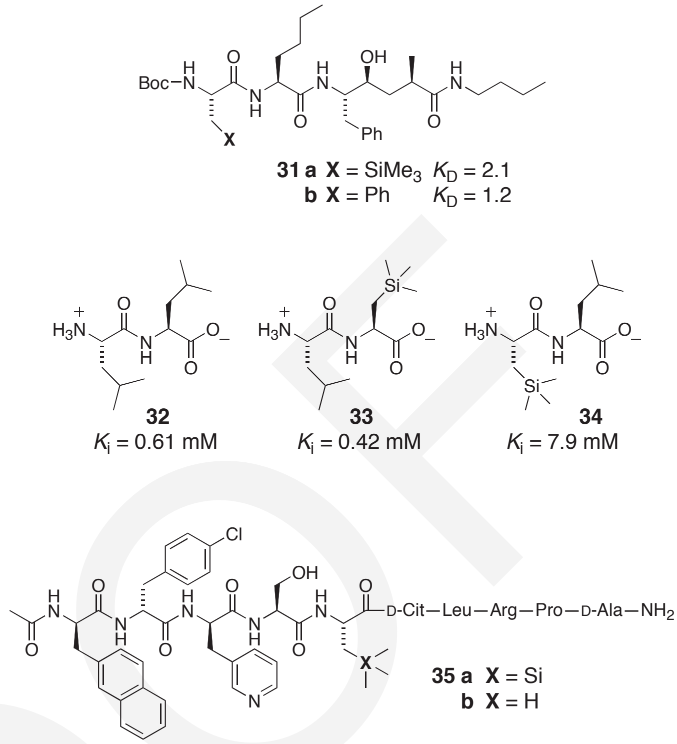


Figure 12. Trimethylsilyl alanine in modified peptides.

Organosilane Analogs—Silicon Replacement of Methine and Aryl Group Carbon

Replacement of a hydrogen on alanine with a trimethylsilyl group yields a non-natural amino acid that has been proposed as a replacement for both phenylalanine and for leucine. As inhibitors of the aspartic protease renin, trimethylsilyl alanine derivative **31a** was nearly as effective as the phenylalanine **31b**.[54] Dipeptide inhibitors of thermolysin **32**–**34** have been described. Replacement of leucines individually gave, for **33**, a slightly better inhibitor and for **34** an order of magnitude poorer inhibition.[55]

Replacing a tyrosine with trimethylsilyl alanine in the structure of Cetrorelix to give **35a,** or with a *tert*-Leu to give **35b**, led to equivalent antagonism of gonadotropin-releasing hormone in rats for both structures. The effect of silane **35a** was substantially longer lasting, however, than the carbon analog **35b**.[56]

A recently developed bioactive organosilane is **36** where the *o*-toluyldimethylsilane moiety replaced the dithienyl group of **37**. Silane **36** was the first orally active inhibitor of squalene epoxidase[57] and effectively lowered cholesterol biosynthesis in rats. Gem-dimethyl carbon analog **38**, also an effective inhibitor of squalene epoxidase,[58] appears to have been designed by analogy with the silane.

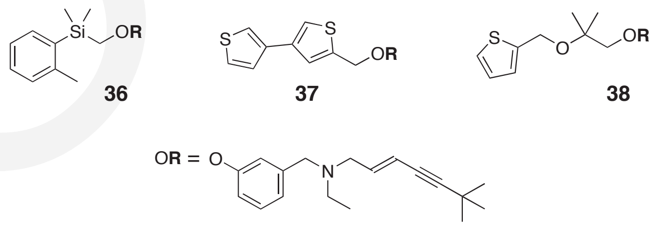
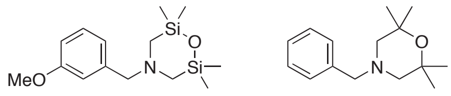


Figure 13. Silane **36** is an orally active inhibitor of cholesterol biosynthesis.[59]

Organosilane Analogs—The Silicon Switch with Tertiary Ethers and Alcohols

Alcohols and ethers can be starting points for introduction of silicon in bioactive substances. The Si–O bond, while very strong, is also somewhat labile. This is particularly clear in optically active silanols, which racemize in the presence of water. In addition, silanols are slightly more acidic, and better hydrogen bonding, than carbinols. Trialkyl(or aryl)silanols and silyl ethers have been found to have a very interesting level of biological activities (see also Figure 4).

The interesting siloxane **39** has been tested as a skeletal muscle relaxant in several mammals, including man.[6] Doses up to 100 mg of **39** were well tolerated in healthy males.[60] Similar biological activities have not been reported for the carbon analog **40**, which has been evaluated for hypolipidemic activity.[61]



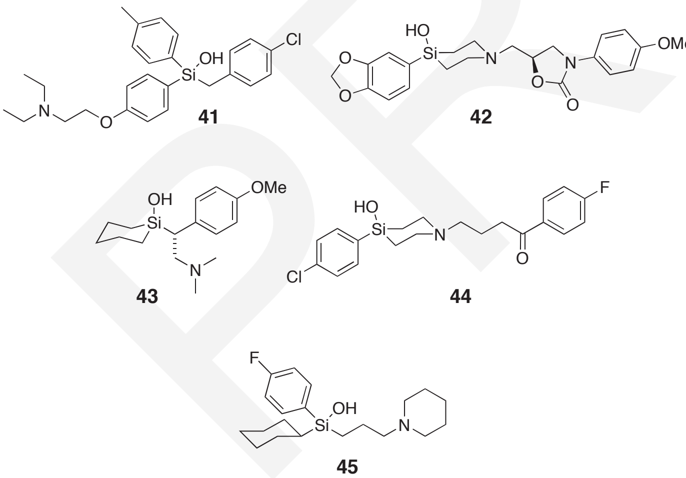
39 **40**

Figure 14. Skeletal muscle relaxant **39**.[6]
Similar evaluation of the carbon analog has not been reported.

A number of silanols have been prepared as analogs of known bioactive carbinols, Figure 15. Carbinol **41** has potent hypolipidemic activity in mice, with similar activity to the carbon analog. The silanol, however, is less toxic than the carbinol in repeated dosings.[62] The silane analog **42** of the experimental antipsychotic panamesine was found to be a 3-fold better ligand for the sigma-1 receptor.[63] Silanol **43**, an analog of the serotonin/noradrenalin reuptake inhibitor venlafaxine, has a pharmacological profile that differs from its carbon analog. The (*R*) isomer (shown) inhibits noradrenaline reuptake 10-fold more potently than it inhibits serotonin and dopamine reuptake transporters.[64]

An altered profile is also seen for silanol **44**, in comparison to its carbinol analog haloperidol. These dopamine receptor antagonists interact with the human dopamine receptors. In comparison with the carbinol, the silanol is nearly 5-fold more selective for the D_2 receptor.[65] The consequences of this selectivity are not yet known.

Perhaps no silicon switch has been more successful than *p*-fluoro-sila-difenidol **45**. Silanol **45** is more active as a muscarinic antagonist than the carbon analog by factors of 32-81, depending on the receptor subtype.[66,67] Silanol **45** is a commercially available pharmacological tool.

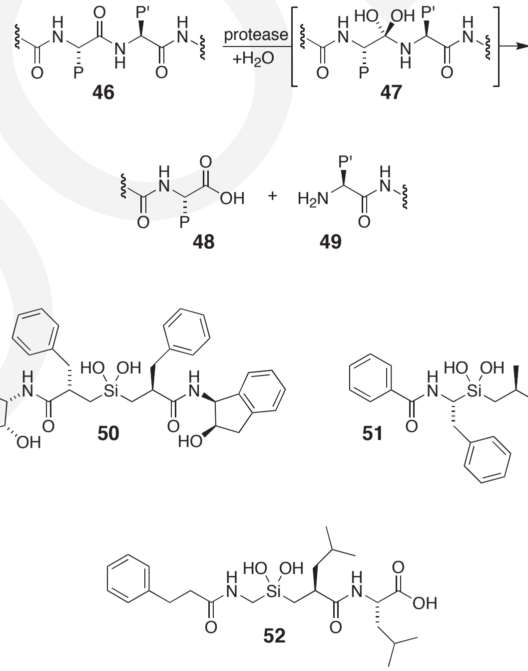


41 **42** **43** **44** **45**

Figure 15. Silanols prepared in silicon switch strategy studies.

Organosilane Analogs—Silicon Substitution for Unstable Carbon

Silicon can substitute for an unstable carbon atom as well.[68] Hydrolysis of amides and esters proceed through a tetrahedral intermediate such as **47**, and inhibition of these hydrolytic enzymes is an important area of drug design. Silanediols can mimic the hydrated carbonyl of **47**. Three silanediol enzyme inhibitors have been prepared, with enzyme inhibition of 2.7–40 nM; in all cases nearly as effective as the corresponding carbinol, ketone or phosphinic acid. Symmetric **50** inhibits the HIV protease, an aspartic protease.[69] Silanediols **51** and **52** inhibit the metalloproteases angiotensin-converting enzyme (ACE) and thermolysin, respectively.[70-72] Inhibition of ACE is an important approach to controlling hypertension. A crystal structure of **52** bound at the active site of thermolysin found it to bind in a conformation nearly identical to a corresponding phosphinamide inhibitor.[73]



46 **47** **48** **49** **50** **51** **52**

Figure 16. Silanediols as mimics of the unstable hydrated carbonyl group **47**, and its use as protease inhibitors.

α-Amino Silanes

Positioning a primary amine adjacent to a trialkylsilane yields a compound with special properties.[74] The simplest example, aminomethyltrimethylsilane **53** is an inactivator of monoamine oxidase enzymes MAO-A and MAO-B, proceeding through an electron transfer mechanism.[75,76] In contrast, the carbon analog **54** is a substrate for the enzymes. Disabling MAO-A is a potential treatment for depression whereas MAO-B inactivation can play a role in the treatment of Parkinson's disease.[77,78]

The four homologous aminomethylsilanes **53** and **55–58** were tested as inhibitors of the semicarbazide-sensitive amine oxidase, finding **58** > **53** ~ **57** >> **56**.[79] It was subsequently reported that **33c** was a selective inhibitor of MAO-B.[80] Inhibition of diamine oxidase by diamines related to **53** have also been evaluated.[81] All a-aminosilane MAO inactivators are characterized as electron-rich silyl substituted methylamines.

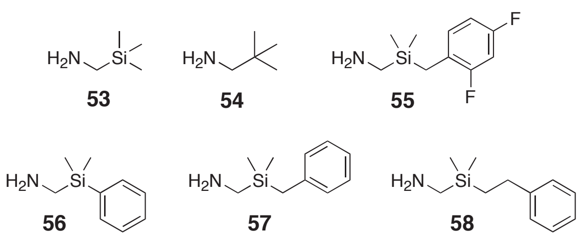


Figure 17. Inactivators of monoamine oxidases.

Metabolism of Organosilanes

In general, the metabolic pathways for organosilanes follows pathways expected for the corresponding carbons structures. In a rough comparison of **59** and **61**, Fessenden found similar metabolic rates, and standard oxidation products, Figure 18. In contrast, Si–H bond-containing structure **68** was found by Fessenden to be oxidized and excreted much more rapidly *in vivo* than **64**.[13]

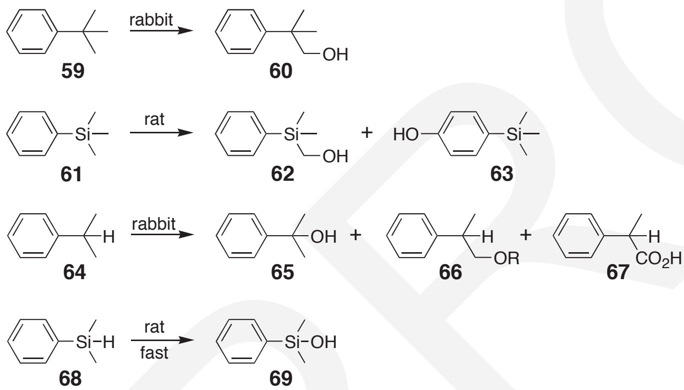


Figure 18. Comparative metabolism of organosilanes.[13]

As a model for the partially oxidized silanes in silicones, hexamethyldisiloxane **70** is metabolized in rats to give hydrolysis product **73** and the corresponding hydroxymethyl products **71**, **72** and **74**. In addition, loss of methyl to give dimethylsilanediol **75** was observed.[82]

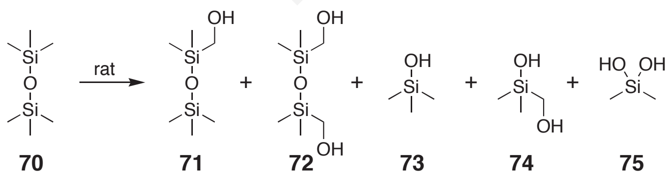


Figure 19. Metabolic fate of hexamethyldisiloxane.[82]

A study of the triazole fungicide simeconazole **76** found that oxidation of the carbons surrounding the silicon was the major oxidation path. These paths included cleavage of the Si–C bonds.[83]

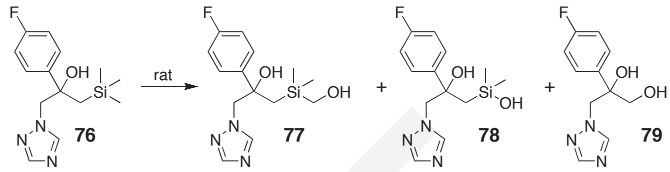


Figure 20. Oxidation of carbon surrounding the silicon in fungicide simeconazole **76**.[83]

The fate of skeletal muscle relaxant **39** has been studied in both rats and man. Notably, dealkylation of the methyl ether and the nitrogen and oxidation of the aromatic ring gave the major metabolites. Hydroxylation of the silicon methyl groups was not reported.[60,84]

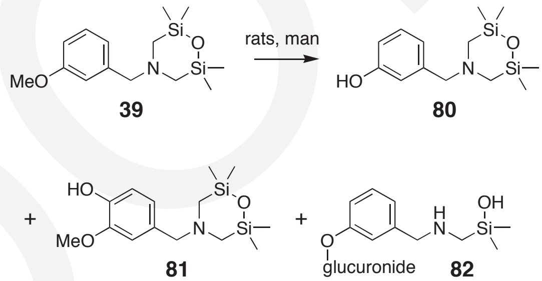


Figure 21. Metabolism of skeletal muscle relaxant **39** gave oxidation of the aromatic ring and cleavage of the N–C bond.[60,84]

Overall, the metabolic fate of organosilanes appears to follow rather standard pathways so long as strained or silicon hydrides are avoided.

Future Prospects

The last two decades have seen the successful launch and marketing of organosilane pesticides. It seems likely that the next several years will see approval of the first organosilicon pharamaceutical. Novel organosilane structures with biological activity continue to be identified and this will likely result in new clinical evaluations. Hopefully additional insight into metabolism and reaction pathways will emerge.

References

1. Englebienne, P., Hoonacker, A. V., *Drug Design Reviews - Online* **2005,** *2,* 467-83.
2. Mills, J. S., Showell, G. A. *Expert Opinion On Investigational Drugs* **2004,** *13,* 1149-57.
3. Bains, W., Tacke, R. *Current Opinion in Drug Discovery and Development* **2003,** *6,* 526-43.
4. Sieburth, S. M. “Isosteric Replacement of Carbon with Silicon in the Design of Safer Chemicals”, in *Designing Safer Chemicals,* DeVito, S. C., Garrett, R. L., Eds.; American Chemical Society:Washington, DC 1996, pp 74-83.
5. Tacke, R., Linoh, H., Patai, S., Rappoport, Z. “Bioorganosilicon Chemistry”, in *The Chemistry of Organic Silicon Compounds(2),* John Wiley & Sons:New York 1989, pp 1143-206.
6. Barcza, S. “The Value and New Directions of Silicon Chemistry for Obtaining Bioactive Compounds”, in *Silicon Chemistry,* Corey, E. R., Corey, J. Y., Gaspar, P. P., Eds.; Wiley:New York 1988, pp 135-44.
7. Fessenden, R. J., Fessenden, J. S. *Adv. Organomet. Chem.* **1980,** *18,* 275-99.
8. Tacke, R., Wannagat, U. *Top. Curr. Chem.* **1979,** *84,* 1-75.
9. Fessenden, R. J., Fessenden, J. S. *Adv. Drug Res.* **1967,** *4,* 95-132.
10. Cassidy, S. *Manufacturing Chemist* **1989,** *December,* 51.
11. Friedberg, K. D., Schiller, E. “Silicon”, in *Handbook on Toxicity of Inorganic Compounds,* Seiler, H. G., Sigel, H., Eds.; Marcel Dekker:New York 1988, pp 595-617.
12. Liu, G., Sieburth, S. M. *Org. Lett.* **2005,** *7,* 665-8.
13. Fessenden, R. J., Hartman, R. A. *J. Med. Chem.* **1970,** *13,* 52-4.
14. Guliashvili, T., El-Sayed, I., *Angew. Chem. Int. Ed.* **2003,** *42,* 1640-2.
15. Ottosson, H. *Chem. Eur. J.* **2003,** *9,* 4144-55.
16. Seyferth, D., Annarelli, D. C. *J. Am. Chem. Soc.* **1975,** *97,* 2273-5.
17. Franz , A. K., Woerpel, K. A. *Acc. Chem. Res.* **2000,** *33,* 813-20.
18. Moberg, W. K., Basarab, G. S., Cuomo, J., Liang, P. H., Greenhalgh, R., Roberts, T. R. “Biologically Active Organosilicon Compounds: Silicon-Containing Triazole Fungicides”, in *Pesticide Science and Biotechnology,* Blackwell Scientific:Boston 1986, pp 57-60.
19. Sieburth, S. M., Manly, C. J., *Pestic. Sci.* **1990,** *28,* 289-307.
20. Itoh, H., Kajino, H., *Bioorg. Med. Chem.* **2002,** *10,* 4029-34.
21. Sieburth, S. M., Lin, S. Y., Engel, J. F., Greenblatt, J. A., Burkart, S. E., Gammon, D. W., Crombie, L. “Silane Analogs of MTI-800: Biology and Chemistry”, in *Recent Advances in the Chemistry of Insect Control II,* Royal Society of Chemistry:London 1990, pp 142-50.
22. Bom, D., Curran, D. P., *J. Med. Chem.* **2000,** *43,* 3970-80.
23. Song, L., Bevins, R., *J. Med. Chem.* **2006,** *49,* 4344-55.
24. Daud, A., Valkov, N., *Clinical Cancer Research Clinical Cancer Research* **2005,** *11,* 3009-16.
25. Morris, R. L., Varnes, M. E., *Photochem. Photobiol.* **2002,** *75,* 652-61.
26. Xue, L. -. y., Chiu, S. -. m., *Oncogene* **2001,** *20,* 3420-7.
27. Rizvi, N. A., Marshall, J. L., *J. Clin. Oncol.* **2002,** *20,* 3522-32.
28. Minagawa, N., Nakayama, Y., *Oncol Res* **2004,** *14,* 407-14.
29. Miyagawa, N., Homma, T., *Pharmacology* **2003,** *67,* 21-31.
30. Shudo, K., Kagechika, H., *Biological & Pharmaceutical Bulletin* **2004,** *27,* 1887-9.
31. Kocsis, P., Farkas, S., *J. Pharmacol. Exp. Ther.* **2005,** *315,* 1237-46.
32. Alfthan, O., Andersson, L., *Scandinavian Journal of Urology and Nephrology* **1983,** *17,* 37-43.
33. Cunningham, J. G., Ford, R. B., *Amer. J. Vet. Res.* **1981,** *42,* 2178-81.
34. Voronkov, M. G. *Top. Curr. Chem.* **1979,** *84,* 77-135.
35. Kazimirovskaya, V. B., D’yakov, V. M., *Pharm. Chem. J.* **2001,** *35,* 465-7.
36. Black, C. A., Ucci, J. W., *Bioorg. Med. Chem. Lett.* **2002,** *12,* 3521-3.
37. Metcalf, R. L., Fukuto, T. R. *J. Econ. Ent.* **1965,** *58,* 1151.
38. David, W. A. L., Metcalf, R. L., *J. Econ. Ent.* **1960,** *53,* 1021.
39. Nair, H. K., Quinn, D. M. *Bioorg. Med. Chem. Lett.* **1993,** *3,* 2619-22.
40. Hornsperger, J., Collard, J., *Biochemical Society Transactions* **1994,** *22,* 758-66.
41. Cutler, N. R., Seifert, R. D., *Clin Pharmacol Ther* **1995,** *58,* 54-61.
42. Fahmy, M. A. H., Fukuto, T. R., *J. Agric. Food Chem.* **1973,** *21,* 585-91.
43. Woo, D. V., Christian, J. E., *Can. J. Pharm. Sci.* **1979,** *14,* 12-4.
44. Showell, G. A., Mills, J. S. *Drug Discovery Today* **2003,** *8,* 551-6.
45. Daiss, J. O., Burschka, C., *Organometallics* **2005,** *24,* 3192-9.
46. Barcza, S., Hoffman, C. W. *Tetrahedron* **1975,** *31,* 2363-7.
47. Pitt, C. G., Friedman, A. E., *Tetrahedron* **1975,** *31,* 2369-77.

48. Berdycheva, O., Desbat, B., *Chem. Phys. Lipids* **2003,** *125,* 1-11.
49. Gaboriau, F., Vaultier, M., *Redox Report* **2005,** *10,* 9-18.
50. Berdysheva-Desert, O., Desbat, B., *Colloids Surf., B* **2005,** *42,* 227-34.
51. Cavelier, F., Vivet, B., *J. Am. Chem. Soc.* **2002,** *124,* 2917-23.
52. Cavelier, F., Marchand, D., *J. Peptide Res.* **2004,** *63,* 290-6.
53. Pujals, S., Fernández-Carneado, J., *J. Am. Chem. Soc.* **2006,** *128,* 8479-83.
54. Weidmann, B. *Chimia* **1992,** *46,* 312-3.
55. Ishikawa, H., Yamanaka, H., *Appl. Microbiol. Biotechnol.* **1999,** *53,* 19-22.
56. Tacke, R., Merget, M., *Organometallics* **2000,** *19,* 3486-97.
57. Chugh, A., Ray, A., *Prog. Lipid Res.* **2003,** *42,* 37-50.
58. Sawada, M., Matsuo, M., *Eur. J. Pharmacol.* **2001,** *431,* 11-6.
59. Gotteland, J., Brunel, I., *J. Med. Chem.* **1995,** *38,* 3207-16.
60. Tse, F. L. S., Jaffe, J. M., *J. Clin. Pharmacol.* **1984,** *24,* 47-57.
61. Bennett, G. B., Houlihan, W. J., *J. Med. Chem.* **1976,** *19,* 709-14.
62. Tacke, R., Bentlage-Felten, A., *Z Naturforsch [B]* **1986,** *41B,* 649-54.
63. Ilg, R., Burschka, C., *Organometallics* **2006,** *25,* 5396-408.
64. Daiss, J. O., Burschka, C., *Organometallics* **2006,** *25,* 1188-98.
65. Tacke, R., Heinrich, T., *Organometallics* **2004,** *23,* 4468-77.
66. Tacke, R., Terunuma, D., *J. Organomet. Chem.* **1995,** *501,* 145-54.
67. Tacke, R., Handmann, V. I., *Organometallics* **2002,** *21,* 3727-32.
68. Sieburth, S. M., Chen, C. -. A. *Eur. J. Org. Chem.* **2006,** 311-22.
69. Chen, C. -. A., Sieburth, S. M., *Chem. Biol.* **2001,** *8,* 1161-6.
70. Mutahi, M. w. a., Nittoli, T., *J. Am. Chem. Soc.* **2002,** *124,* 7363-75.
71. Kim, J., Hewitt, G., *J. Org. Chem.* **2005,** *70,* 5781-9.
72. Kim, J., Sieburth, S. M. *J. Org. Chem.* **2004,** *69,* 3008-14.
73. Juers, D. H., Kim, J., *Biochemistry* **2005,** *44,* 16524-8.
74. Picard, J. P. *Adv. Organomet. Chem.* **2005,** *52,* 175-375.
75. Silverman, R. B., Banik, G. M. *J. Am. Chem. Soc.* **1987,** *109,* 2219-20.
76. Silverman, R. B. *Acc. Chem. Res.* **1995,** *28,* 335-42.
77. Youdim, M. B. H., Weinstock, M. *NeuroToxicology* **2004,** *25,* 243-50.
78. Ives, N. J., Stowe, R. L., *BMJ* **2004,** *329,* 593-9.
79. Danzin, C., Collard, J., *Bioorg. Med. Chem. Lett.* **1995,** *5,* 2363-6.
80. Danzin, C., Zreika, M., *Biochemical Society Transactions* **1994,** *22,* 768-73.
81. Van Dorsselaer, V., Schirlin, D., *Bioorganic Chemistry* **1996,** *24,* 178-93.
82. Varaprath, S., McMahon, J. M., *Drug Metab. Disp.* **2003,** *31,* 206-14.
83. Wakabayashi, K., Sadakane , S., *J. Pest. Sci.* **2005,** *30,* 90-8.
84. Dain, J. G., Nicoletti, J. *Xenobiotica* **1995,** *25,* 951-61.

CROSS-COUPLING OF SILANOLS AND SILANOLATES

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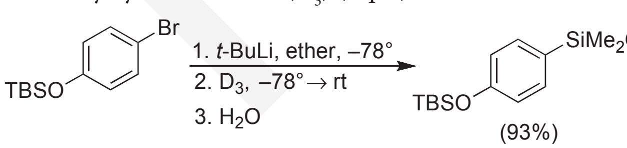
Introduction

Organosilanols (and their conjugate bases) find ubiquitous application as stabilizing ligands in coordination chemistry of main group and transition metals complexes.[1] However, prior to 2000, the only applications of silanols in organic synthesis was the use of KOTMS for the mild saponification of methyl esters[2] and nitriles[3] and as an oxygen nucleophile in enantioselective allylic substitution.[4] However, in 2000 two independent reports demonstrated the utility of organosilanols as donors in cross-coupling reactions under activation by silver(I) oxide[5] or TBAF.[6] The advantages of organosilanols as coupling partners are manifold in comparison to the halosilanes, including: (1) ease of synthesis, (2) stability toward oxygen and moisture, (3) ease of purification, (4) chemical stability, and (5) diversity of synthetic methods for their preparation. An additional advantage of significant synthetic importance is the ability to activate the cross-coupling of organosilanols with Brønsted bases, thus avoiding the incompatibilities associated with fluoride.[7,8] Moreover, the conjugate bases of organosilanols are stable, often free flowing powders that are "self-activating" cross-coupling partners, i.e. require no additional activators.[9] These two variants of cross-coupling are presented separately because of the differences in substrate scope. Even those cross-coupling reactions that undoubtedly involve the silanolate salt through *in situ* generation will be presented in the silanol section, only those cross-couplings that employ the preformed, isolated silanolates are included in the subsequent section.

Silanols

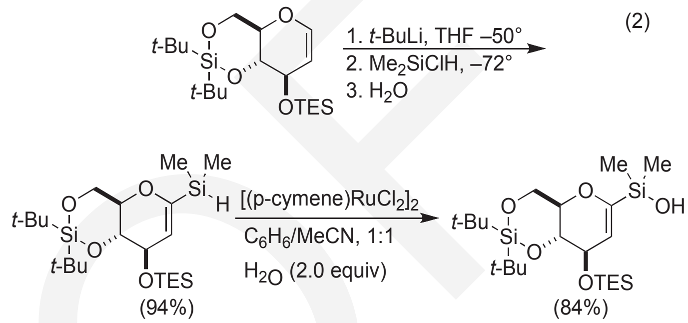
Preparation

Many different methods are available for the preparation of silanols and silanol surrogates from a variety of precursors. The most common method for introduction of a silanol unit involves the reaction of an organometallic reagent (lithium or magnesium) with a silicon electrophile. The most direct process involves the reaction of the organometallic reagent with hexamethylcyclotrisiloxane (D_3) (Eq. 1).[10]



(1)

This method works well for aryl- and alkenyllithium reagents. Less reactive organometallic species, or those unstable at higher temperatures require more reactive silicon electrophiles such as dimethyldichlorosilane or dimethylchlorosilane. Whereas the former can be converted into the corresponding silanol by mild hydrolysis (acetate buffer) the latter is converted to the silanol by oxidation with water or an alcohol under catalysis by ruthenium or iridium complexes (Eq. 2).[11]



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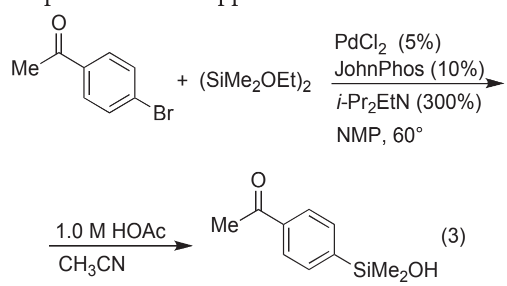
Hydrosilylation of alkynes is a powerful method for creating carbon-silicon bonds with site and stereoselectivity. For this method, silanol surrogates are needed and can be found in the many commercially available hydrosilanes bearing chloro, alkoxy, or silyloxy substituents. More robust surrogates such as benzylsilanes are also available. The steric course of the hydrosilylation is dependent upon the transition-metal catalyst: (1) platinum catalysts (e.g. H_2PtCl_6, (DVDS)Pt•(t-Bu_3P))[12] react with terminal alkynes to give (E)-1-alkenylsilanes via a *syn* process whereas $[(C_6H_6)RuCl_2]_2$ promotes an *anti* addition process to afford (Z)-alkenylsilanes.[13] Remarkably, the cationic ruthenium complex $[(Cp)Ru(MeCN)_3]^+ PF_6^-$ reacts with terminal alkynes to afford 2-alkenylsilanes.[14]

A palladium-catalyzed insertion method has been developed to allow the introduction of silanols on cyclic substrates wherein formation of an organometallic reagent is precluded by sensitive functionality (Eq. 3).[15] For effective reaction with aryl bromides, a bulky electron-rich phosphine (JohnPhos)[16] is required. The pH of the workup is critical to suppress formation of the disiloxane.



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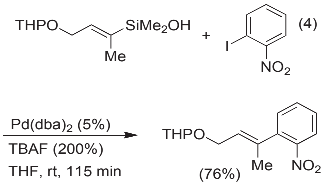
Cross-Coupling

Fluoride Activation

Arylsilanols. Only a simple phenyl group has been transferred under these conditions by the use of phenyldimethylsilanol in combination with a limited number of aryl iodides. A stoichiometric amount of silver(I) oxide is also used together with TBAT.[17]

Alkenylsilanols. This class represents a very large number of examples that employ acyclic and cyclic alkenylsilanes of varying substitution patterns in cross-coupling with aryl, heteroaryl and alkenyl halides. The stereospecificity of cross-coupling of simple alkenylsilanes is illustrated for a prenylating agent (Eqs. 4 and 5).[18]



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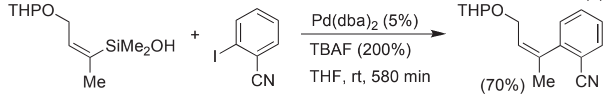

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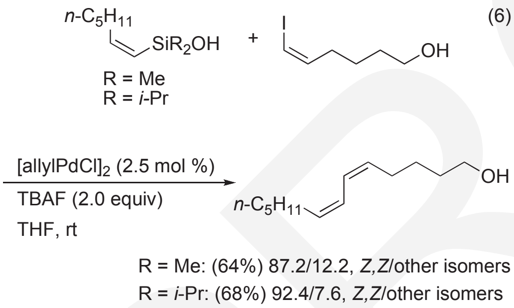
For the iodide electrophiles, no phosphine ligand is needed and the reactions take place at room temperature with electron-deficient, electron-rich and sterically hindered arenes. In a competition study, dimethyl-, diethyl-, diisopropyl- and diphenylsilanols react at approximately the same rate under activation by TBAF.[19]

Cross-couplings with alkenyl iodides and bromides proceed with high geometrical selectivity and only minor amounts of *cine* substitution products (Eq. 6).[6,18,20] Diisopropylsilanols give slightly higher geometrical selectivities compared to dimethylsilanols.[6]



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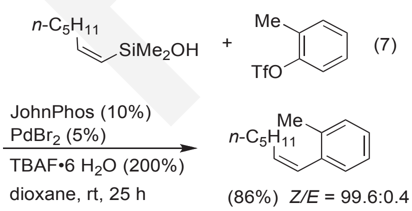
Aryl triflates can participate in cross-coupling reactions but the conditions need to be carefully adjusted. To facilitate the oxidative addition step, an electron-rich, hindered phosphine (John-Phos) is needed and, to suppress fluoride-assisted S–O bond cleavage of the triflate, the TBAF is hydrated with 6 to 8 equiv of water (Eq. 7).[21] For electron deficient aryl triflates, TBAF•30H_2O is required.



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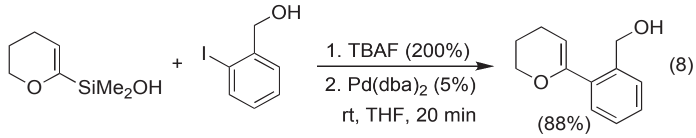
α-Alkoxyalkenylsilanols, both cyclic (pyranyl and furanyl) and acyclic undergo ready cross-coupling with aryl iodides under the standard conditions with TBAF (Eq. 8).



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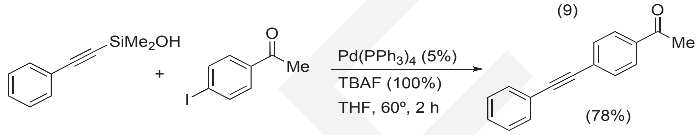
Alkynylsilanols. A limited set of simple alkynylsilanols undergo a "copper-free", Sonogashira-type cross coupling with aryl iodides using $(Ph_3P)_4Pd$ and TBAF (Eq. 9).[22]



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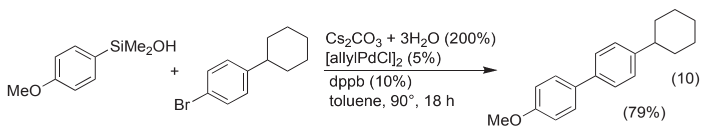
Brønsted Base Activation. For this disparate collection of cross-coupling reaction conditions, the only unifying characteristic is that the activators are all Brønsted bases. Thus, under this rubric is found activation by silver(I) oxide, potassium trimethylsilanolate, cesium carbonate, cesium hydroxide, potassium *tert*-butoxide, sodium hexamethyldisilazide, and sodium or potassium hydride. Undoubtedly, the corresponding silanolate is being formed to some extent and is likely the active component. However, because the parent silanol is the species employed in these processes, these conditions are be described herein.

Arylsilanols. The first reported use of silanols in a cross-coupling reaction employed a full equivalent of silver(I) oxide as the activator in the presence of $Pd(OAc)_2$ in warm THF.[5,23,24] Phenylsilanols bearing electron-donating and withdrawing groups can be used with similarly modified aryl iodides. It is likely that silver activates the arylpalladium iodide by abstraction of an iodide to form a cationic palladium(II) species and activates the arylsilanol through formation of a hypercoordinate complex. The intermediacy of a palladium(II) silanolate was not suggested.

Phenylsilanols can also undergo cross-coupling in the presence of cesium bases (carbonate or hydroxide). However, the bases must carry 2-3 molecules of water of hydration to reverse the formation of inactive disiloxanes formed from the silanols under the elevated temperatures needed to effect cross-coupling with aryl iodides and bromides (90-110°).[25,26] In addition, ligands play an important role in suppressing the formation of homocoupling products from as well as reduction of the electrophile (Eqs. 10 and 11).



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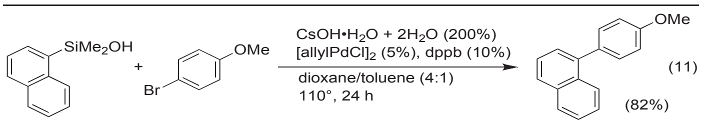

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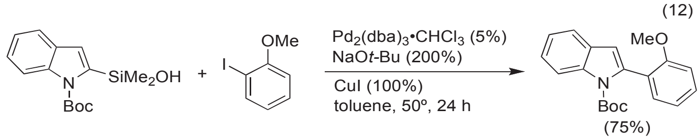
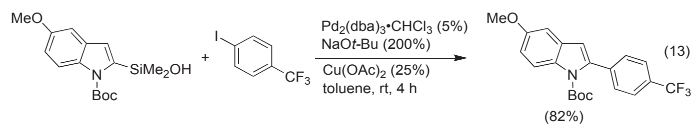
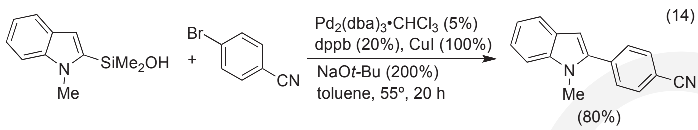
The failure of disiloxanes to undergo cross-coupling under Brønsted base activation sharply contrasts their behavior under fluoride activation. The limited scope of arylsilanol TG and harsh reaction conditions limited the utility of this method, which has been replaced by the use of the preformed potassium silanolate salts (*vide infra*).

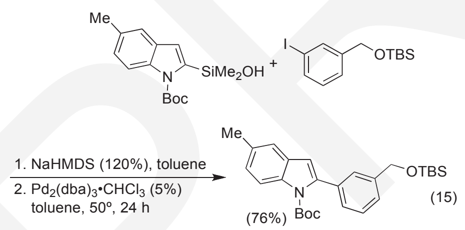
Heteroarylsilanols. A significant number of π-excessive heteroaromatic silanols have been prepared and three different conditions for their cross-coupling reactions have been developed, two of which involve the use of the parent silanol.[27-29] *N*-Boc- and *N*-methyl-2-indolyldimethylsilanol undergo smooth cross-coupling with aryl bromides and iodides in the presence of sodium *tert*-butoxide and 1.0 equiv of copper(I) iodide to suppress protiodesilylation (Eqs. 12-14). The amount of copper can be reduced to 25 mol % with activated indole derivatives.

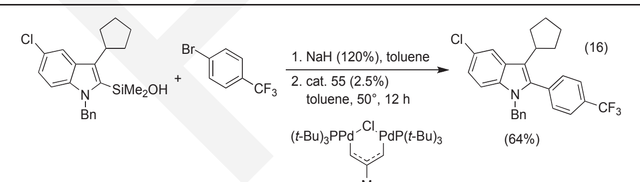


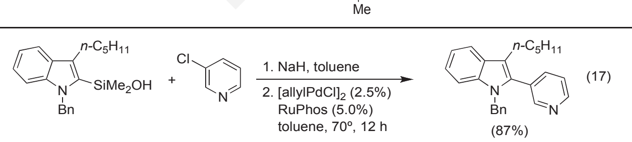




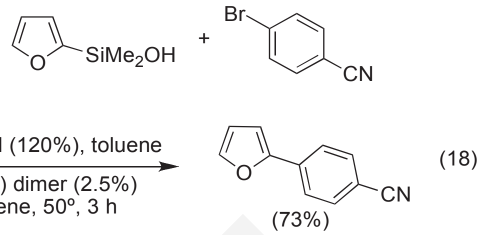
A more general protocol involves the stoichiometric deprotonation of the heteroarylsilanol with either sodium hydride or sodium hexamethyldisilazide. This modification allows a number of important advances including the elimination of copper(I) salts to suppress protiodesilylation (no protons) and the ability to cross-couple with aryl and heteroaryl bromides and chlorides (Eqs. 15-17).[29,30] For the less reactive electrophiles an appropriate phosphine ligand or precatalyst is needed to effect oxidative addition. S-Phos,[31] Ru-Phos[32] and the palladium(I) dimer[33] serve well in this capacity.



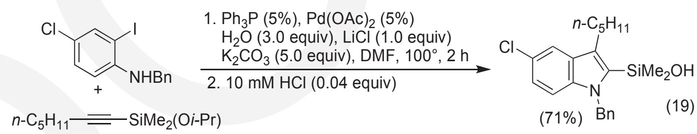




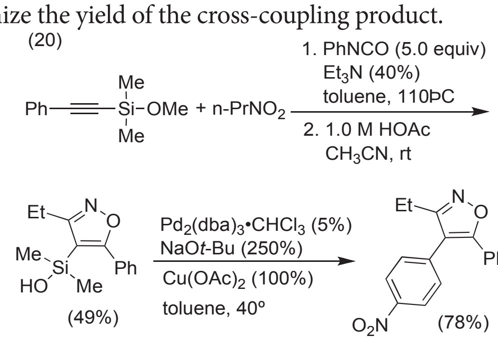
In addition, 2-furyl-, 2-thienyl- and *N*-Boc-(2-pyrrolyl) dimethylsilanols undergo cross-coupling under these conditions with a similar scope of electrophile (Eq. 18).

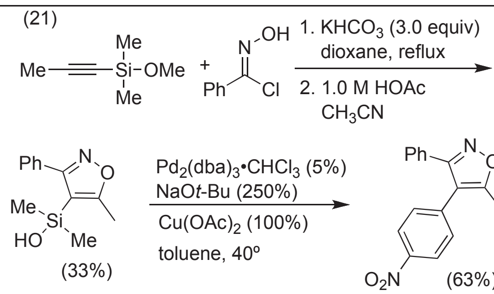


The 3-substituted-2-indolylsilanols in Scheme 34 are prepared by a variant of the Larock indole synthesis that employs alkynylsilyl ethers and places the silanol group in the 2-position for coupling (Eq. 19).[30] 2-Iodo-*N*-alkyl anilines are used as precursors with both isopropyl and *tert*-butylsilyl ethers. These silyl ethers are sufficiently robust to withstand the Larock heteroannulation conditions and can be deprotected with very mild acid hydrolysis. The sequence then allows for the controlled construction of 2,3-disubstituted indoles from anilines whereby unsymmetrical alkynes would otherwise lead to mixtures of constitutional isomers. The cross-coupling of isolated, preformed sodium silanolate salts represent the third variant and is discussed in the next section.

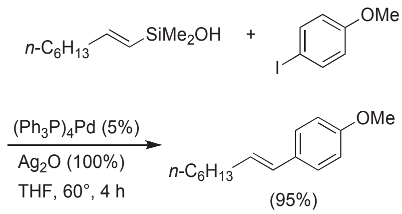


Another sequential process that first constructs a silylated heterocycle, which is then used for cross-coupling, involves the [3+2] cycloaddition of nitrile oxides with alkynylsilyl ethers (Eqs. 20 and 21).[34] The nitrile oxides can be generated under two different conditions, both sufficiently mild to allow the use of an alkynylsilyl methyl ether as the 2π-component. The [3+2] cycloadditions proceed in modest regioselectivity (ca. 4-5:1) and the minor constitutional isomer can be removed easily. The cross-coupling reactions require extensive optimization to suppress protiodesilylation. As had been seen before, copper salts, in this case copper(II) acetate, are used to maximize the yield of the cross-coupling product.





Alkenylsilanols. Several different methods of activation have been employed for this family of organosilanols including silver(I) oxide[5] (Eq. 22), KOTMS[35,36] (Eq. 23), sodium *tert*-butoxide[37,38] (Eq. 24), and potassium hydride[39] (Eq. 25). Both aromatic and olefinic iodides are active partners. Functional group compatibility is good and the reactions are stereospecific with respect to the alkenylsilanol unit. Diisopropylsilanols react significantly slower (ca. 20-fold) compared to dimethylsilanols under activation by KOTMS.



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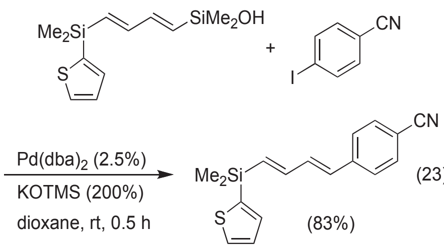

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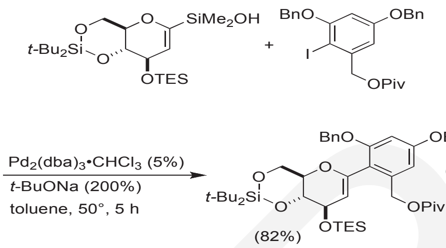

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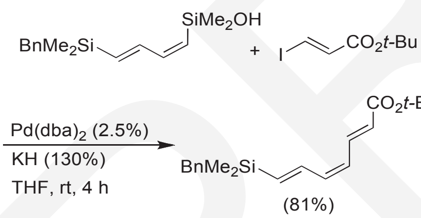

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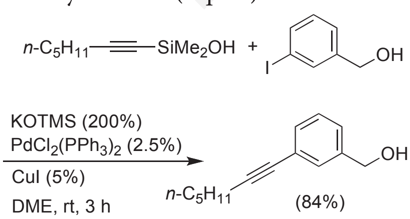
Alkynylsilanols. As is the case with trimethylsilylalkynes, the silanol version of the Sonogashira reaction offers little advantage under activation by fluoride, but activation by KOTMS leads to a significantly more rapid transmetalation (room temperature compared to 65-120˚). Copper(I) iodide is essential for clean cross-coupling and in this report the substrates are limited to aryl iodides (Eq. 26).[40]

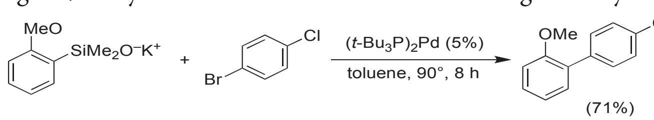


(26)

Silanolates

Although silanolate salts are certainly the reactive species in the cross-coupling reactions carried out under Brønsted base activation, these salts are always generated in situ from the parent silanol. Depending upon the strength of the Brønsted base employed, the formation of the silanolate may or may not be quantitative. Moreover, the conjugate acid remains in the reaction mixture (except in the case of NaH and KH). The pre-formation and isolation of the sodium or potassium silanolates (from the corresponding hydrides) offers a number of preparative advantages. First, silanols dimerize to the corresponding disiloxanes in the presence of acids or bases, and isolating the metal salt prevents this process. Second, using the isolated preformed silanolate in the reaction not only simplifies the experimental procedure (adding one reagent as opposed to the silanol and base), but also ensures that the cross-coupling partner is always present in its active form. Moreover, a metal silanolate can be generated cleanly with a stoichiometric quantity of metal hydride, without the need for an excess of an activator. The use of an excess of the activator can be problematic in the cross-coupling reaction for several reasons. Surplus activator (i.e. KO*t*-Bu, $KOSiMe_3$) can compete with silanolate for the Pd center of the arylpalladium halide. As a competitive inhibitor, the activator can form an inactive species in the cross-coupling reaction where it serves as a ligand on the Pd(II) aryl complex. This process sequesters palladium in an inactive form, and subsequently slows the cross-coupling reaction.[41] Silanolate must displace the activator to allow the Pd to reenter the catalytic cycle as the palladium silanolate. An excess of the activator can also limit functional group compatibility. For example, when NaO*t*-Bu is employed with substrates bearing ethyl esters, a competing transesterification reaction takes place.[42] Furthermore, excess amounts of hydride reagents give reduction products,[36] and are incompatible with substrates bearing sensitive functional groups. The direct introduction of the silanolate avoids these problems and many of these salts are stable, free-flowing powders.

Arylsilanolates. The limitations encountered in the cross-coupling of arylsilanols under Brønsted base activation (Eqs. 10, 11) are substantially overcome by the use of potassium arylsilanolate salts in combination with $(t\text{-Bu}_3P)_2Pd$.[42] A wide range of arylsilanolates bearing various functional groups (alkoxy, dialkylamino, trifluoromethyl, fluoro, chloro, alkoxycarbonyl) couple effectively with aryl bromides and chlorides bearing an equally diverse set of functional groups (halo, alkoxy, silyloxy, alkoxycarbonyl) in good yield. In addition, various heteroaromatic bromides function as cross-coupling partners (Eqs. 27-31). Other ligand/catalyst combinations show more limited generality.[43]



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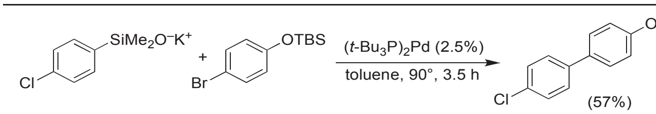

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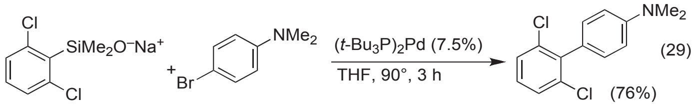
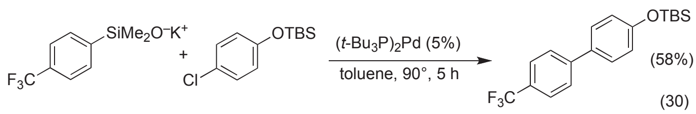
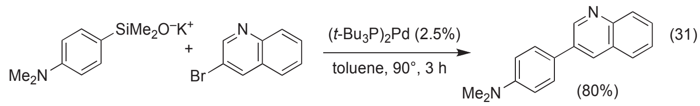
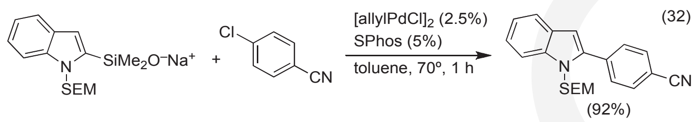
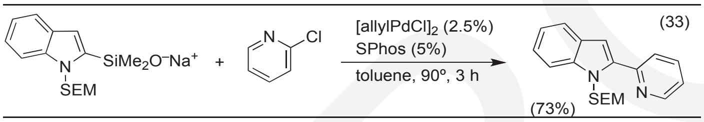


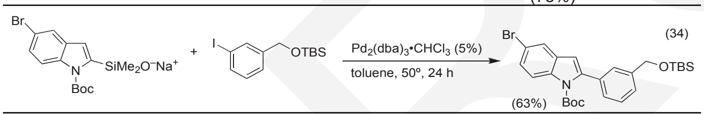


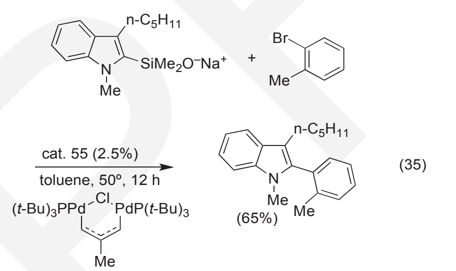


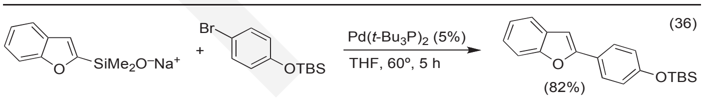
Heteroarylsilanolates. The successful cross-coupling of *in situ* generated sodium silanolates of π-excessive heterocyclic silanols illustrated in Eqs. 12-17 can be extended to other heterocycles and coupling partners by the use of preformed salts. For example, the preformed *N*-SEM-2-indolylsilanolate can engage in cross-coupling with a variety of aryl and heteroaryl bromides and chlorides (Eqs. 32, 33) whereas the 5-bromo-*N*-Boc-2-indolylsilanolate couples with iodides selectively (Eq. 34)[29] and finally *N*-Me-3-pentyl-2-indolylsilanolate (formed by a Larock annulation process)[30] couples cleanly with a variety of aryl bromides (Eq. 35). Moreover, a large number of 2-benzofuranylsilanolates undergo smooth coupling under similar conditions (Eqs. 36, 37).[42]

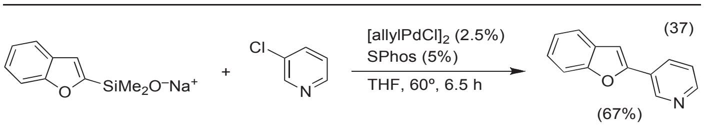




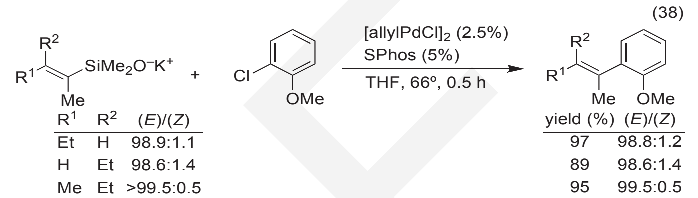


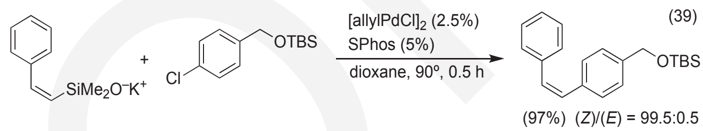


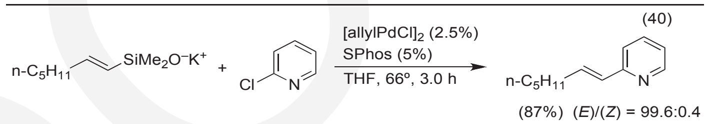




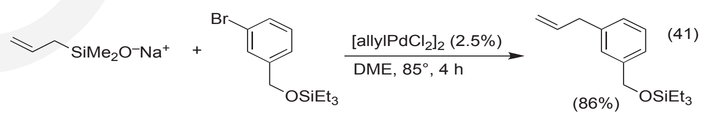
Alkenylsilanolates. Although alkenylsilanols undergo efficient cross-coupling by various methods of activation with Brønsted bases, the preformed potassium salts are highly effective in reactions with aromatic and heteroaromatic chlorides.[44] These reactions display superior generality with respect to the acceptor, extremely high stereospecificity for a number of different alkenylsilanolate substitution patterns and overall higher yields than the couplings with the corresponding bromides or iodides (Eqs. 38-40). The absence of byproducts derived from reduction or homocoupling of the electrophile accounts for the better performance of these reactions.



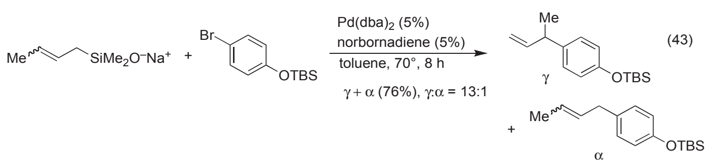


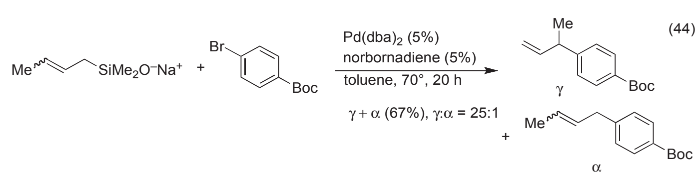


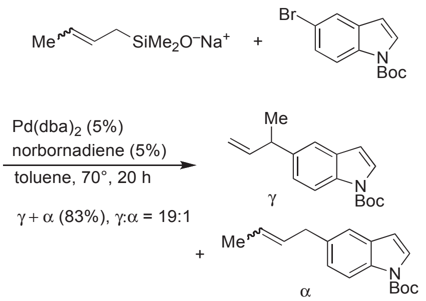
Allylsilanolates. The sodium salts of allyldimethylsilanol and 2-butenyldimethylsilanol undergo palladium-catalyzed cross-coupling with a wide variety of aryl bromides to afford allylated and crotylated arenes.[45] The reaction of the allyldimethylsilanolate affords good yields of the allylation products from both electron-rich and sterically hindered bromides (Eqs. 41, 42).



Sodium 2-butenyldimethylsilanolate (*E*/*Z* = 80:20) affords good yields of the γ-substituted product with electron-rich and electron-poor bromides (Eqs. 43-45).

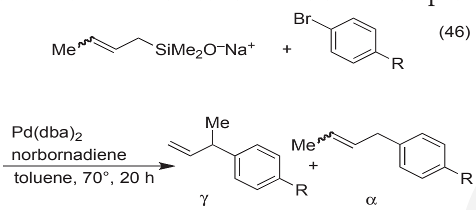






(45)

In general, high γ-site selectivities are obtained with catalysts bearing π-acidic ligands such as dba. Norbornadiene assists in catalyst turnover. The scope in aromatic bromide is good and the γ-site selectivity is generally higher than 10:1. Interestingly, the use of pure sodium (*E*)-2-butenyldimethylsilanolate led to a noticeable improvement in the γ-site selectivity (Eq. 46). The role of π-acidic ligands and double bond geometry are interpreted in terms of a kinetically controlled, γ-selective transmetalation followed by direct reductive elimination to form the branched product.



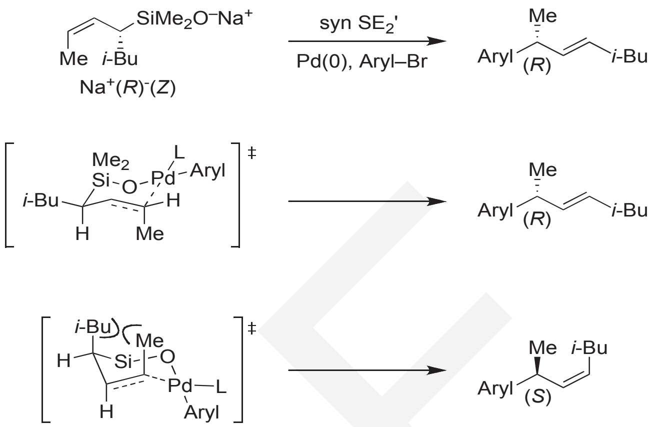
(46)

(*E*)/(*Z*)	R	yield (%)	γ/α
80:20	PhCO	81	14:1
>97:3	PhCO	79	24:1
80:20	OMe	46	7.2:1
>97:3	OMe	46	18:1

In γ-site-selective cross-coupling reactions of unsymmetrically substituted allylic silanes, a new stereogenic center is created. With the aid of enantiomerically enriched and configurationally defined allylic dimethylsilanolates, the stereochemical course of the S_E2' process has been elucidated. This study has revealed a strong and consistent stereochemical correlation for the cross-coupling of enantiomerically enriched allylic dimethylsilanolate (Eq. 47).[46]

In the presence of $[allylPdCl]_2$ and 4,4'-(trifluoromethyl) dibenzylideneacetone a wide range of aryl bromides undergo highly γ-site selective cross-coupling with perfect *syn* S_E2' stereospecificity. These results are interpreted in terms of an intramolecular transmetalation via a chair-like, transition structure. In the preferred transition structure, the Si–O–Pd linkage controls the delivery of the palladium electrophile to the γ–terminus of the allylic silane. The palladium is tricoordinate and the alkene takes up the fourth coordination site in the square-planar complex. The *pseudo*-equatorial orientation of the *iso*-butyl group assures high selectivity in the formation of an *E* double bond in the product. In addition, the allylic methyl group is positioned orthogonal to the ligand plane of palladium to avoid unfavorable steric interactions. An alternative transition state structure that also involves an intramolecular delivery of the palladium moiety suffers from severe 1,3-diaxal steric strain between the *iso*-butyl and allylic methyl group.

Scheme 1

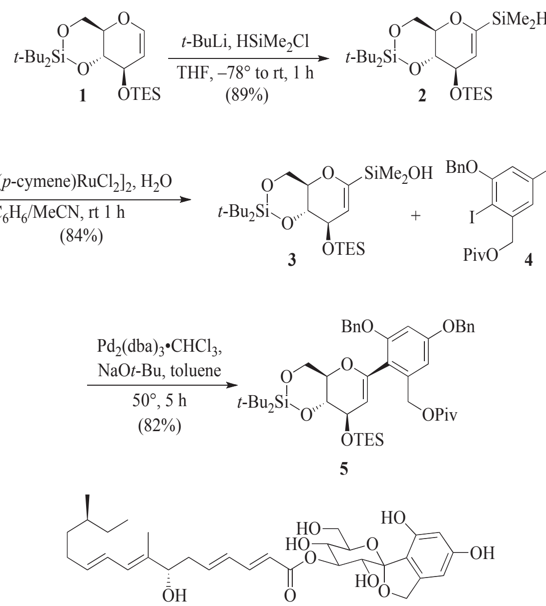


Total Synthesis with Silanolates

Papulacandin D.[37,38] The papulacandins are a family of antifungal agents, isolated from the deuteromycetous fungus *Papularia sphaerosperma* that have demonstrated potent *in vitro* antifungal activity against various pathogens. All of the papulacandins are amphipathic molecules composed of an aromatic moiety linked *via* a spirocyclic structure to a lactose moiety with two different aliphatic acyl side-chains. The simplest member of the family, papulacandin D, lacks the O-(6'-acyl-β-galactoside) at the O-(4) position. The key strategic disconnection for the synthesis of papulacandin D requires the cross-coupling of a 2-pyranylsilanol with an aryl halide (Scheme 51). Although α-oxyalkenylsilanols are competent substrates for cross-coupling, the requirement for fluoride activation is clearly incompatible with the silyl ether protecting groups planned in the total synthesis. Therefore, fluoride-free conditions for the cross-coupling had to be developed.

The actual synthesis required the cross-coupling of the glycal silanol **3** with the protected iodo resorcinol derivative **4** (Scheme 2).

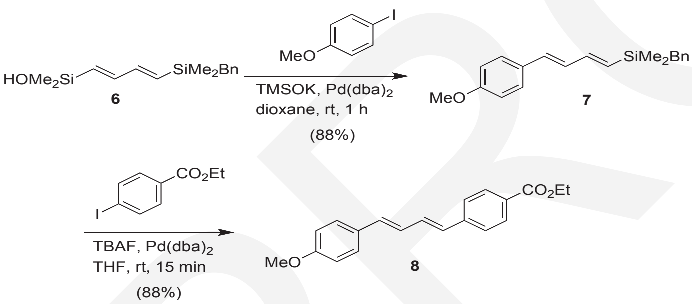
Scheme 2



To prepare **3**, silyl-protected glycal **1** is lithiated at C(1) followed by capture with chlorodimethylsilane. The resulting hydrosilane **2** is subjected to a ruthenium-catalyzed, oxidative hydrolysis to afford the base-sensitive silanol **3**. The key cross-coupling reaction of **4** was quite challenging because of protiodesilylation of **3**, but ultimately this critical transformation could be achieved efficiently using sodium *tert*-butoxide as the Brønsted-base activator and $Pd_2(dba)_3$•$CHCl_3$ as the catalyst to provide *C*-arylglycal **5** in good yield. Glycal **5** contains the entire carbon framework of the sugar fragment of papulacandin D.

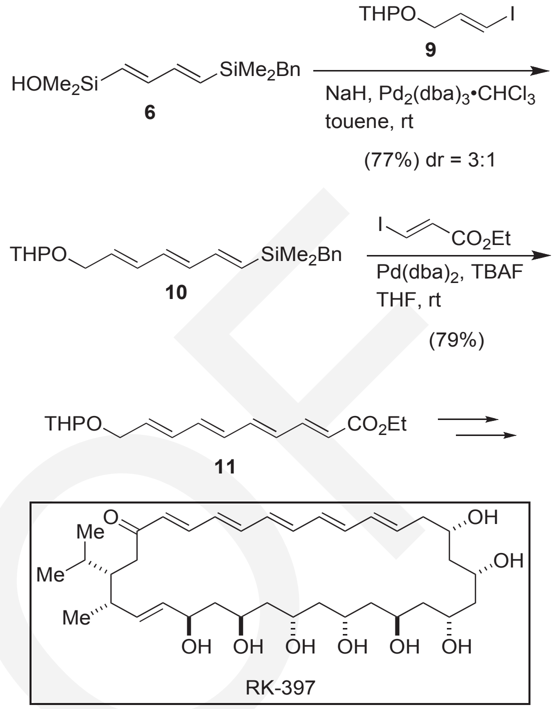
RK-397.[39,47] The silicon-based cross-coupling reaction is mechanistically unique in that two different modes of transmetalation are possible. This mechanistic duality has significant preparative utility because the different mechanistic pathways can be accessed via complementary reaction conditions. The feasibility of using both modes of activation in a single reagent is illustrated by sequential Brønsted base/fluoride-promoted cross-coupling reactions using the linchpin reagent (*E*,*E*)-[(4-benzyldimethylsilyl)-1,3-butadienyl]dimethylsilanol **6**. This bifunctional reagent can combine with two electrophiles under complementary conditions for the construction of unsymmetrical polyenes. In the first cross-coupling reaction, **6** is treated with KOTMS in the presence of an aryl iodide and $Pd(dba)_2$ to afford the (1-aryl-1,3-butadienyl) benzylsilane **7**. The benzyldimethylsilyl group is inert under these conditions. Subsequently, treatment of **7** with TBAF effects the second cross-coupling reaction which proceeds smoothly to afford the unsymmetrical 1,4-diaryl-1,3-butadiene **8** (Scheme 3).

Scheme 3



The total synthesis of the polyene-polyol antifungal agent RK-397 aptly demonstrates the power of complementary modes of activation for silicon-based cross-coupling reaction (Scheme 4). Whereas in the above synthetic study, both electrophiles are *aryl* iodides, for the construction of the polyene fragment of RK-397, however, the cross-coupling reaction with two alkenyl iodides is required. This extension is challenging because alkenyl iodides are less reactive. Thus, for the cross-coupling of **6** with alkenyl iodide **9**, NaH is employed instead of KOTMS as the Brønsted base promoter. The stoichiometric generation of the silanolate using a strong base such as NaH provides heightened reactivity. The resulting triene **10** is then combined with ethyl (*E*)-3-iodopropenoate under fluoride-promoted cross-coupling conditions to afford tetraene **11**. This key fragment is then incorporated onto the polyol fragment, to complete the total synthesis of RK-397.

Scheme 4



Summary and Outlook

The impact of transition metal catalyzed cross-coupling reactions cannot be overestimated. This Nobel Prize winning chemistry has transformed the practice of synthetic organic chemistry in academic and industrial laboratories alike. The ability to construct single bonds between sp^3, sp^2 and sp hybridized carbon atoms in myriad chemical environments has enabled the straightforward, strategic disconnection of target molecules into pairwise combinations of donors and acceptors. The recent development of high performance ligands has enabled the use of more and more acceptors such as chlorides, tosylates, phosphates and carboxylates. However on the donor side, the boronic acid derivatives have monopolized the attention of practitioners, particularly in the pharmaceutical sector. This preference has stimulated the commercial production of hundreds of boronic acid derivatives, which then leads to the self fulfilling consequence of using only these reagents and disregards the advantages and in some cases superiority of other donors including tin and silicon.

One of the unique advantages (and to some extent also drawbacks) of silicon are the literally dozens of organosilane moieties that can participate in cross-coupling reactions from the most inert trialkylsilanes to the highly reactive trichlorosilanes. This diversity allows for precise tuning of the reactivity and functional compatibility of the donor for a specific cross-coupling reaction. Of course, this diversity also presents a challenge for the experimentalist to identify which of the many options would be optimal. Fortunately, a recent comprehensive review of the area provides a thorough treatment of the advantages of each activating group and the transformations for which it is suitable together with the reaction conditions needed to effect the cross-coupling.[48]

The advantages of cross-coupling reactions with organosilicon compounds include ease of introduction of the silicon moiety, functional compatibility, mildness of reaction conditions, non-toxicity of reagents, low molecular weight overhead and minimized waste stream. With the availability of more and more silicon containing building blocks and precursors, such as those complied in this brochure, we are confident that the use of silicon-based cross-coupling processes will soon take their rightful place along with the other workhorse processes.

References

1. Lickiss, P. In *Adv. Inorg. Chem.*; Academic Press, Inc.: 1995; Vol. 42, p 147.
2. Laganis, E. D.; Chenard, B. L. *Tetrahedron Lett.* **1984**, *50*, 5831.
3. Merchant, K. J. *Tetrahedron Lett.* **2000**, *41*, 3747.
4. Lyothier, I.; Difieber, C.; Carreira, E. M. *Angew. Chem. Int. Ed.* **2006**, *45*, 6204.
5. Hirabayashi, E.; Mori, A.; Kawashima, J.; Suguro, M.; Nishihara, Y.; Hiyama, T. *J. Org. Chem.* **2000**, *65*, 5342.
6. Denmark, S. E.; Wehrli, D. *Org. Lett.* **2000**, *2*, 565.
7. Denmark, S. E.; Sweis, R. F. *Chem. Pharm. Bull.* **2002**, *50*, 1531.
8. Denmark, S. E.; Sweis, R. F. *Acc. Chem. Res.* **2002**, *35*, 835.
9. Denmark, S. E.; Regens, C. S. *Acc. Chem. Res.* **2008**, *41*, 1486.
10. Denmark, S. E.; Butler, C. R. Hexamethylcyclotrisiloxane. *e-EROS Encyclopedia of Reagents for Organic Synthesis* [Online Early Access]. Published Online: 2007. (accessed DOI: 10.1002/047084289X.rn00784).
11. Lee, M.; Ko, S.; Chang, S. *J. Am. Chem. Soc.* **2000**, *122*, 12011.
12. Chandra, G.; Lo, P. Y.; Hitchcock, P. B.; Lappert, M. F. *Organometallics* **1987**, *6*, 191.
13. Denmark, S. E.; Pan, W. T. *Org. Lett.* **2002**, *4*, 4163.
14. Trost, B. M.; Ball, Z. T. *J. Am. Chem. Soc.* **2005**, *127*, 17644.
15. Denmark, S. E.; Kallemeyn, J. M. *Org. Lett.* **2003**, *5*, 3483.
16. Wolfe, J. P.; Singer, R. A.; Yang, B. H.; Buchwald, S. L. *J. Am. Chem. Soc.* **1999**, *121*, 9550.
17. Napier, S.; Marcuccio, S. M.; Tye, H.; Whittaker, M. *Tetrahedron Lett.* **2008**, *49*, 3939.
18. Denmark, S. E.; Pan, W. *J. Organomet. Chem.* **2002**, *653*, 98.
19. Denmark, S. E.; Neuville, L.; Christy, M. E. L.; Tymonko, S. A. *J. Org. Chem.* **2006**, *71*, 8500.
20. Denmark, S. E.; Neuville, L. *Org. Lett.* **2000**, *2*, 3221.
21. Denmark, S. E.; Sweis, R. F. *Org. Lett.* **2002**, *4*, 3771.
22. Chang, S.; Yang, S. H.; Lee, P. H. *Tetrahedron Lett.* **2001**, *42*, 4833.
23. Hirabayashi, K.; Kawashima, J.; Nishihara, Y.; Mori, A.; Hiyama, T. *Org. Lett.* **1999**, *1*, 299.
24. Hirabayashi, K.; Kondo, T.; Toriyama, F.; Nishihara, Y.; Mori, A. *Bull. Chem. Soc. Jpn.* **2000**, *73*, 749.
25. Denmark, S. E.; Ober, M. H. *Org. Lett.* **2003**, *5*, 1357.
26. Denmark, S. E.; Ober, M. *Adv. Synth. Catal.* **2004**, *346*, 1703.
27. Denmark, S. E.; Baird, J. D. *Org. Lett.* **2004**, *6*, 3649.
28. Denmark, S. E.; Baird, J. D. *Org. Lett.* **2006**, *8*, 793.
29. Denmark, S. E.; Baird, J. D.; Regens, C. S. *J. Org. Chem.* **2008**, *72*, 1440.
30. Denmark, S. E.; Baird, J. D. *Tetrahedron* **2009**, *65*, 3120.
31. Barder, T. E.; Walker, S. D.; Martinelli, J. R.; Buchwald, S. L. *J. Am. Chem. Soc.* **2005**, *127*, 4685.
32. Milne, J. E.; Buchwald, S. L. *J. Am. Chem. Soc.* **2004**, *126*, 13028.
33. Werner, H.; Kühn, A. *J. Organomet. Chem.* **1979**, *179*, 439.
34. Denmark, S. E.; Kallemeyn, J. M. *J. Org. Chem.* **2005**, *70*, 2839.
35. Denmark, S. E.; Tymonko, S. A. *J. Am. Chem. Soc.* **2005**, *127*, 8004.
36. Denmark, S. E.; Sweis, R. F. *J. Am. Chem. Soc.* **2001**, *123*, 6439.
37. Karabelas, K.; Hallberg, A. *J. Org. Chem.* **1986**, *51*, 5286.
38. Denmark, S. E.; Regens, C. S.; Kobayashi, T. *J. Am. Chem. Soc.* **2007**, *129*, 2774.
39. Denmark, S. E.; Fujimori, S. *J. Am. Chem. Soc.* **2005**, *127*, 8971.
40. Denmark, S. E.; Tymonko, S. A. *J. Org. Chem.* **2003**, *68*, 9151.
41. Denmark, S. E.; Sweis, R. F. *J. Am. Chem. Soc.* **2004**, *126*, 4876.
42. Denmark, S. E.; Smith, R. C.; Chang, W.-T. T.; Muhuhi, J. M. *J. Am. Chem. Soc.* **2009**, *131*, 3104.
43. Denmark, S. E.; Smith, R. C.; Tymonko, S. A. *Tetrahedron* **2007**, *63*, 5730.
44. Denmark, S. E.; Kallemeyn, J. M. *J. Am. Chem. Soc.* **2006**, *128*, 15958.
45. Denmark, S. E.; Werner, N. S. *J. Am. Chem. Soc.* **2008**, *130*, 16382.
46. Denmark, S. E.; Werner, N. S. *J. Am. Chem. Soc.* **2010**, *132*, 3612.
47. Denmark, S. E.; Fujimori, S. In *Strategies and Tactics in Organic Synthesis*; Harmata, M. A., Ed.; Elsevier: Amsterdam, 2008; Vol. 7.
48. Chang, W.-T. T.; Smith, R. C.; Regens, C. S.; Bailey, A. D.; Werner, N. S.; Denmark, S. E. *Org. React.* **2011**, *75*, 214.

Silicon-Based Blocking Agents

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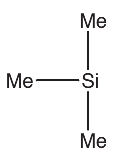
SILICON-BASED BLOCKING AGENTS

General Considerations

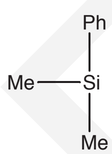
The ideal protecting group for an active-hydrogen moiety such as an alcohol or amine would be one that would mimic the hydrogen atom itself, but be much more flexible in its reactivity. It would readily go on in high yield, be stable over as wide a variety of reaction conditions as possible and, at the same time, be selectively removable in the presence of other functional groups including other protecting groups. While no single silyl group can fulfill all of these conditions in all cases, the available range of silicon-based blocking agents can offer the synthetic chemist viable answers to nearly every protection-deprotection challenge. The ability to vary the organic groups on silicon introduces the potential to alter the R3Si group in terms of both its steric and electronic characteristics and thereby influence the stability of the silylated species to a wide variety of reaction and deprotection conditions. This allows the synthetic chemist to select a silyl protecting group that can, for example, be simultaneously removed during the work-up of the reaction step(s) that required the protection, or that can be selectively removed in the presence of another silyl or other protecting group.

In addition to having the ability to be fine-tuned to fit a particular need, the ease and high-yield introduction and deprotection of the silyl protecting groups contribute significantly to their popularity and utility.

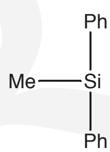
The commonly utilized trisubstituted silyl protecting groups and their acronyms are shown below.



TMS



DMPS



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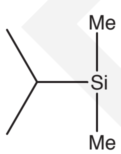

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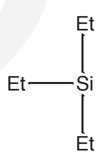
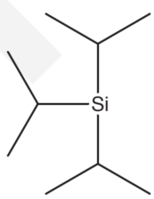


TES



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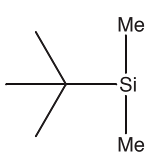
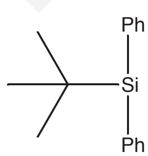
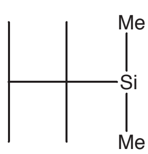


TBS



TBDPS



TDS

The use of silicon-based blocking agents has been reviewed with regard to reaction/deprotection,[1-7] oxidation of silyl ethers,[8] and selective deprotection[9].

Introduction of the Silyl Groups

In general smaller groups on silicon make the trisubstituted silyl group more reactive and easier to introduce. Thus, a general relative reactivity scale is: Me_3Si > Ph_2MeSi > Et_3Si > $^iPrMe_2Si$ > $^tBuMe_2Si$ > $^tBuPh_2Si$ > $ThMe_2Si$ (where Th = thexyl) > $^iPr_3Si$. The leaving group on silicon also plays a role in both reactivity and byproducts. The general relative reactivity of R_3Si-X as a function of X is: X = CN > OTf > I > Br > Cl > trifluoroacetamido > acetamido > R_2N > RO. Others, such as perchlorates, and sulfates, though very reactive, are not very practical. These general reactivity trends will not apply to all sets of reaction conditions, but present a practical working guide.

The introduction of the silyl group depends on the nature of the silyl group itself and the substrate. Silyl groups are most often used for the protection of alcohols in the form of their silyl ethers. Generally, the less sterically hindered the silyl group the easier it is to introduce (and, indeed, to remove). The introduction of the sterically unimpeded trimethylsilyl group to a primary, secondary or tertiary alcohol is a straightforward process taking place with a variety of reagents under several mild, high-yield reaction conditions. On the other hand, the introduction of the more sterically demanding tert-butyldimethylsilyl group requires reaction of the alcohol with tert-butyldimethylchlorosilane in the presence of imidazole as a catalyst[10] and the formation of the tert-butyldimethylsilyl ether of tertiary alcohols is very difficult. Alternatively, a more reactive form such as tert-butyldimethylsily trifluoromethanesulfonate can be used.

Consideration of Byproducts

The introduction of a silyl group onto an alcohol, amine or other active hydrogen system is the result of a substitution reaction at silicon releasing the protonated form of the leaving group from silicon. This leaving group can be acidic, e.g. HCl, HBr, HI, HO_3SCF_3; basic, e.g. NH_3, Me_2NH, Et_2NH; or neutral, e.g. CH_3CONH_2, $CH_3CONHMe$, CF_3CONH_2, $CF_3CONHMe$. The effect of the nature and physical properties of these leaving groups on the reaction product and purification must be considered when selecting a silicon-based protecting group.

Stability of Silyl-Protected Functional Groups

The relative stabilities of the silyl-protected functional groups, for example, alcohols as silyl ethers, is roughly the same as the relative rates for their introduction. It must be remembered, however, that the stability of the system is dependent upon the specific reaction conditions and, in particular, the pH. For example, phenyl-substituted silyl ethers are equal or more reactive than their trimethylsilyl counterparts under alkaline conditions, but less reactive under acidic conditions. In general terms, however, the relative stabilities of the silyl-protected functional groups will follow the order of: $^{i}Pr_3Si$ > $ThMe_2Si$ > $^{t}BuPh_2Si$ > $^{t}BuMe_2Si$ > $^{i}PrMe_2Si$ > Et_3Si > Ph_2MeSi > Me_3Si. Again, this order is meant to be a general guide as the actual stabilities will depend on the pH of the medium as well as other reaction conditions. The results of a study of the stability of various silyl ethers as a function of the groups on silicon and the nature of the alcohol towards various hydrolysis conditions and common organic reagents are shown in Table 1. The reader is referred to the excellent review by Crouch and Nelson on the selective deprotection of silyl groups in synthesis.[9]

The Trimethylsilyl, TMS, Group

Common reagents for this reaction are trimethylchlorosilane, TMCS, and hexamethyldisilazane, HMDS, although others are used depending on the leaving group from silicon. The reaction of trimethylchlorosilane with an alcohol liberates HCl, which must be trapped. This is normally achieved with the presence of a tertiary amine. Hexamethyldisilazane reacts with alcohols to give ammonia as a byproduct. This can be simply led away from the reaction or trapped. The reactions of HMDS in the absence of a catalyst are oftentimes quite slow. Common catalysts are TMCS, lithium salts, ammonium chloride among others. Trimethylsilylation reagents which liberate neutral byproducts are bis(trimethylsilyl) trifluoroacetamide, bis(trimethylsilyl)acetamide and others as listed in Table 2.

If greater reactivity is necessary one can turn to the more reactive species such as the (dimethylamino)trimethylsilane, cyanotrimethylsilane, and trimethylsilyl triflate.

Deprotection of the TMS group is usually accomplished by mild hydrolysis in aqueous or alcohol medium. Trimethylsilyl ethers can be deprotected in the presence of TES ethers.[11,12]

The Triethylsilyl, TES, Group

The triethylsilyl protecting group is primarily used for the protection of alcohols, although other functional groups can be and have been protected as their TES derivatives. The stability of the triethylsilyl ethers falls between those of the corresponding TMS and TBS ethers. The most common reagent for the introduction of the TES group is triethylchlorosilane and the methods used for the reaction are those that are employed for TMCS. TES ethers can be selectively removed in the presence of TBS ethers.[13]

The tert-Butyldimethylsilyl, TBS, Group

The TBS group is used for the protection of alcohols[10], amines[14], thiols[14], lactams[14], and carboxylic acids[14]. The TBS group is commonly introduced via tert-butyldimethylchlorosilane, although other, more-reactive derivatives, such as the triflate, can be used. Because of its steric bulk the reaction of an alcohol with tert-butyldimethyl-chlorosilane requires the presence of imidazole as a catalyst.[10] The high stability of TBS-protected groups to a variety of reaction conditions, its clean NMR characteristics, and its ease of removal with fluoride ion makes it a popular choice among the silicon-based blocking agents. TBS ethers can be removed in the presence of TIPS,[15] and TBDPS,[16] ethers.

The Triisopropylsilyl, TIPS, Group

The TIPS group is one of the most sterically hindered silyl protecting groups, being removed only slowly under standard acid- or base-catalyzed hydrolysis conditions. TIPS ethers show a stability greater than TBS ethers. Reaction with tetrabutylammonium fluoride is a common method for TIPS desilylations.[17] The TIPS group is usually introduced from triisopropylchlorosilane, but triisopropylsilane[15] or the triflate[16] can also be used.

The Thexyldimethylsilyl, TDS, Group

The TDS group was proposed as a silyl blocking agent that would have more stability than the TBS group and whose reagent, TDS-Cl, would be less expensive to produce commercially.[18] TDS-Cl is a liquid making it somewhat easier to handle this air-sensitive material than the corresponding solid TBS-Cl. The TDS group provides protection for alcohols, amines, carboxylic acids, and thiols. In the even of low reactivity the more reactive triflate derivative, TDS-OTf, can be used. Reaction of TDS-Cl with alcohols is carried out under conditions like those for the TBS-Cl silylations.

The tert-Butyldiphenylsilyl, TBDPS, Group

The TBDPS group has greater steric demands than the TBS group and, therefore, tends to form more stable silylated species than their corresponding TBS analogs.[19] Alcohols, amines,[20] amides,[21] hydroxamic acids,[22] and carboxylic acids[23] are among the groups that have been blocked by the TBDPS group. Deprotection is usually through the reaction with tetrabutylammonium fluoride, TBAF.

Phenyl-Substituted Silyl Groups

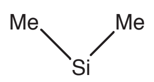
Phenyldimethylsilyl, diphenylmethylsilyl, and triphenylsilyl groups are also used to protect alcohols. While these reagents bring no special steric advantages to the blocking agent picture they do bring an electronic one. Phenylsilyl ethers are more stable towards acid with an increase in stability following an increase in phenyl substitution.[24] A similar stability towards alkaline hydrolysis is not seen. The stability of the diphenylmethylsilyl ethers has been carefully studied.[25] Introduction of the phenyl-substituted silyl groups is through their respective chlorides.

Other Trialkylsilyl Groups

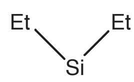
In principle any trialkylsilyl group can be considered a silyl blocking agent, though not all are, of course, used in that manner. The more notable ones can be found in the Tables along with pertinent information concerning reactivity and stability.

Bridging Blocking Agents

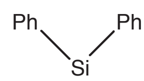
The commonly employed silicon-based agents for the protection of diols and related species such as diamines and hydroxyacids are shown below.



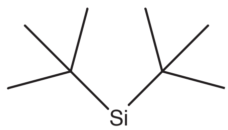
DMS



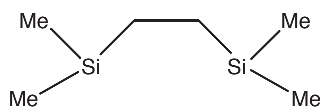
DES



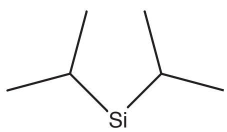
DPS



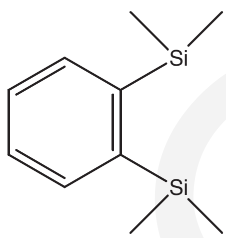
DTBS



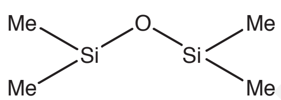
STABASE



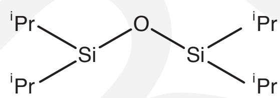
DIPS



BSB



TMDS



TIPDS

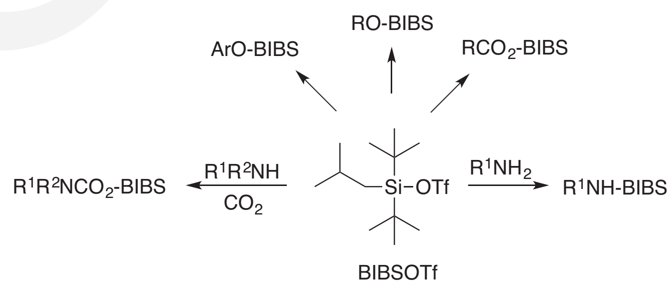
The use of various silylene units such as the dimethyl-(DMS)[26], diethyl-(DES)[27], diisopropyl-(DIPS)[28], di-tert-butyl-(DTBS)[28,29] and diphenylsilylene(DPS)[30] groups have been employed for the protection of diols, hydroxyacids, diamines, and similar difunctional systems. Here again, as expected, the more hindered the silicon center the more stable the silylated species becomes. Thus, the DTBS ethers of diols are hydrolytically stable between pH 4 and pH 10. The 6- and 7-membered ring systems from 1,3- and 1,4-diols, respectively, are more stable than the 5-membered rings that result from the reaction of 1,2-diols. The disilylethane derivative, tetramethyldisilylethane (STABASE) is used for the protection of primary amines, including those of the esters of aminoacids.[31] The tetraisopropyldisiloxanyl (from TIPDS) unit is highly useful for the protection of the 3',5'-dihydroxy units of nucleosides.[32] The benzostabase group can be used to protect primary aliphatic and aromatic amines.[33,34]

Special Silicon-Based Blocking Agents

Diisopropylchlorosilane has been shown to provide both protective and stereoselective reactive properties in the silylation/reduction of β-hydroxyketones.[35] The chloromethyldimethylchlorosilane has been very effectively used in the analytical arena taking advantage of the greater electron capture detection of the chlorine atom.[36,37] Suitably substituted alcohols can be reacted with bromomethyldimethylchlorosilane to silylate the hydroxyl, followed by a radical cyclization and functionalization of the silicon-carbon bond to provide diols, or α-methyl alcohols.[38,39] The (pentafluorophenyl)dimethylsilyl group has been successfully used in the derivatization of hydroxysteroids, which can be detected at femtogram levels.[40] Carboxylic acids are protected as their trimethylsilylethyl esters with the advantage of being readily cleaved with the elimination of ethylene.[41]

Di-tert-Butylisobutylsilyltrifluoromethane sulfonate

In 2011 professor E. J. Corey and coworkers (*Org. Lett.* 2011, 13, 4120.) reported a new very sterically hindered and stable organosilyl protecting group, Di-tert-Butylisobutylsilyltrifluoromethane sulfonate, given the acronym BIBS. This novel organosilane is readily prepared in good yield in a process that Gelest has scaled up to commercial quantities. The Corey group has shown that the stable protection of alcohols, phenols, primary and secondary amines, carboxylic acids as well as silyl enol ethers is possible. In addition impressive selectivity of the protection of a primary amine versus an aniline, a carboxylic acid versus a primary alcohol, a primary amine versus a primary alcohol and a silyl enol ether versus a phenol was demonstrated.



Deprotection

The clean deprotection or desilylation of a silyl-protected functional group is essential to its utility. The relative stability correlation of trisubstituted silyl ethers towards hydrolysis under acid catalysis is TMS ≅ DMPS ≅ MDPS < TES ≅ DMIPS < TPS < TBS < TDS < TIPS < TBDPS < DTBMS.[42] The relative stabilities towards hydrolysis in base is TMS ≅ DMPS ≅ MDPS < DMIPS ≅ TES < TBDPS ≅ TBS < TDS < TIPS < DTBMS.[42] Denmark and coworkers[25] have looked at the steric and electronic effects on the desilylation of silyl ethers in acid and base.

In addition the long-range structural effects on the desilylation of silyl ethers has been investigated.[43]

Table 1
Resistance of Silylated Alcohols to Chemical Transformations

$t^{1/2}$ for Si-OR bond scission at room temperature

Blocking group	Substrate	HCl -THF	KF - methanol	CH_3MgBr in ether	n-Butyl lithium	LAH -THF	Pyridinium Chlorochromate
$(CH_3)_3Si$-	n-butanol	<15 min	2 min	48 hr	2 hr	30 min	<30 min
	cyclohexanol	<15 min	2 min	>48 hr	3 hr	1 hr	<30 min
	t-butanol	<15 min	24 hr	>48 hr	50 hr	24 hr	<30 min
$(C_2H_5)_3Si$-	n-butanol	<15 min	2 hr	no reaction	24 hr	1 hr	<30 min
	cyclohexanol	<15 min	20 hr	no reaction	>48 hr	2 hr	<30 min
	t-butanol	<15 min	no reaction	no reaction	no reaction	no reaction	1 hr
cyclohexylMe$_2$Si-	cyclohexanol	< 15 min	10 hr	no reaction	36 hr	2 hr	<30 min
$^iPr(CH_3)_2Si$-	cyclohexanol	10-30 min	24-30 hr	no reaction	>60 hr	3 hr	<30 min
$^tBuMe_2Si$-	n-butanol	>3 hr	no reaction	no reaction	no reaction	25 hr	10 hr
	cyclohexanol	>3 hr	no reaction	no reaction	no reaction	>50 hr	>20 hr
	t-butanol	no reaction	no reaction	no reaction	no reaction	no reaction	>20 hr
$^tHexylMe_2Si$-	n-butanol	16 hr	no reaction	no reaction	no reaction	>30 hr	22 hr
	cyclohexanol	30 hr	no reaction	no reaction	no reaction	no reaction	50 hr
	t-butanol	no reaction	no reaction	no reaction	no reaction	no reaction	no reaction
$^iPr_3Si$-	cyclohexanol	no reaction	no reaction	no reaction	no reaction	no reaction	>72 hr
$^tBuPh_2Si$-	n-butanol	no reaction	100 hr	no reaction	no reaction	no reaction	no reaction
	cyclohexanol	no reaction	no reaction	no reaction	no reaction	no reaction	no reaction
	t-butanol	no reaction	no reaction	no reaction	no reaction	no reaction	no reaction

Table 2
Trimethylsilyl Blocking Agents

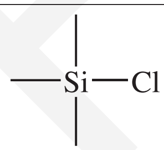
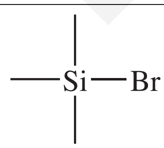
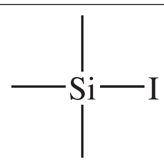
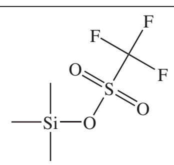
Product	Structure	Comments	Pricing
SIT8510.0 Trimethylchorosilane, TMCS [75-77-4]		Reacts in presence of HCl acceptor.[6] Will silylate strong acids with expulsion of HCl.[119] High purity grade available, SIT8510.1. Protects hindered alcohols w/ Mg/DMF.[120]	25g ¥3,400 750g ¥14,400 3kg ¥60,000 15kg inquire
SIT8430.0 Trimethylbromosilane, TMBS [2857-97-8]		More reactive than SIT8510.0 Less reactive, but more Less reactive, photolytically stable than SIT8564.0.[121]	25g ¥7,600 2.5kg ¥189,000
SIT8564.0 Trimethyliodosilane, TMIS [16029-98-4]		Extremely reactive silylating agent.[121] Used with HMDS for hindered alcohols.[122] Forms enol silyl ethers with ketones and SIT8620.0.[123]	25g ¥8,300 100g ¥31,800 2.5kg ¥260,000
SIT8620.0 Trimethylsilyltrifluoromethane-sulfonate TMSOTf [27607-77-8]		Strong silylating agent for C- or O-silylations.[123,124] Reacts w/ nitroalkanes to give N, N-bis (trimethylsiloxy)enamines.[125,126] These are useful reagents.[127]	25g ¥8,600 100g ¥28,400 2.5kg ¥230,000

Table 2 *(continued)*

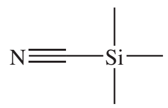
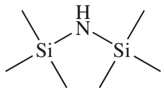
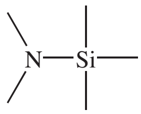
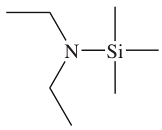
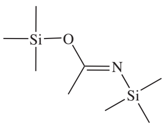
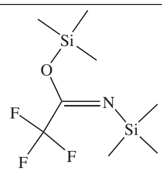
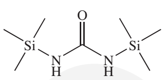
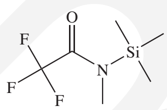
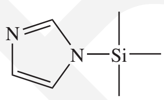
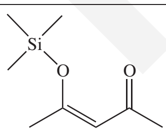
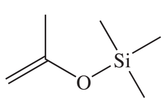
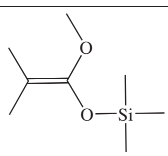
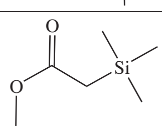
SIT8585.0 Trimethysilyl Cyanide TMSCN [7677-24-9]		Releases toxic HCN upon reaction. Extremely reactive silylating agent for acids and alcohols. Amines and thiols react more slowly than acids and alcohols. Does not react with amides, ureas or carbonates.[128] Silylates amino acids.[129] *includes liquid dispensing cylinder	25g inquire 1.5kg inquire
SIH6110.0 Hexamethyldisilazane, HMDS [999-97-3]		Releases ammonia upon reaction. Both trimethylsilyl groups used. Silylations catalyzed by SIT8510.0 and other reagents.[6]	25g ¥5,600 1.5kg ¥23,200 14kg ¥130,000
SID3605.0 Dimethylaminotrimethylsilane, TMSDMA [2083-91-2]		Similar to SID6110.0 and SID3398.0 Liberates Me_2NH upon reaction. Liberates Me_2NH upon reaction. Silylates urea-formaldehyde polycondensates.[130] Silylates phosphorous acids.[131]	25g ¥8,000 100g ¥20,100 2kg ¥207,000
SID3398.0 Diethylaminotrimethylsilane, TMSDMEA [996-50-9]		Releases diethylamine upon reaction. Moderately strong silylating agent. Selectively silylates equatorial over axial hydroxyls.[132]	25g ¥7,200 100g ¥27,300 2kg ¥207,000
SIB1846.0 Bis(Trimethylsilyl)acetamide, BSA [10416-59-8]		More reactive than SIH6110.0. Releases neutral acetamide upon re-action. Both silyl groups used. Used for silylation in analytical applications.[133] Reactions catalyzed by acid. Forms enol silyl ethers in ionic liquids.[134]	25g ¥8,200 100g ¥18,800 2kg ¥156,000
SIB1876.0 Bis(Trimethylsilyl)trifluoroacet-amide, BSTFA [25561-30-2]		More reactive than BSA (SIB1846.0). Commonly used for analytical purposes. Reacts very well in DMF or acetonitrile.[14,133]	25g ¥18,800 100g ¥53,300 2kg ¥275,000
SIB1878.0 Bis(Trimethylsilyl)urea,BSU [18297-63-7]		By-product is urea. Used for alcohols and acids.[135] Used in synthesis of penicillins and cephalosporins.[136]	50g ¥4,500 250g ¥19,800 10kg ¥245,000
SIM6576.0 N-Methyl-N-Trimethylsilyl-Tri-fluoroacetamide MSTFA [24589-78-4]		Silylation reagent similar to SIB1846.0, but with liquid, volatile byproduct	25g ¥22,500 100g ¥65,500
SIT8590.0 Trimethylsilylimidazole, TMSIM [7449-74-3]		Powerful silylating agent for alcohols. Does not react with aliphatic amines.[6]	25g ¥6,100 100g ¥21,400 2kg ¥170,000
SIT8572.0 2-Trimethylsiloxy-pent-2-en-4-one [13257-81-3]		Reacts with 1°, 2° and 3° alcohols.[137]	25g ¥21,500
SII6460.0 Isopropenoxytrimethylsilane, IPOTMS [1833-53-0]		By-product is acetone. Good for alcohols and acids.[138] Provides acetonides with diols.[115]	5g ¥25,700
SIM6496.0 1-Methoxy-1-trimethysiloxy-2-methyl-1-propene [31469-15-5]		Used for silylation of acids, alcohols, thiols, amides and ketones.[139,140]	25g ¥28,400 100g ¥84,600
SIM6571.5 Methyl Trimethylsilylacetate [2916-76-9]		Used for 3° alcohols and enolizable ketones.[141,142]	10g ¥27,300

Table 2 *(continued)*

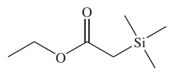
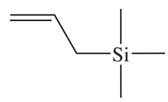
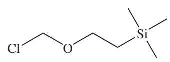
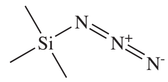
SIE4901.6 Ethyl Trimethylsilylacetate [4071-88-9]		Silylation of ketones, alcohols, acetylenes, thiols under the influence of fluoride ion.[143-145d]	5g ¥14,100
SIA0555.0 Allytrimethylsilane [762-72-1]		Neutral propylene by-product. Acid-catalyzed silylations. Used for acids[146] and thiols.[147] Employed in the synthesis of N-trimethylsilylpyridinium triflate an active trimethylsilylating agent.[148]	25g ¥13,800 100g ¥36,800 1.5kg ¥203,000
SIT8588.5 2-(Trimethylsilyl)ethoxymethyl-chloride, 95%, SEM-Cl [76513-69-4]		Hydroxyl group protecting unit. Deprotected with fluoride ion.[149] Used to protect carboxylic acids.[150,151] Protects anomeric center of pyranosides.[152] Used for the introduction of hydroxymethyl group.[153]	5g ¥27,800 25g ¥101,000
SIT8580.0 Trimethylsilyl Azide [4648-54-8]			10g ¥12,500 50g ¥39,500

Table 3
Trialkylsilyl Blocking Agents

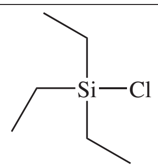
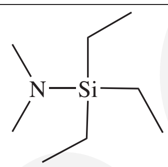
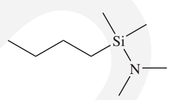
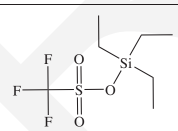
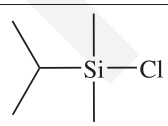
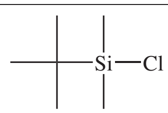
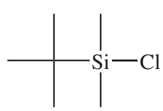
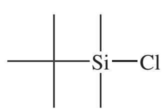
Product	Structure	Comments	Pricing
SIT8250.0 Triethylchlorosilane [994-30-9]		Stability of ethers intermediate between TMS and TBS ethers.[154] Good for 1°, 2°, 3° alcohols. Can be cleaved in presence of TBS, TIPS and TBDPS ethers.[10]	10g ¥6,800 50g ¥18,800 2kg ¥122,000
SID3603.0 N,N-Dimethylaminotriethylsi-lane [3550-35-4]		Very reactive triethylsilyl protecting group. Dimethylamine by-product produced.	50g ¥41,900
SIB1937.0 n-Butyldimethyl(dimethylami-no)silane [181231-67-4]		Reactive aminofunctional organosilane.	10g ¥15,400 50g ¥53,800
SIT8335.0 Triethylsilyl-trifluoromethane-sulfonate [79271-56-0]		More reactive than SIT8250.0. Useful for more hindered alcohols.[155]	10g ¥11,100 50g ¥38,700 2kg ¥385,000
SII6462.0 Isopropyldimethylchlorosilane [3634-56-8]		Ethers comparable in stability to those of TES-protected ethers.[156]	25g ¥20,400 100g ¥58,600 2kg inquire
SIB1935.0 and SIB1935.2 tert-Butyldimethylchlorosilane [18162-48-6]		Excellent for 1° and 2° alcohols. Silylation catalyzed by imidazole. Stable to many reagents.[22] Can be selectively cleaved in presence of acetate, THP and benzyl ethers[157] among others.[158]	25g ¥8,300 100g ¥20,300 750g ¥191,400 2kg inquire
SIB1935.4 tert-Butyldimethylchlorosilane, 3M in THF [18162-48-6]			100g ¥18,600 2kg ¥99,900
SIB1935.5 tert-Butyldimethylchlorosilane, 2.85M in toluene [18162-48-6]			100g ¥19,400 2kg ¥99,900 750g inquire

Table 3 *(continued)*

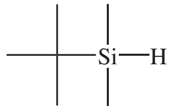
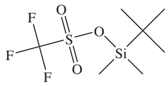
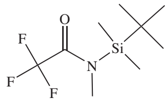
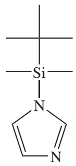
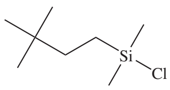
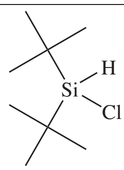
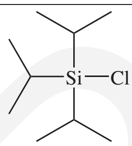
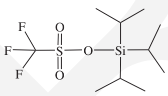
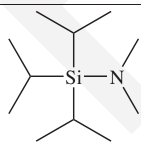
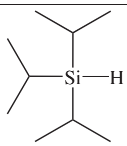
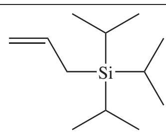
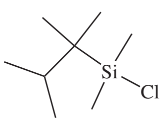
SIB1938.0 tert-butyldimethylsilane [29681-57-0]		Sterically hindered organosilane capable of dehydrogenative coupling.[76]	5g ¥13,500 25g ¥43,800
SIB1967.0 tert-Butyldimethylsilyltrifluoro-methanesulfonate [69739-34-0]		More reactive than SIB1935.0[159] Converts acetates to TBS ethers.[160]	10g ¥18,800 50g ¥65,000 2kg inquire
SIB1966.0 N-(tert-Butyldimethylsi-lyl)-N-trifluoroacetamide [77377-52-7]		Employed in silylations for analytical purposes.[161,162]	5g ¥26,800
SIB1964.0 tert-butyldimethylsilylimidazole		Reactive sterically hindered orgaosilane.	1g ¥20,400
SID4065.0 3,3-Dimethylbutyldimethylchlo-rosilane [56310-20-4]		Sterically hindered neohexylchlorosilane protecting group.	25g ¥12,500 100g ¥32,600
SID3120.0 Di-tert-butylchlorosilane [56310-18-0]		Used in selective silylation of internal alcohols or diols.[163] Employed in the *o*-vinylation of phenols via silylation/direction sequence.[164]	10g ¥33,200 50g ¥122,300
SIT8384.0 Triisopropylchlorosilane [13154-24-0]		TIPS ethers more stable than TBS ethers.[24] Protects carboxylic acids.[165] Used in synthesis of free-4-hydroxylhexopyranoses.[166]	25g ¥11,200 100g ¥36,700 2kg ¥183,000
SIT8387.0 Triisopropylsilyl-trifluorometh-anesulfonate [80522-42-5]		More reactive than SIT8384.0.[167] Used to make Tsoc, (triisopropylsilyloxycarbonyl) protecting groups for amines.[168]	10g ¥16,400 50g ¥55,400 2kg inquire
SIT8384.5 Triisopropyl(dimethylamino) silane [181231-66-3]		Reactive sterically hindered organosilane.	10g ¥27,800
SIT8385.0 Triisopropylsilane [6485-79-6]		Silylates strong acids with loss of hydrogen.[167] Silylates 1° alcohols selectively.[25]	25g ¥10,000 100g ¥22,600 1.5kg ¥220,000
SIA0535.0 Allyltriisopropylsilane [24400-84-8]		Reaction w/ triflic acid and then pyridine gives the active triisopropylsilylating agent, triisopropylsilylpyridinium triflate.[148]	5.0g ¥36,300
SIT7906.0 Thexyldimethylchlorosilane [67373-56-2]		Ethers show stability similar to or greater than the TBS ethers. Used for 1° and 2° amines.[29,169] Selective for 1° alcohols.[169]	25g ¥17,200 100g ¥48,300 750g inquire

Table 3 *(continued)*

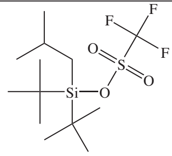
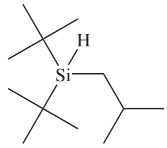
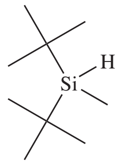
SID3226.0 Di-tert-butylisobutylsilyltrifluoromethanesulfonate, BIBS [1314639-86-5]		Highly sterically-hindered blocking agent useful for protection of alcohols, amines, acids, enol silyl ethers.[37]	10g ¥47,200
SID3224.0 Di-tert-butylisobutylsilane BIBS-H [1314639-86-4]		Highly sterically-hindered silane for potential dehydrogenative silylation.[37,76]	10g ¥51,200
SID3258.0 Di-tert-butylmethylsilane [56310-20-4]		Highly sterically-hindered silane for potential dehydrogenative silylation.	10g ¥25,200

Table 4
Phenyl-Containing Blocking Agents

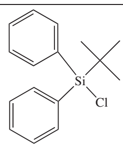
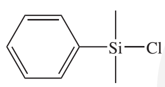
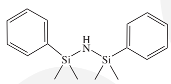
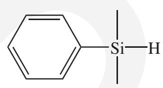
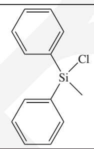
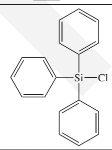
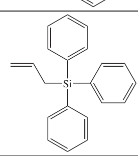
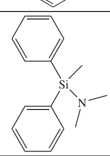
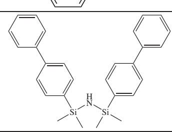
Product	Structure	Comments	Pricing
SIB1968.0 tert-Butyldiphenylchlorosilane [58479-61-1]		Forms more stable ethers than TBS ethers.[31] Used to protect phenols,[170] amines,[171] carboxylic acids, and amides.[172,173]	10g ¥5,000 50g ¥15,600 2kg ¥295,000
SIP6728.0 Phenyldimethylchlorosilane [768-33-2]		Used in analytical procedures.[175]	25g ¥9,700 100g ¥25,700 2kg ¥116,400
SID4586.0 Diphenyltetramethyldisilazane [3449-26-1]		Similar to SIP6728.0. Emits ammonia upon reaction. Used for silylation of capillary columns.[176]	5g ¥13,000 25g ¥41,600 2kg inquire
SIP6729.0 Phenyldimethylsilane [766-77-8]		Reacts with alcohols in presence of Wilkinson's catalyst.[177]	25g ¥14,600 100g ¥39,500 2kg inquire
SID4552.0 Diphenylmethylchlorosilane [144-79-6]		Stability versus other silyl ethers studied.[60]	25g ¥8,600 100g ¥31,000 2.5kg ¥84,400
SIT8645.0 Triphenylchlorosilane [76-86-8]		Ethers hydrolyze comparably to TMS ethers in base and 4 times slower in acid.[178] Can lead to solid products.[179]	25g ¥17,800 100g ¥50,100
SIA0575.0 Allyltriphenylsilane [18752-21-1]		Reaction w/triflic acid and then pyridine gives triphenylsilylpyridinium triflate, an active triphenylsilylating agent.[148]	2.5g ¥17,200
SID4552.5 Diphenylmethyl(dimethylamino)silane [68733-63-1]		More reactive than SID4552.0. Liberates dimethylamine upon reaction.	25g ¥16,200
SIB1026.4 1,3-Bis(4-biphenyl)-1,1,3,3-tetramethyldisilazane		Reactivity and stability similar to that of SID4586.0	10g ¥44,300

Table 5
Specialty Silicon-Based Blocking Agents

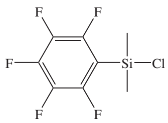
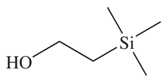
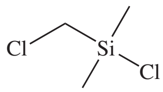
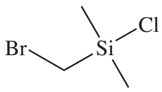
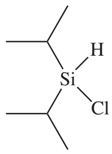
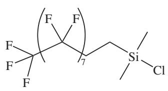
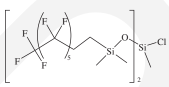
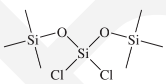
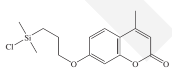
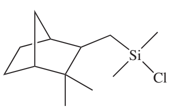
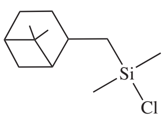
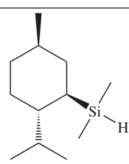
Product	Structure	Comments	Pricing
SIP6716.1 Pentafluorophenyldimethylchlorosilane FLOPHEMESYL CHLORIDE [20082-71-7]		Ethers detectable at femtogram level by ECD. Forms excellent derivatives for mass spectral analysis.[117,118,180,181]	5g ¥46,400
SIT8589.2 Trimethylsilylethanol [2916-68-9]		Used for protection of acids.[182,183]	10g ¥28,400 50g ¥103,200
SIC2285.0 Chloromethyldimethylchlorosilane [1719-57-9]		Can form cyclic products with appropriate 1,2-difunctional substrates.[184] Used in analytical applications for greater ECD detectability.[185]	25g ¥7,700 750g ¥47,700 2kg ¥399,000
SIB1890.0 Bromomethyldimethylchlorosilane [16532-02-8]		Has been applied to the synthesis of diols and β-methyl alcohols.[186,187]	25g ¥20,400 100g ¥58,600
SID3535.0 Diisopropylchlorosilane [2227-29-4]		Silylates and reduces β-hydroxy ketones selectively.[188] Photochemically removable.[189]	5g ¥14,100 25g ¥45,900
SIH5840.4 (Heptadecafluoro-1,1,2-2-tetrahydradecyl)-dimethylchlorosilane [74612-30-9]		Potential blocking agent for fluorous phase synthesis.[190]	5g ¥15,100 25g ¥50,100
SIB1815.5 Bis(tridecafluoro-1,1,2,2-tetrahydrooctyldimethylsiloxy)-methylchlorosilane		Potential blocking agent for fluorous phase synthesis.[190]	5g ¥49,900
SIB1837.0 Bis(trimethylsiloxy)dichlorosilane [2750-44-9]		Sterically-hindered for the protection of diols	25g ¥34,200
SIC2266.8 7-[3-(Chlorodimethylsilyl)propoxy]-4-methylcoumarin [129119-77-3]		Flourescent tag silicon-based protecting group.[116]	10g ¥24,700
SIC2056.2 (-)-Camphanyldimethylchlorosilane [684284-12-6]		Chiral silicon-based protecting group.	10g ¥26,800
SID4074.0 (Dimethylchlorosilyl)methyl-7,7-dimethylnorpinane [72269-53-5]		Chiral silicon-based blocking agent.	10g ¥13,300
SIM6472.7 (-)-Menthyldimethylsilane		Chiral silicon-based protecting group via dehydrogenative silylation.[76]	5g ¥48,500

Table 6
Bridging Silicon-Based Blocking Agents

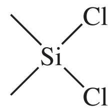
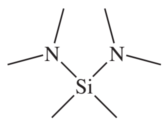
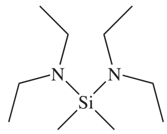
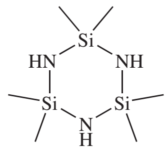
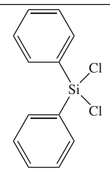
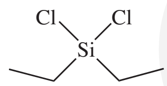
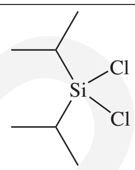
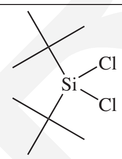
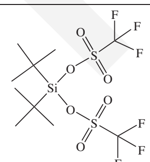
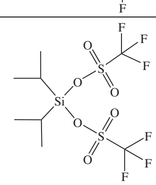
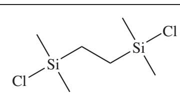
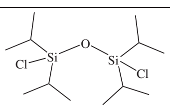
Product	Structure	Comments	Pricing
SID4120.0 and SID4120.1 Dimethyldichlorosilane [75-78-5]		Reacts with alcohols,[191] diols,92[5] and hydroxy carboxylic acids.[193] Employed as a protecting group/template in C-glycoside synthesis.[194]	500g inquire 2kg inquire
SIB1072.0 Bis(Dimethylamino)dimethyl-silane [3768-58-9]		More reactive than SIB4120.0. Reacted with diols,[195] diamines,[196] and treatment for glass.[197]	25g ¥11,900 100g ¥31,000 2kg inquire
SIB1068.0 Bis(Diethylamino)dimethylsilane [4669-59-4]		Similar to SIB1072.0.	50g ¥39,500 2kg inquire
SIH6102.0 Hexamethylcyclotrisilazane [1009-93-4]		Silylates diols with loss of ammonia. Similar in reactivity to HMDS.[198,199]	25g ¥6,200 100g ¥10,400 2kg ¥174,000
SID4510.1 Diphenyldichlorosilane [80-10-4]		Reacts with alcohols,[200] diols,[195] 2-hydroxybenzoic acids.[201]	25g ¥5,300 100g ¥11,000 2kg ¥42,400
SID3402.0 Diethyldichlorosilane [996-50-9]		Similar to, but more stable derivatives than dimethylsilylenes.	25g ¥11,900 100g ¥31,000 1kg inquire
SID3537.0 Diisopropyldichlorosilane [7751-38-4]		Forms tethered silyl ethers from diols.[42,202,203] Protects 3',5' hydroxyls of nucleosides, but less effectively than SIT7273.0.[204]	10g ¥9,000 50g ¥25,700 1kg ¥203,000
SID3205.0 Di-tert-butyldichlorosilane [18395-90-9]		Used to protect 1,2-diols,[43] and 1,3- diols.[205] Forms 4,6-cyclic di-tert-butylsilylenediyl ethers w/glycopyranosides.[206]	5g ¥31,000 25g ¥113,800
SID3345.0 Di-tert-butylsilylbis(trifluoro-methanesulfonate) [85272-31-7]		More reactive than SID3205.0.[42] Converts 1,3-diols to cyclic protected 1,3-diols.[207] Reacts w/1,3-diols in preference to 1,2-diols.[208]	5g ¥17,200 25g ¥44,800
SID3534.0 Di-isopropylbis(trifluorometh-anesulfonyl)silane [85272-30-6]		More reactive than SID3345.0. Protects diols[209]	5g ¥33,700
SIB1042.0 Bis(dimethylchlorosilyl)ethane [13528-93-3]		Protection for 1° amines,[210,211] including amino acid esters.[212]	25g ¥9,300 100g ¥22,500
SIT7273.0 Tetraisopropyldichlorodisiloxane [69304-37-6]		Highly useful for protection of 3',5'- dihydroxynucleosides.[46] Protects 1,2-diequatorial diols.[213]	5g ¥9,400 25g ¥45,600 2kg ¥307,000

Table 6 *(continued)*

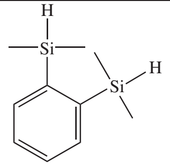
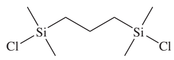
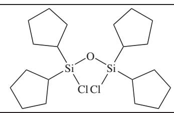
SIB1084.0 1,2-Bis(dimethylsilyl)benzene [17985-72-7]		Used to protect anilines,[48] amines,[188] and amino acids.[214]	2.5g ¥41,100
SIB1048.2 1,3-Bis(chlorodimethylsilyl)-propane [2295-06-9]		Potentially useful silylating agent for diols and related systems.	5g ¥31,000
SIT7087.0 1,1,3,3-Tetracyclopentyl-dichlorodisiloxane		Used in the protection of 3',5'-dihydroxynucleosides.	5g ¥20,700 25g ¥72,400

Table 7

Deprotection Of 1° Silyl Ethers In The Presence Of Other 1° Silyl Ethers[9]

Deprotection of:	In the Presence of:				
	1° TMS	1° TES	1° TIPS	1° TBS	1° TBDPS
1° TMS		$NaHCO_3$[367]	NaOH/EtOH[132] MCM-41[368]	NaOH/EtOH[132] $Cu(NO_3)_2$[133], $Ce(NO_3)_3$[133] $[Bu_2(NCS)Sn]_2O$[134] $BiCl_3$[369] $Bi(O_2CCF_3)_3$[369] K_2CO_3[370], MCM-41[368]	NaOH/EtOH[132] $Cu(NO_3)_2$[133] $Ce(NO_3)_3$[133] HCl[132,135]
1° TES			TFA[371] H_2/Pd-C[372] MCM-41[368]	HF/py[136] TCNQ/MeCN/H_2O[137] DDQ/MeCN/H_2O[137,138] CSA[373], IBX/DMSO[374] MCM-41[368], H_2/Pd-C[372]	SiF_4/CH_2Cl_2[139] DDQ/MeCN/H_2O[137,138] MCM-41/MeOH[140] CSA[375,376], H_2/Pd-C[372,377] MSOTf/HCO_2DPM/SiO_2[378] $ZnBr_2/H_2O$[379]
1° TIPS					TMSOTf/HCO_2DPM, SiO_2[378]
1° TBS			HCl/EtOH[132] H_2SiF_6/tBuOH[141,142] NaOH/EtOH[15] Cyclohexene/PdO[143] Alumina[144] H_2SO_4[380], CSA[381,382] PPTS[383], H_2SiF_6[384] H_2/Pd-C[372,377] TMSOTf/Et_3N/MeOH[385] $CeCl_3$•$7H_2O$/NaI[386] Decaborane[387]	TsOH/THF/H_2O[145] Cl_2CHCO_2H[146,147] TBAF[148], TBSOTf[149] HOAC[388], PPTS[389] TBAF[390], DDQ[391] $MnO_2/AlCl_3$[392] DMSO/H_2O[393] H_2/Pd-C[372]	HCl[132,150,394,395] HOAc/THF/H_2O[19,151-154] CSA/MeOH[155,156,164] PPTS[157,158,399-403], TsOH[159] MeOH/CCl_4[160], $Cu(NO_3)_2$[133] $Ce(NO_3)_3$[133], Cyclohexene/PdO[143] Alumina[145], SiF_4/CH_2Cl_2[139] DDQ/MeCN/H_2O[137,138] AcBr/CH_2Cl_2[161], TMSOTf[162] HF-py/THF[163], PPTS/EtOH[164] H_2SO_4[396], TFA[397.398], TsOH[404, 405] CSA[406-408], LL-ALPS-SO_3H[409] AcCl/MeOH[410], $Zn(BF_4)_2$[411] $Cu(OTf)_2/Ac_2O$[412], $InCl_3$[413] $CeCl_3$•$7H_2O$/NaI[386] $Ce(OTf)_4$/THF/H_2O[414] $PdCl_2(MeCN)_2$[415], I_2/MeOH[416] Br_2/MeOH[417], IBr[418] LiCl/DMF[419], CCl_4/MeOH[420] $CeCl_3$•$7H_2O$[421], $ZnBr_2/H_2O$[379] $ZrCl_4/Ac_2O$[422], HF-pyr[423,424] I_2/KOH[400], H_2/Pd-C[372,377] Bu_4NOH/MeOH[425], TBAF[426] TMSOTf/HCO_2DPM/SiO_2[378] Decaborane[387]
1° TBDPS			KOH[427]	TBAF/HOAc[166,428,429] TBATB/MeOH[165] NaOH[429-431], Bu_4NOH[428]	$LiAlH_4$[167] HF-py[432], TBAF[390]

Table 8
Deprotection Of 1° Silyl Ethers In The Presence Of 2° Silyl Ethers[9]

Deprotection of:	In the Presence of:				
	2° TMS	2° TES	2° TIPS	2° TBS	2° TBDPS
1° TMS	Rexyn 101[168] K_2CO_3/MeOH[169] Alumina[170] HOAc[433] Swern conditions[434]	$NaHCO_3$[367] Swern conditions[434]		BF_3OEt_2[171]	
1° TES	Swern conditions[434]	HOAc[172,437,438] CSA[384], PPTS[435] HBr/PPh_3[436] HF-pyr[367], TBAF/HOAc[439,440] TBAF[441-446] KF[447] LiOH[367] Swern cond.[434,448,449] CrO_3-2pyr[450] HF-pyr[451]	HOAc[172] TMSOTf/i-Pr_2NEt[452] HF-pyr[367,453] LiOH[367]	HOAc/H_2O/THF[172,174] RMgX[175], HCl[454], HBr/PPh_3[436] CSA[384,451,455], PPTS[456], TFA[457,458] HF/pyr[459,460], HF[447], TMSOTf/i-Pr_2EtN[461], TBAF[384], TBAF/HOAc[439], KF[447], Swern cond.[462]	SiF_4/CH_2Cl_2[139] DDQ/MeCN/H_2O[137,138] TsOH[448] citric acid[463] TMSOTf/i-Pr_2NEt[461] TMSOTf/Et_3N/MeOH[385]
1° TIPS			TBAF[176], CSA[464] TBAF[453], SiF_4[465] $POCl_3$-DMF[466] $(TfO)_2$O-DMF[466] CBr_4/MeOH[467] CAN/SiO_2[468]	TFA/H_2O/THF[177]	TFA/H_2O/THF[178] CSA[469]
1° TBS		HF-pyr[373]	HCl[15,179,470,471] HOAc [180,181,473-477] TsOH/PPTS[182] HF/py[183,184] NaOH[15] Cyclohexene/PdO[143] TsOH[185,186] H_2SO_4[472] HOAc[87-91] CSA[381-383,470,478-481] PPTS[482] TsOH[483] NH_4Cl/MeOH[484] HF-pyr[479,480,485-487] TBAF[488] polymeric DCKA[617] TBAF•3H_2O[384]	HCl[187,489], HOAc[172,490-492] TFA/H_2O/THF[188,189] CSA/MeOH[156], PPTS[190] Acid Amberlite[191] NH_4F[192], HF/MeCN[193,194] H_2SiF_6/^{t}BuOH[142], HF/py[195] H_2/wet Pd[196], AgOAc[197] NBS/DMSO[198], TBAF[199,200] MeOH/CCl_4[160], NaOH[15] Cyclohexene/PdO[201], Alumina[141,202] CAN/^{i}PrOH[203], $POCl_3$/DMP[204] $(CF_3SO_2)_2)$/DMF[204] CSA[381-383,401,479,480,493-502] PPTS[389,401,496,497,519-544] TsOH[404,405,510] TsOH/Bu_4NHSO_4[511], TFA[398,512-516] acidic $CHCl_3$[517], $Cu(OTf)_2/Ac_2O$[412] BCl_3[518], HF-py[479,480,485-545], HF[546,547] H_2SiF_6[548], NH_4F[549], TBAF/HOAc[452,550,564] TBAF[551-555], TAS-F[556], CBr_4-hν[557,558], Jones rgt.[523] LiBr/18-C-6[559] CAN/i-PrOH[560], $POCl_3$-DMF[466,561] $(TfO)_2$O-DMF[466] H_2/Pd-C[372], QFC[562] Bu_4NBr_3/MeOH[425], $MnO_2/AlCl_3$[392] Oxone[563], CAN/SiO_2[468]	HOAc/H_2O/THF[205,206] TsOH[207-209] PPTS[158,210,211] TBAF[212] HF/py[113] HF/Et_3N[214] IBr/DCM[81] HCl[179] HOAc[758] CSA[407,408,759,760] PPTS[761-764] TsOH[764-766] HF-pyr[696] HF[469,767-769] H_2SiF_6[713] TMSOTf/Et_3N/MeOH[385] $Cu(OTf)_2/Ac_2O$[412] $Zn(OTf)_2$[411] K_2CO_3[466] NaOH[752] TBTU[770] QFC polymeric DCKA[618] $InCl_3$[413]
1° TBDPS		TBAF/HOAc[565,566] NaOH/DMPU[567]	NaH/HMPA[215] HF-pyr[568] KOH/18-C-6[569]	NaH/HMPA[218], NaOH[217] KOH/MeOH[218] TBAF[199,219,220,524,529,576] NH_4F[193,570,571], NaOH/DMPU[567] KOH/18-C-6[569] TBAF/HOAc[428,519,526,565, 568,566,572-575] TAS-F[577], NaH/propargyl alcohol[395]	HF/py[223] alumina[144], CSA[578] HF-py[432,579], NH_4F[570] TBAF[469,580] $POCl_3$-DMF[466] $(TfO)_2$O-DMF[466]

Table 9
Deprotection Of 1° Silyl Ethers In The Presence Of 3° Silyl Ethers[9]

Deprotection of:	In the Presence of:				
	3° TMS	3° TES	3° TIPS	3° TBS	3° TBDPS
1° TMS	PPTS[224]				
1° TES		HF/py[235,479,525,533,587] CSA[376,586], PPTS[435]		Amberlyst-15[583] TBAF/HOAc[440]	HOAc[771]
1° TIPS				TBAF[235] SiF_4[224]	
1° TBS	HF[584,585]	CSA[376,581,586] HF-pyr[479,525,533,587]		TBAF[227,543,772] TBAF/HOAc[588] CSA[219,228 407,408,773] NH_4F[41], H_2SiF_6[142] SiF_4/CH_2Cl_2[139] $MeOH/CCl_4$[160]HF-py[544] oxone[563]	
1° TBDPS		TBAF/HOAc[566]		TAS-F[774]	

Table 10
Deprotection Of 2° Silyl Ethers In The Presence Of 1° Silyl Ethers[9]

Deprotection of:	In the Presence of:				
	1° TMS	1° TES	1° TIPS	1° TBS	1° TBDPS
2° TMS	Amberlyst 15[168]		TBAF[464]	HCl[229] K_2CO_3/MeOH[230,231] TsOH[589] citric acid[548] H_2SiF_6[548] NaOH[471]	HCl[232], TsOH[233] Acetone/$Me_2C(OMe)_2$/CSA[234] PhSeCl/K_2CO_3[235], TBAF[236] PPTS[237,238], Alumina[170] K_2CO_3/MeOH[239], HOAc[590] CSA[591], TsOH[589,592,594] BF_3-OEt_2[590], TMS-OTf[531]
2° TES		HF/py[225]	TFA[177] $H_2SiF_6/HF/H_2O$[240] HCl[595] HOAc[469] CSA[380,451] PPTS[596] H_2SO_4[380] Ph_3P-HBr[380] HF-pyr[367,384,453] HF-Et_3N[597]	DDQ/MeCN/H_2O[138] HCl/py[241] NH_4Cl[242,243] TBAF/THF/ $NH_4Cl(s)$[242] HF-py[370] I_2/Ag_2CO_3[598,599] Pd/C, MeOH[600] H_2, Pd/C[372]	HCl[135,234,520,529,603,604] HOAc[245,395], Cl_3CCO_2H[246] TsOH[247,382,602-604], HF/MeCN[248,249] PhSeCl/K_2CO_3[235], TBAF[156,599,607] DDQ/MeCN/H_2O[138] SiF_4/CH_2Cl_2[139] CSA/$CHCl_3$/MeOH[250] CSA[601], PPTS[164,602] H_2SO_4[607], BF_3-OEt_2[382,602] Et_3N-HF[608] HF-pyr[609],2,4,4,6-tetrabromo- 2,5-cyclohexadienone/PPh_3[611] H_2, Pd/C[612], $ZnBr_2/H_2O$[379]
2° TIPS					
2° TBS			$H_2SiF_6/HF/H_2O$[208] CSA[596]	DIBAL-H[251] $MnO_2/AlCl_3$[392]	HCl[15,252], HOAc/H_2O/TH[253,254] TsOH[255,256], PPTS[158,257,432,613] BF_3OEt_2[258], TMSOTf[162] HF/MeCN[188], TBAF[155] SiF_4/CH_2Cl_2[139], CSA/MeOH[164] H_2SiF_6[569], TMS-OTf/Et_3N[385] TMS-OTf[432,614], $Cu(OTf)_2/Ac_2O$[412] $InCl_3$[413], $LiAlH_4$[615,616], IBr[775] $P_2O_5/(MeO)_2CH_2$[405], LiCl/DMF[419] polymeric DCKA[618] $ZnBr_2/H_2O$[379], $Zn(BF_4)_2$[411]
2° TBDPS				NaH/HMPA[259] TBATB/MeOH[165]	

Table 11
Deprotection Of 2° Silyl Ethers In The Presence Of 1° Silyl Ethers[9]

Deprotection of:	In the Presence of:				
	2° TMS	2° TES	2° TIPS	2° TBS	2° TBDPS
2° TMS	TBAF[260] SiO_2-Cl/ NaI[776]	HF-pyr[533,582] TBAF[446] KF[567]	Citric Acid/MeOH[261] TBAF/HOAc[262,263] $FeCl_3$[264] TBAF[464] KF[447] NaOH[471] H_2SiF_6[548]	HCl[265], TsOH[266,267] HOAc/H_2O/THF[268] PPTS[269,622], HF/Et_3N[270] Citric Acid/MeOH[271,272] $Cu(NO_3)_2$[133], $Ce(NO_3)_3$[133] DDQ/wet EtOAc[273] K_2CO_3/MeOH[239] HOAc[620,621], TsOH[594], CSA[623] HF-pyr[533,582], HF/Et_3N[624] BF_3-OEt_2[625,626], K_2CO_3[627-629] TBAF[630], KF[447,567]	TBAF[274] $Cu(NO_3)_2$[133] $Ce(NO_3)_3$[133] K_2CO_3[628,629] $NaIO_4$[631]
2° TES		HOAc[13,275] TBAF[276,436,498] TsOH[632] TFA[633,634] HF-py[533,579] TBAF/ HOAc[439] $(NH_4)HF_2$[635] KF[447] NaOH/DMPU[567]	TFA[177,277,278] HOAc[279-281] PPTS[11,479,636,] MoO_5/HMPA[272,283] WO_5/HMPA[282,283] HF-py/py-THF[284] H_2SO_4[380] TFA[637] HF-py[367,638,639] $Zn(OTf)_2$/EtSH[656] NH_4F[637] Amberlyst-15[641]	HOAc/H_2O/THF[278] TFA[177,277,278,633,634,652,] PPTS[11,285,286,613,623,646,651,683] HF/MeCN[287] HF/py[287,288,384,437,454,533,609,582,606,653,654] DDQ/MeCN/H_2O[138] MoO_5/HMPA[282,283] WO_5/HMPA[282,283] PTSA/MeOH[289] TfOH/H_2O-THF[290] TBAF/THF[291] PPTS/MePH[292] MCM-41/MeOH[140] HCl[642,643], HOAc[569,644,645] CSA[373,596] TsOH[460] HF-Et_3N[435,655] HF[781] $Zn(OTf)_2$/EtSH[656], $TiCl_3$(O-iPr)[654] TBAF/HOAc[439,658] TBAF[395,436,498,659,660], KF[447] NaOH/DMPU[567]MCM-41[368] $PdCl_2$/CuCl/H_2O[661]	HOAc/H_2O/THF[293] CSA[294] TBAF[155,295,665,666] SiF_4/CH_2Cl_2[139] DDQ/MeCN/H_2O[138] HF/MeCN[287] HF/py[286] HCl[662] HOAc[469,663] HF[664] K_2CO_3[667] $NaIO_4$[631]
2° TIPS			HF[536,674]	TBAF[297,668,669] PTSA/MeOH[298] TsOH[480] HF/Et_3N[639], $LiAlH_4$[670]	$NaIO_4$[631]
2° TBS	HCl[299]	TBAF[654]	HCl[15,671,672] H_2SiF_6(aq)[142] HOAc[280,281] HF/MeCN[188] TBAF[263,300,383] CSA[479,673] HF[536,674] Et_3N-3HF[675] H_2SiF_6/Et_3N[676]	HCl[15] CSA[302,439,677] TsOH[303] HF/MeCN[188,304-306] $LiAlH_4$[167] KF/H_2O[307] TBAF[274,308-311,499,619,534,535,616,651,683-688,777] H_2SO_4[678], HF-py[679,680] HF[681] BF_3-OEt_2[682] P_2O_5/$(MeO)_2CH_2$[405] MnO_2/$AlCl_3$[392]	TsOH[312-314] HCO_2H/THF/H_2O[315] CSA[316] PPTS[317,318,694,695] HF/MeCN[319] TBAF[200,320,321] SiF_4/CH_2Cl_2[139] $Cu(NO_3)_2$[133] $Ce(NO_3)_3$[133] DDQ/MeCN/H_2O[138] HCl[689,690] HOAc[691-693] HF-pyr[696,697] TMS-OTf[432,614] BF_3-OEt_2[698] $Sc(OTf)_3$[699] $NaIO_4$[631]
2° TBDPS			TBAF/THF[179]		

Table 12
Deprotection Of 2° Silyl Ethers In The Presence Of 3° Silyl Ethers[9]

Deprotection of:	In the Presence of:			
	3° TMS	3° TES	3° TIPS	3° TBS
2° TMS	TsOH[267,322]	HOAc[268], CSA[700] KF[447,567], HF-py[533,582]		
2° TES		TsOH[323], HF-pyr[531,579], HCl[642,643], PPTS[701] HF-py[384,533,582] TBAF[436,702]		HOAc[324] CSA[199] HCl[440] TfOH[703]
2° TIPS				
2° TBS			H_2SiF_6/^{t}BuOH/H_2O[142]	HOAc[325] CSA[326,327] TBAF[328,329] TfOH[703] HF[704]
2° TBDPS				

Table 13
Deprotection Of 3° Silyl Ethers In The Presence Of 1° Silyl Ethers[9]

Deprotection of:	In the Presence of:				
	1° TMS	1° TES	1° TIPS	1° TBS	1° TBDPS
3° TMS			PPTS/MeOH[330] PPTS[778], HCl[595]	$ClCH_2CO_2H$/MeOH[146] HCl[705], BH_3-SMe_2[706]	HCl[398], HOAc[771] BF_3-OEt_2[707,708], K_2CO_3[398]
3° TES			HF-Et_3N[597] TBAF[709]	SiO_2[331] TBAF/ NH_4Cl[709]	TBAF[709]
3° TIPS					
3° TBS					$LiAlH_4$[326,332]
3° TBDPS					

Table 14
Deprotection Of 3° Silyl Ethers In The Presence Of 2° Silyl Ethers[9]

Deprotection of:	In the Presence of:				
	2° TMS	2° TES	2° TIPS	2° TBS	2° TBDPS
3° TMS			TBAF/HOAc[263,711]	HCl[333,398,705] $LiAlH_4$[334] TBAF[335] $FeCl_3$[336] HF[681], BH_3-THF[712] TBAF/HOAc[711] K_2CO_3[398]	HCl[224] H_2SiF_6[713,714] K_2CO_3[715]
3° TES			TBAF/HOAc[711]	Et_3NHF[337,338] HF-Et_3N[435,655] TBAF/HOAc[711]	
3° TIPS					
3° TBS			TBAF/HOAc[711]	TBAF[324] TBAF/HOAc[711]	
3° TBDPS					

Table 15
Deprotection Of 3° Silyl Ethers In The Presence Of 3° Silyl Ethers[9]

Deprotection of:	In the Presence of:				
	3° TMS	3° TES	3° TIPS	3° TBS	3° TBDPS
3° TMS			HCl/THF[339]		
3° TES					
3° TIPS					
3° TBS				CSA[340]	
3° TBDPS					

Table 16
Deprotection Of Phenolic Silyl Ethers In The Presence Of Alkyl Silyl Ethers[9]

Deprotection of:	In the Presence of:					
	1° TMS	1° TBS	2° TBS	3° TBS	1° TBDPS	2° TBDPS
ArOTMS	Dowex 1-X8 (HO^- form)[341]	TBAF[342,343], $BiCl_3$[369] $Bi(O_2CCF_3)_3$[369], $Bi(OTf)_3$[369] PIFA-MK10[717]	TBAF[344] SiO_2[718]			
ArOTES		NaOH[132]				
ArOTBS		NaOH[132], K_2CO_3/Kryptofix 222/MeCN[345] TBAF[346,347,429,717,719-721] KF/18-crown-6[347] KF/Al_2O_3/MeCN[348] KF-Al_2O_3[722] CsF/RX/DMF[728], K_2CO_3[724], $CsCO_3$[725], Et_3NO[726], LiOH[727] NaOH/ TBAH[728], KOH[729] LiOH/RX/DMF[730], TMG[731] PIFA-MK10[717], DMSO/H_2O[393]	K_2CO_3/Kryptofix 222/MeCN[345] TBAF[344,346], CSA[732] TBAF[719,733,734] K_2CO_3[724] CsF/CH_3CN[735] Et_3NO[726] NaOH/TBAH[728] KOH[736] LiOH/RX/DMF[730] KF-Al_2O_3[737]	10% HCl[349]	TBATB/MeOH[165] $Zn(BH_4)_2$[411] TBAF[750,751] NaOH/TBAH[728]	
ArOTIPS		PIFA-MK10[717]			NaOH[754]	TBAF[753] NaOH[754]
ArOTBDPS		NaOH[132] PIFA-MK10[717]			TMG[731]	TMG[731]

Table 17
Deprotection Of Alkyl Silyl Ethers In The Presence Of Phenolic Silyl Ethers[9]

Deprotection of:	In the Presence of:				
	ArOTMS	ArOTES	ArOTBS	ArOTIPS	ArOTBDPS
1° TMS	Dowex CCR-2 (H^+ form)[341]		HCl[132]	HCl[132] Amberlite IR-120 (H^+ form)[351]	HCl[132]
2° TMS				Amberlite IR-120 (H^+ form)[351]	
1° TES		Pd/C/MeOH[600]	$ZnBr_2/H_2O$[379]	$ZnBr_2/H_2O$[379]	$ZnBr_2/H_2O$[379]
2° TES			PPTS[738] $BiBr_3/Et_3SiH$[779] $ZnBr_2/H_2O$[379]	$ZnBr_2/H_2O$[379]	$ZnBr_2/H_2O$[379]

Table 17 *(continued)*

Deprotection of:	In the Presence of:				
	ArOTMS	ArOTES	ArOTBS	ArOTIPS	ArOTBDPS
1° TBS			HCl[132,352], TFA[353], PPTS[345,735] HF/MeCN[345,354,355], BF_3OEt_2[345,356] SiF_4/CH_2Cl_2[139], $MeOH/CCl_4$[160] $TMSCl/H_2O/CH_3CN$[357] $Oxone/MeOH_{aq}$[358,563] Nafion-H/NaI[739], LL-ALPS-SO_3H[409] AcCl/MeOH[410], TMS-Cl/H_2O[740] TMS-Cl/NaI/H_2O[740], Me_2SBr_2[739] TBSOTf/THPOAc[741] $BiBr_3/H_2O/MeCN$[742] $BiCl_3/NaI$[743], $CeCl_3{\bullet}7H_2O$[727] CuOTf, Ac_2O[412], $Sc(OTf)_3/H_2O$[699] $ZnBr_2/H_2O$[379], $InCl_3$[413] $ZrCl_4/Ac_2O$[422], decaborane[387] $Ce(OTf)_4/THF/H_2O$[414] $CBr_4/MeOH$[467], $I_2/MeOH$[744] CAN/SiO_2[468], Oxone/MeOH[563] H_2/Pd-C[780]	HCl[132] Amberlite IR-120 (H^+ form)[351] HF-pyr[746] BF_3-OEt_2[747] $ZnBr_2/H_2O$[379] $ZrCl_4/Ac_2O$[422]	HCl[132,476] $ZnBr_2/H_2O$[379] $InCl_3$[413] $BiOClO_4$[745]
2° TBS			TFA[359,749], BF_3OEt_2[345,356] HF/MeCN[346], PPTS[345] SiF_4/CH_2Cl_2[139], Nafion-H/NaI[739] $BiBr_3/H_2O$/ MeCN[742], $BiCl_3/NaI$[743] $CeCl_3{\bullet}7H_2O$[727], $ZnBr_2/H_2O$[379] $InCl_3$[413], Me_2SBr_2[739]	TFA[749] $ZnBr_2/H_2O$[379]	$ZnBr_2/H_2O$[379]
1° TIPS				HCl[132], $CBr_4/MeOH$[467] $I_2/MeOH$[744]	HCl[132], $Sc(OTf)_3/H_2O$[696] $CBr_4/MeOH$[467], $I_2/MeOH$[744]
1°TBDPS				HCl[132]	HCl[132], $Sc(OTf)_3/H_2O$[699] $CBr_4/MeOH$[467], $I_2/MeOH$[744]

Table 18
Deprotection Of Silylene- And Disiloxane-Protected Diols In The Presence Of 2° Alkyl Silyl Ethers

Deprotection of:	In the Presence of:				
	2°TMS	2°TES	2°TIPS	2°TBS	2°TBDPS
DTBS silylene				HF/py[29,122,360,361] KF/MeOH[307,362,363]	
TIPDS siloxane					HF/MeCN[364]

Table 19
Deprotection Of Aryl Silyl Ethers In The Presence Of Another Aryl Silyl Ether

Deprotection of:	In the Presence of:				
	ArOTMS	ArOTES	AROTBS	ArOTIPS	ArOTBDPS
ArOTMS					
ArOTES					
ArOTBS			$SbCl_3$[754], KF-Al_2O_3[737] $CCl_4/MeOH$[755] $NaClO_2/NaH_2PO_4$/py[756]		HCl[754]
ArOTIPS					
ArOTBDPS					

Generic Silylation Procedures

1. Hexamethyldisilazane, SIH6110.0, in the trimethylsilylation of alcohols.

One equivalent of the alcohol to be silylated is mixed with 0.5 equivalents of hexamethyldi-silazane, SIH6110.0, in an inert solvent or without solvent. Warming the reaction to 40 - 50 °C or adding a drop of trimethylchlorosilane can significantly accelerate the rate of reaction. The reaction is allowed to continue until no further evidence of the evolution of ammonia is observed. For primary and secondary alcohols the reaction is quite rapid and nearly quantitative. For tertiary alcohols the reaction may be slower.

2. Trimethylchlorosilane, SIT8510.0 and SIT8510.1, in the trimethylsilylation of alcohols.

One equivalent of the alcohol, 1.1 equivalent of pyridine or triethylamine are mixed in an inert solvent and one equivalent of trimethylchlorosilane, SIT8510.0 or SIT8510.1, is added. The amine can also be used as the solvent of the reaction. The reaction can be followed by any of the standard techniques including thin layer and gas chromatography. The reaction is quite fast with primary and secondary alcohols and slower with tertiary alcohols. The trimethylsilylation of amides and amines can be accomplished by a modification of this procedure wherein the reaction mixture is heated to reflux for 16 h.

3. Trimethylbromosilane, SIT8430.0, or Trimethyliodosilane, SIT8564.0, in the trimethylsilylation of alcohols.

One equivalent of the alcohol, 1.1 equivalent of a suitable amine base are mixed in an inert solvent and the trimethylbromosilane, SIT8430.0, or trimethyliodosilane, SIT8564.0, is added. These reagents are more reactive towards hindered alcohols than the trimethylchlorosilane.

4. Trimethyliodosilane, SIT8564.0, Hexamethyldisilazane, SIH6110.0 combination in the trimethylsilylation of hindered alcohols.

The alcohol (1 equiv.), trimethyliodosilane, SIT8564.0, (2.2 equiv.) and hexamethyldisilazane (1.1 equiv.) are mixed in pyridine as solvent and the reaction mixture is stirred at room temperature.

5. Trimethylsilyltrifluoromethanesulfonate, SIT8620.0, or Trimethylsilyl Cyanide, SIT8585.1, in the trimethylsilylation of hindered alcohols.

Trimethylsilylation with these very reactive silanes is carried out by the simple mixing of the alcohol and the silane in an inert solvent and allowing the reaction to occur, usually at room temperature. CAUTION: Hydrogen cyanide is generated in the reaction with trimethylsilyl cyanide.

6. Allyltrimethylsilane, SIA0555.0, in the silylation of carboxylic acids.

The acid (1 equiv.) is dissolved in carbon tetrachloride (other solvents such as dichloromethane can probably be used as well) and allyltrimethylsilane, SIA0555.0, is added. To this reaction mixture is added about 3 drops (for 10 mmol reaction) of trifluoromethanesulfonic acid. The reaction is very fast and is complete when the evolution of propylene ceases.

7. Triethylchlorosilane, SIT8250.0, tert-Butyldimethylchlorosilane, SIB1935.0, tert- Butyldiphenylchlorosilane, SIB1968.0, Triisopropylchlorosilane, SIT8384.0, or Thexyldimethylchlorosilane, SIT7906.0, in the silylation of alcohols.

The alcohol (1 equiv.) is dissolved in DMF along with the chlorosilane (1.1 equiv.) and imidazole (2.2 equiv.) or 2,6-lutidine (2.2 equiv.). The reaction is usually heated to about 40 °C for 10 - 20 h for completion.

8. tert-Butyldimethylsilylation of an alcohol in dichloromethane.

The tert-butyldimethylsilylation of an alcohol has been carried out by treating 0.89 equiv. of tert- butyldimethylchlorosilane in dichloromethane with 0.91 equiv. of the alcohol, 1.19 equiv. of triethylamine and 0.036 equiv. of 4-dimethylaminopyridine at room temperature for several hours.

9. Triisopropylsilyltrifluoromethanesulfonate, SIT8387.0, in the silylation of alcohols.

The alcohol (1 equiv.) is reacted with triisopropylsilyltrifluoromethanesulfonate, SIT8387.0, in dichloromethane with 2,6-lutidine (2.2 equiv.) as catalyst. The reaction can be carried out as low as -78 °C in less than 5 h.

10. tert-Butyldimethylsilyltrifluoromethanesulfonate, SIB1967.0, in the silylation of alcohols.

The alcohol (1 equiv.) is treated with tert-butyldimethylsily ltrifluoromethanesulfonate as a 1 M solution in a 50:50 by volume mixture of pyridine and dichloromethane. Additional SIB1967.0 may have to be added to finish the reaction for less reactive alcohols.

11. Di-tert-Butylsilylbis(trifluoromethanesulfonate), SID3345.0, in the silylation of diols.

The diol (1 equiv.) is reacted with di-tert-butylsilylbis(trifluor omethanesulfonate), SID3345.0, (1.2 equiv.) and 2,6-lutidine (3.0 equiv.) in chloroform and allowed to react at 0 to 25 °C. 1,3-Diols and 1,4-diols are, in general, more reactive than 1,2-diols.

12. tert-Butyldiphenylchlorosilane, SIB1968.0, in the silylation of primary amines.

The amine (1 equiv.) is reacted with tertbutyldiphenylchlorosilane, SIB1968.0, and triethylamine (1.5 equiv.) in acetonitrile at room temperature for 1-3 h. Secondary amines do not react.

13. 1,2-Bis(chlorodimethylsilyl)ethane, SIB1042.0, in the silylation of primary amines.

The amine (1 equiv.) is reacted with the 1,2-bis(chlorodimethylsilyl)ethane (1 equiv.) and triethylamine (2 equiv.) in dichloromethane at room temperature for 2-3 h. A convenient way to isolate the product is to filter, concentrate, add pentane, filter again and concentrate to give the product in high purity without distillation.

14. 1,1,3,3-tetraisopropyl-1,3-dichlorodisiloxane, SIT7273.0, in the silylation of nucleosides.

The nucleoside (1 equiv.) is reacted with the silane, SIT7273.0, and imidazole (4.4 equiv.) in DMF at room temperature. The yields are about 80 percent.

15. 1,2-Bis(dimethylsilyl)benzene, SIB1084.0.

The amine (1 equiv.) is reacted with the silane, SIB1084.0, with a catalytic amount of Wilkinson's catalyst, tris(triphenylphosphine)rhodium (I) chloride, in toluene solution.

16. Trimethylsilylethanol, SIT8589.2, in the protection of a carboxylic acid.

The acid (1 equiv.) is reacted with 2-trimethylsilylethanol, SIT8589.2, (1 equiv.), dicyclohexylcarbodiimide (1 equiv.) in ethyl acetate with a catalytic amount of DMAP added. A typical reaction is about 12 h at room temperature.

17. Triisopropylchlorosilane, SIT8384.0, in protection of a sulfonic acid.

The acid (1 equiv.) is reacted with triisopropylchlorosilane, SIT8384.0, (1.4 equiv.) and triethylamine (1 equiv.) in dichloromethane for 1 h at -35 °C and 15 h at room temperature.

18. Triisopropylsilyltrifluoromethansulfonate, SIT8387.0, as precursor to Triisopropylcarbamate, Tsoc, protecting group.

The amine to be protected in the presence of triethylamine is reacted with carbon dioxide (introduced as a gas or as dry ice) at -78 °C for 30-60 min. This mixture is then treated with triisopropylsilyltrifluo-romethanesulfonate, SIT8387.0, at room temperature. The reaction mixture can be washed with water without hydrolysis of the protecting group.

19. Formation of acetonides of diols with Isopropenoxytrimethylsilane, SII6460.0.

The diol (1 equiv.) is mixed with isopropenoxytrimethylsilane, SII6460.0, in an inert solvent (THF, ether, toluene) and 1 or 2 drops of concentrated HCl or trimethylchlorosilane, is added. The reaction is complete in less than 30 min.

20. Dimethylaminotrimethylsilane, TMSDMA, SID3605.0 and Diethylaminotrimethylsilane, TMSDEA, SID3398.0.

The alcohol or amine (1 equiv.) is reacted with the aminotrimethylsilane and dimethylamine or diethylamine is distilled off as the reaction proceeds. These reagents are particularly useful in the silylation of amines. HMDS, SIH6110.0, is preferred for the trimethylsilylation of alcohols.

An alternative procedure for the silylation with the aminosilanes is with acid catalysis. This is best achieved with ammonium sulfate, trimethylchlorosilane as well as trichloroacetic acid.

21. Trimethylsilylimidazole, TMSI, SIT8590.0.

Trimethylsilylimidazole, SIT8590.0, is a very reactive trimethylsilylating agent, especially for alcohols.

It is typically reacted with an equivalent amount of the hydroxyl group(s) in the presence or absence of an acid catalyst.

22. N,O-Bis(trimethylsilyl)acetamide, BSA, SIB1846.0.

The alcohol (1 equiv.) is reacted with N,O-bistrimethylsilylacetamide, SIB1846.0, (0.5 equiv.) in an inert solvent. The reaction proceeds faster with a small amount of trimethylchlorosilane as catalyst.

23. N,O-Bis(trimethylsilyl)trifluoroacetamide, BSTFA, SIB1876.0.

The alcohol (1 equiv.) is reacted with N, O-bis(trimethylsilyl) trifluoroacetamide, SIB1876.0, (0.5 equiv.) in an inert solvent with or without trimethylchlorosilane catalysis. This has the advantage of producing the liquid by-product, trifluoroacetamide, which is oftentimes more easily removed than the solid acetamide from SIB1846.0 or diphenylurea from SIB1878.0. 24. N, N-Bis(trimethylsilyl)urea, BSU, SIB1878.0.

Two equivalents of this solid trimethylsilylating agent is reacted with the alcohol (1 equiv.) in an inert solvent. The solid, insoluble diphenylurea produced is readily removed by filtration and the product is purified.

Deprotection Of Silyl Ethers

1. Acid-Catalyzed cleavage of trimethylsilyl ethers.

The silylated alcohol (0.4 mmol) in dichloromethane (4 mL) is treated with a drop of 1N HCl and the reac- tion mixture is stirred for 30 min.

In a transeterification approach a 0.5 M solution of the trimethylsilylated alcohol in methanol is treated with pyridinium p-toluenesulfonate (PPTS) at room temperature for 30 min. The lower boiling trimethyl- methoxysilane is removed by distillation.

2. Base-Catalyzed cleavage of trimethylsilyl ethers.

The mildest conditions for the base-catalyzed cleavage of trimethylsilyl ethers is the treatment of a methanol solution of the silylated alcohol with an excess of potassium carbonate for 1-2 h.

3. Selective cleavage of a triethylsilyl ether with hydrogen fluoride-pyridine —representative procedure for the cleavage of silyl ethers with HF•pyridine.

Treatment of 180 mmol of the silylated alcohol with 4 mL of the stock solution of hydrogen fluoride-pyridine solution (2 mL of HF•pyridine, 4 mL pyridine and 16 mL THF) for 2-3 h results in the cleavage of the tri- ethylsilyl ether.

4. Acid-catalyzed cleavage of triethylsilyl ethers.

A cold (0 °C) methanol solution of the silyl ether is treated with p-toluenesulfonic acid (0.33 equiv.) for 1-2 h. A solution of the silyl ether in THF is treated with an aqueous solution of trifluoromethane-sulfonic acid.

5. Cleavage of a tert-butyldimethylsilyl ether with tetra-n-butylammonium fluoride —representative procedure for the deprotection of silyl ethers with TBAF.

A solution of the silyl ether in THF (approximately 4 M) is treated with 3 equiv. of 1 M tetra-n-butyl-ammo- nium fluoride in THF at ambient temperature until the silyl ether is converted. This usually requires from 2 - 16 h.

6. Cleavage of a tert-butyldimethylsilyl ether with tris(dimethylamino)sulfur-(trimethylsilyl)difluoride, SIT8715.0 —representative procedure for the deprotection of silyl ethers with TAS-F.

A dilute (0.4 M) solution of the alcohol in THF is added to the SIT8715.0 at ambient temperature and the resulting solution is stirred for 1 - 2 h.

7. Cleavage of a tert-butyldimethylsilyl ether with hydrofluoric acid —representative procedure for the deprotection of silyl ethers with HF.

Hydrofluoric acid (49% aqueous solution, excess) is added to the silyl ether in acetonitrile at 0 °C. After stir- ring for a short time (10 - 30 min usually) the reaction is carefully quenched by the addition of saturated aqueous sodium hydrogen carbonate (CAUTION: STRONG EVOLUTION OF CARBON DIOXIDE).

8. Cleavage of a tert-butyldiphenylsilyl ether with tetra-n-butylammonium fluoride in acetic acid.

A stock solution of TBAF in acetic acid is prepared (0.15 mL of HOAc per 1.0 mL of 1 M TBAF in THF). The silyl ether is dissolved in THF and reacted with an excess of the stock solution for several h.

References

1. Greene, T.; Wuts, P.G.M.; *Protecting Groups in Organic Synthesis*; 2nd ed.; Wiley, New York, **1991**.
2. Kocienski, P. J.; "*Protecting Groups*; Thieme: Stuttgart, **1994**.
3. Lalonde, M.; Chan, T. H. *Synthesis*, **1985**, 817.
4. Olsson, L.-I. Acta Pharm. Suec. **1986**, 23, 370.
5. Birkofer, L.; Ritter, A. *Newer Methods in Preparative Organic Chemistry*, Vol. V. p 211, Academic Press, New York, **1968**.
6. Pierce, A. E.; *Silylation of Organic Compounds*, Pierce Chemical Co., Rockford, IL, **1968**.
7. Klebe, J. F.; *Acct. Chem. Res.* **1970**, 299.
8. Muzart, J. *Synthesis*, **1993**, 11.
9. Nelson, T. D.; Crouch, R. D. *Synthesis*, **1996**, 1031.
10. Corey, E. J.; Venkateswarlu, A. *J. Am. Chem. Soc.*, **1972**, 94, 6190.
11. Askin, D., et al. *J. Org. Chem.* **1990**, 55, 5451.
12. Brown, R. C. D.; Kocienski, P. J. *SynLett.* **1994**, 417.
13. Toshima, et al. *Tetrahedron Lett.* **1989**, 30, 6413.
14. Aizpurua, J. M.; Palomo, C. *Tetrahedron Lett.* **1985**, 26, 142.
15. Cunico, R. F.; Bedell, L. *J. Org. Chem.* **1980**, 45, 4797.
16. Thomas, E. J.; Williams, A. C. *J. Chem. Soc., Chem. Commun.* **1987**, 992.
17. Corey, E. J., et al. *Tetrahedron Lett.* **1981**, 22, 3455.
18. Wetter, H.; Oertle, K. *Tetrahedron Lett.* **1985**, 26, 5515.
19. Hannessian. P.; Lavallee, P. *Can. J. Chem.* **1975**, 53, 2975.
20. Quilliam, M. A.; Yaraskavich. J. M. *J. Liquid Chrom.* **1985**, 8, 449.
21. Overman, L. E., et al. *Tetrahedron Lett.* **1986**, 27, 4391.
22. Muri, D., et al. *Org. Lett.* **2000**, 2, 539.
23. Pecquet, F.; d'Angelo, J. *Tetrahedron Lett.* **1982**, 23, 2777.
24. Sommer, L. H. *Stereochemistry, Mechanism, and Silicon*, McGraw-Hill, New York, NY **1965**, 126.
25. Denmark, S. E., et al. *J. Org. Chem.* **1987**, 52, 165.
26. Trost, B. M., et al. *Tetrahedron Lett.* **1983**, 48, 3252 and references cited therein.
27. Mai, K.; Patil, G. *J. Org. Chem.* **1986**, 51, 3545.
28. Corey, E. J.; Hopkins, P.B. *Tetrahedron Lett.* **1982**, 23, 4871.
29. Trost, B. M.; Caldwell, C.G. *Tetrahedron Lett.* **1981**, 22, 4999.
30. Barlos, K., et al. *J. Org. Chem.* **1982**, 47, 1324.
31. Djuric, S., et al. *Tetrahedron Lett.* **1981**, 22, 1787.
32. Markiewicz, W. T. *J. Chem. Res.* (S) **1979**, 24.
33. Bonar-Law, R. P., et al. *Tetrahedron Lett.* **1990**, 31, 6721.
34. Bonar-Law, R. P., et al. *Tetrahedron Lett.* **1990**, 31, 6725.
35. Anwar, S., et al. *J. Chem. Soc., Chem. Commun.* **1986**, 831.
36. Thomas, B. S., et al. *J. Chem. Soc., Chem. Commun.* **1966**, 408.
37. Eaborn, C., et al. J. Chem. Soc. (C) **1969**, 2502.
38. Stork, G.; Kahn, M. *J. Am. Chem. Soc.* **1985**, 107, 500.
39. Stork, G.; Sofia, M.J. *J. Am. Chem. Soc.* **1986**, 108, 6826.
40. Poole, C. F.; Zlatkis, A. *J.* Chromatogr. Sci. **1979**, 17, 115.
41. White, J. D., et al. *J. Org. Chem.* **1993**, 57, 2270.
42. Kunz, H.; Waldman, H. *Comprehensive Organic Synthesis*; Trost, B.M.; Fleming, I.; Eds.; Pergamon: Oxford, **1991**; Vol. 6, pp 631.
43. Bastiaansen, P. M. F. M et al. *J. Org. Chem.* **1995**, 60, 6154.
44. Marsmann, H. C.: Horn, H. Z. *Z. Naturforsch.* **1972**, 27b, 1448.
45. Nishiguchi, I., et al. *Synthesis*, **2000**, 1025.
46. Schmidt, H. A. *Chemiker-Ztg.* **1980**, *104*, 253.
47. Häässig, R., et al. *Chem. Ber*. **1982**, *115*, 1990.
48. Hergot, H. H.; Simchen, G. *Liebigs Ann. Chem.* **1980**, 1718.
49. Simchen, G.; Kobler, W. *Synthesis*, **1976**, 259.
50. Feger, H.; Simchen, G. *Liebigs Ann. Chem.* **1986**, 428.

51. Dilman, A. D., et al. *J. Org. Chem.* **2000**, *65*, 8826.
52. Feger, H.; Simchen, G. *Liebigs Ann. Chem.* **1986**, 1456.
53. Hosten, N.; Anteunis, M. J. D. *Bull. Soc. Chim. Belg.* **1988**, *97*, 45.
54. Räädler, et al. *J. Prakt. Chem.* **1976**, *318*, 697.
55. Weterling, N.; Schmutzler, R. *Z. Naturforsch.* **1988**, *43b*, 1524.
56. Weisz, I., et al. *Chim. Sci. Hung.* **1968**, *58*, 189.
57. Blau, K.; Halket, J. "*Handbook of Derivatives for Chromatography*", 2nd Ed., J. Wiley and Sons, New York, NY, **1993**.
58. Smietana, M.; Mioskowski, C. *Org. Lett.* **2001**, *3*, 1037.
59. Verboom, W., et al. *Synthesis*, **1981**, 807.
60. Cooper, E. E. *Chem. Ind.* **1978**, 794.
61. Palomo, C. *Synthesis*, **1981**, 809.
62. Ballester, A.; Palomo, C. *Synthesis*, **1983**, 571.
63. Veysogln, T.; Mitscher, L. A. *Tetrahedron Lett.* **1981**, *22*, 1303.
64. Donike, M.; Jaenicke, L. *Angew. Chem.* **1969**, *81*, 995.
65. Larson, G. L.; Hernáández, A. *J. Org. Chem.* **1973**, *38*, 3935.
66. Kita, Y., et al. *Tetrahedron Lett.* **1979**, *19*, 4311.
67. Kita, Y., et al. *Synthesis*, **1982**, 1089.
68. Paquette, L. A.; Sugimara, T. *J. Am. Chem. Soc.* **1986**, *108*, 3841.
69. Sugimara, T.; Paquette, L. A. *J. Am. Chem. Soc.* **1987**,*109*, 3017.
70. Nakamura, E., et al. *J. Am. Chem. Soc.* **1976**, *98*, 2346.
71. Nakamura, E., et al. *Bull. Chem. Soc. Jpn.* **1981**, *54*, 805.
72. Kuwajima, I., et al. *Org. Synth.* **1983**, *61*, 122.
73. Gambacorta, A.; et al. *Synth. Commun.* **1989**, *19*, 2441.
74. Morita, et al. *Tetrahedron Lett.* **1983**, *24*, 835.
75. Olah, G. A., et al. *J. Org. Chem.* **1981**, *46*, 5212.
76. Olah, G. A.; Klumpp, D. A. *Synthesis* **1997**, 744.
77. Diekman, J., et al. *J. Org. Chem.* **1967**, *32*, 3904.
78. Heathcock, C. H., et al. *J. Org. Chem.* **1985**, *50*, 2095.
79. Toshima, K., et al. *Tetrahedron Lett.* **1986**, *27*, 4741.
80. Bartol, G., et al. *SynLett.* **1998**, 209.
81. Ravindranathan, P. K.; Field, R. A. *SynLett.* **1999**, 311.
82. Simchen, G. in *Advances in Silicon Chemistry*, Vol. 1, Larson, G. Ed. JAI Press, Greenwich, CT, **1991**, p 189 ff.
83. Oriyami, T., et al. *Synth. Commun.* **1999**, 2217.
84. Bazam, A. C.; Knapp, D. R. *J. Chromatogr.* **1982**, *236*, 201.
85. Mawhinney, T. P.; Madson, M. A. *J. Org. Chem.* **1982**, *47*, 3336.
86. Frasch, M.; et al. *Chem. Ber.* **1992**, *125*, 1763.
87. Graziani, A., et al. *Tetrahedron Lett.* **2001**, *42*, 3857.
88. Lipschutz, B. H., et al. *J. Org. Chem.* **1999**, *64*, 3792.
89. Horner, L.; Mathias, J. *J. Organometal. Chem.* **1985**, *282*, 155.
90. Mikami, K., et al. *J. Am. Chem. Soc.* **1990**, *12*, 4035.
91. Hanessian, S.; Lavallee, P. *Can. J. Chem.* **1975**, *53*, 2975.
92. Stern, A. Swenton, J. S. *J. Org. Chem.* **1987**, *52*, 2763.
93. Overman, L. E., et al. *Tetrahedron Lett.* **1986**, *27*, 4391.
94. Pecquet, F.; d'Angelo, J. *Tetrahedron Lett.* **1982**, *23*, 1982.
95. Baldwin, J. E. et.al. *Tetrahedron*, **1983**, *39*, 2989.
96. White, C. A. *J. Chromatogr.* **1983**, *264*, 99.
97. Grob, K. *Making and Manipulating Capillary Columns for GC* A. Hueting, Heidelberg, **1986**.
98. Ojima, I., et al. *Chem. Lett.* **1973**, 501.
99. Sommer, L. A. *Stereochemistry, Mechanism, and Silicon*, McGraw-Hill, New York, NY **1965**.
100. Peterson, R. C.; Ross, S. D. *J. Am. Chem. Soc.* **1963**, *85*, 3164.
101. Ager, D.; Fleming, I. *J. Chem. Res.* **1977**, 6
102. Morgan, E. D.; Poole, C. F. *J. Chromatagr.* **1975**, *104*, 351.
103. Poole, C. F.; Morgan, E. D. *Org. Mass. Spect.* **1975**, *10*, 537.
104. Bourne, G. T., et al. *Tetrahedron*, **1991**, *47*, 4763.
105. Sieber, P. Helv. Chim. Acta, **1977**, *60*, 2711.
106. Luo, Z. Y., et al. *Science*, **2001**, *291*, 1766.
107. Boe, B. *J. Organometal. Chem.* **1972**, *43*, 275.
108. Kelly, R. W. *Tetrahedron Lett.* **1969**, 967.
109. Barlos, K., et al. *J.Org. Chem.* **1982**, *47*, 1324.
110. Abe, H., et al. *J. Org. Chem.* **2000**, *65*, 4315.
111. Cragg, R. H. Lane, R. D. *J. Organometal. Chem.* **1985**, *289*, 23.
112. Cragg, R. H. Lane, R. D. *J. Organometal. Chem.* **1985**, *294*, 7.
113. Deyhimi, F.; Coles, J. A. *Helv. Chim. Acta.* **1982**, *65*, 1752.
114. Birkofer, L.; Stuhl, O. *J. Organometal. Chem.* **1980**, 187, 21.
115. Birkofer, et al. *J. Organometal. Chem.* **1980**, *194*, 159.
116. Chu, H. K., et al. *J. Organometal. Chem.* **1984**, *271*, 327.
117. Cragg, L. H.; Lane, R. D. *J. Organometal. Chem.* **1981**, *212*, 301.
118. Corey, E. J.; Hopkins, P. B. *Tetrahedron Lett.* **1982**, *23*, 4871.
119. Hutchinson, J., et al. *Tetrahedron Lett.* **1991**, *32*, 573.
120. Bradford, C., et al. *Tetrahedron Lett.* **1995**, *36*, 4189.
121. Furusawa, K., et al. *Nucleic Acid Res. Symp. Ser.* **1984**, *15*, 41.
122. Trost, B. M., et al. *J. Org. Chem.* **1983**, *48*, 3252.
123. Kumagai, D., et al. *Tetrahedron Lett.* **2001**, *42*, 1953.
124. Parker, K. A. Georges, A.T. *Org. Lett.* **2000**, *2*, 497.
125. Panek, J. S.; Liu, P. *J. Am. Chem. Soc.* **2000**, *122*, 11090.
126. Djuric, S., et al. *Tetrahedron Lett.* **1981**, *22*, 1787.
127. Barger, T. M., et al. *J. Org. Chem.* **1987**, *52*, 678.
128. Antonsson, T.; Vogel, P. *Tetrahedron Lett.* **1990**, *31*, 89.
129. Ichikawa, S., et al. *J. Am. Chem. Soc.* **1999**, *121*, 10270.
130. Chevalier-Frontin, F., et al. *Tetrahedron Lett.* **1991**, *47*, 9807.
131. McCarthy, J. R., et al. **1998**, US 5,760,210.
132. Davies, J. S., et al. *J. Chem. Soc., Perkin Trans, 1*, **1992**, 3043.
133. Dalla Cort, A. *Synth. Commun.* **1990**, *20*, 757.
134. Otera, J.; Nozaki, H. *Tetrahedron Lett.* **1986**, *27*, 5743.
135. Horita, K., et al. *SynLett.* **1994**, 40.
136. Duplantier, A. J.; Masamune, S. *J. Am. Chem. Soc.* **1990**, *112*, 7079.
137. Tanemura, K., et al. *Bull. Chem. Soc. Jpn.* **1994**, *67*, 290.
138. Tanemura, K., et al. *J. Chem. Soc., Perkin Trans. 1* **1992**, 2997.
139. Corey, E. J.; Yi, K. Y. *Tetrahedron Lett.* **1992**, *33*, 2289.
140. Itoh, A., et al. *SynLett.* **1999**, 357.
141. Pilcher, A. S., et al. *J. Org. Chem.* **1992**, *57*, 2492.
142. Pilcher, A. S.; DeShong, P. *J. Org. Chem.* **1993**, *58*, 5130.
143. Cormier, J. F., et al. *Tetrahedron Lett.* **1993**, *34*, 243.
144. Fexias, J., et al. *J. Chem. Soc., Chem. Commun.* **1994**, 8539.
145. Thomas, E. J.; Williams, A. C. *J. Chem. Soc., Chem. Commun.* **1987**, 992.
146. Carreira, E. M.; Du Bois, J. *J. Am. Chem. Soc.* **1995**, *117*, 8106.
147. Carreira, E. M.; Du Bois, J. *J. Am. Chem. Soc.* **1994**, *116*, 10825.
148. Naruta, Y., et al. *Chem. Lett.* **1986**, 1185.
149. Kozikowski, A. P.; Cheng, X.-M. *Tetrahedron Lett.* **1987**, *28*, 3189.
150. Ireland, R. E.; Obrecht, D.M. *Helv. Chim. Acta* **1986**, *69*, 1273.
151. Marshall, J. A.; Sedrani, R. *J. Org. Chem.* **1991**, *56*, 5496.
152. Nicolaou, K. C.; Magolda, R. L. *J. Org. Chem.* **1981**, *46*, 1506.
153. Nicolaou, K. C., et al. *J. Org. Chem.* **1985**, *50*, 1440.
154. Tanner, D.; Somfai, P. *Tetrahedron*, **1988**, *44*, 619.
155. Nicolaou, K. C., et al. *Angew. Chem. Int. Ed. Engl.* **1991**, *30*, 299.
156. Nicolaou, K. C., et al. *Tetrahedron*, **1990**, *46*, 4517.
157. Marshall, J. A.; Tang,Y. *J. Org. Chem.* **1994**, *59*, 1457.
158. Prakash, C., et al. *Tetrahedron Lett.* **1989**, *30*, 19.
159. Hatakeyama, S., et al. *J. Chem. Soc., Chem. Commun.* **1993**, 125.
160. Lee, A. S.-Y., et al. *Tetrahedron Lett.* **1995**, *36*, 6891.
161. Oriyama, T., et al. *Tetrahedron Lett.* **1994**, *35*, 2027.
162. Bou, V.; Vilarrasa, J. *Tetrahedron Lett.* **1990**, *31*, 567.

163. Aiguade, J., et al. *Org. Lett.* **2001**, *3*, 979.
164. Caprio, V., et al. *Tetrahedron*, **2001**, *57*, 4023.
165. Gopinath, R.; Patel, B. K. *Org. Lett.* **2000**, *2*, 4177.
166. Higashibayashi, S., et al. *SynLett.* **2000**, 1306.
167. De Vries, E. F. J., et al. *J. Org. Chem.* **1994**, *59*, 7133.
168. Bunce, R. A.; Hertzler, D. V. *J. Org. Chem.* **1986**, *51*, 3451.
169. Hurst, D. T.; McInnes, A. G. *Can. J. Chem.* **1965**, *43*, 2004.
170. Feixas, J., et al. *Tetrahedron* **1994**, *50*, 8539.
171. Pettersson, L.; Frejd, T. *J. Chem. Soc., Chem. Commun.* **1993**, 1823.
172. Askin, D., et al. *J. Org. Chem.* **1990**, *55*, 5451.
173. Horvath, et al. *Tetrahedron Lett.* **1993**, *34*, 3993.
174. Yamamoto, Y., et al. *J. Am. Chem. Soc.* **1992**, *114*, 5427.
175. Watanabe, Y., et al. *J. Chem. Soc., Chem. Commun.* **1992**, 681.
176. Kadota, I., et al. *Tetrahedron Lett.* **1995**, *36*, 5777.
177. Jones, T. K., et al. *J. Am. Chem. Soc.* **1990**, *112*, 2998.
178. Vettel, S.; Knochel, P. *Tetrahedron Lett.* **1994**, *35*, 5849
179. Crimmins, M. T., et al. *J. Am. Chem. Soc.* **1996**, *118*, 7513.
180. Ogilvie, K. K., et al. *Tetrahedron Lett.* **1974**, 2865.
181. Mayer, S. C., et al. *J. Org. Chem.* **1994**, *59*, 5192.
182. Romo, D., et al. *J. Am. Chem. Soc.* **1993**, *115*, 7906.
183. Panek, J. S., et al. *Tetrahedron Lett.* **1995**, *36*, 1003.
184. Nicolaou, K. C., et al. *J. Chem. Soc., Chem. Commun.* **1993**, 619.
185. Banfi, L., et al. *Tetrahedron*, **1993**, *49*, 7385.
186. Banfi, L., et al. *J. Org. Chem.* **1995**, *60*, 7870.
187. Halmos, T., et al. *Nucleic Acids Res.* **1989**, *17*, 7663.
188. Martin, S. F., et al. *J. Org. Chem.* **1992**, *57*, 1070.
189. Martin, S. F., et al. *Tetrahedron*, **1996**, *52*, 3229.
190. Ohmori, K., et al. *Tetrahedron Lett.* **1993**, *34*, 4981.
191. Enhom, E. J., et al. *J. Org. Chem.* **1989**, *54*, 5841.
192. Crich, D.; Hermann, F. *Tetrahedron Lett.* **1993**, *34*, 3385.
193. Danishefsky, S. J., et al. *J. Am. Chem. Soc.* **1989**, *111*, 2967.
194. Danishefsky, S. J., et al. *J. Am. Chem. Soc.* **1987**, *109*, 8117.
195. Tanimoto, N., et al. *Angew. Chem. Int. Ed. Engl.* **1994**, *33*, 673.
196. Lee, K.; Wiemer, D. F. *J. Org. Chem.* **1993**, *58*, 7808.
197. Crimmins, M. T.; Lever, J. G. *Tetrahedron Lett.* **1986**, *27*, 291.
198. Tsukuda, N., et al. *J. Org. Chem.* **1995**, *60*, 143.
199. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **1995**, *117*, 1171.
200. Ireland, R. E., et al. *J. Org. Chem.* **1996**, *61*, 6856.
201. Cormier, J. F. *Tetrahedron Lett.* **1991**, *32*, 187.
202. Feixas, J., et al. *J. Chem. Soc., Chem. Commun.* **1992**, 1451.
203. Hwu, J. R., et al. *J. Org. Chem.* **2000**, *65*, 5077.
204. Lellouche, J.-P.; Keoller, S. *J. Org. Chem.* **2001**, *66*, 693.
205. Attwood, S. V., et al. *J. Chem. Soc., Chem. Commun.* **1986**, 479.
206. Barrett, A. G. M., et al. *J. Org. Chem.* **1986**, *51*, 4840.
207. Bone, E. A., et al. *J. Med. Chem.* **1992**, *35*, 3388.
208. Baldwin, J. E., et al. *Tetrahedron*, **1995**, *51*, 5193.
209. Solladiéé, G.; Almario, A. *Tetrahedron*: *Asymmetry* **1995**, *6*, 559.
210. Snider, B. B.; Shi, Z. *J. Am. Chem. Soc.* **1994**, *116*, 549.
211. Posner, G. H., et al. *J. Med. Chem.* **1992**, *35*, 3280.
212. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **1987**, *109*, 2208.
213. Rudge, A. J., et al. *Angew. Chem. Int. Ed. Engl.* **1994**, *33*, 2320.
214. Williams, D. R., et al. *Tetrahedron Lett.* **1994**, *35*, 6417.
215. Smith III, A. B., et al. *Tetrahedron Lett.* **1994**, *35*, 4907.
216. Shekhani, M. S., et al. *Tetrahedron Lett.* **1990**, *31*, 1669.
217. Hatakeyama, S., et al. *Tetrahedron* **1994**, *50*, 13369.
218. Kabat, M. M., et al. *Tetrahedron Lett.* **1992**, *33*, 7701.
219. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **1993**, *115*, 3558.
220. Barrish, J. C., et al. *J. Org. Chem.* **1987**, *52*, 1372.
221. Zhang, W.; Robins, M. J. *Tetrahedron Lett.* **1992**, *33*, 1177.
222. Scheidt, K. A., et al. *J. Org. Chem.* **1998**, *63*, 6436.
223. Congreve, M. S., et al. *J. Am. Chem. Soc.* **1993**, *115*, 5815.
224. Nicolaou, K. C., et al. *Chem. Eur. J.* **1995**, *1*, 467.
225. Brown, R. C. D.; Kocienski, P. J. *SynLett.* **1994**, 417.
226. Wender, P. A., et al. *J. Am. Chem. Soc.* **1997**, *119*, 12976.
227. Kadota, et al. *Tetrahedron Lett.* **1995**, *36*, 5777.
228. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **1992**, *114*, 7935.
229. Keenan, R. M., et al. *Tetrahedron Lett.* **1995**, *36*, 819.
230. Schlessinger, R. H., et al. *J. Am. Chem. Soc.* **1986**, *108*, 3112.
231. Smith, A. B.; Wan, Z. *Org. Lett.* **1999**, *1*, 1491.
232. Fleck, T. J.; Grieco, P. A. *Tetrahedron Lett.* **1992**, *33*, 1813.
233. Devianne, G., et al. *J. Org. Chem.* **1995**, *60*, 7343.
234. Brzezinsky, L. J., et al. *Tetrahedron Lett.* **1994**, *35*, 7601.
235. Kang, S. H., et al. *Tetrahedron Lett.* **1991**, *32*, 4015.
236. Robinson, R. A., et al. *J. Am. Chem. Soc.* **1993**, *113*, 10400.
237. Achmatowicz, B.; Wicha, J. *Tetrahedron*: *Asymmetry*. **1993**, *4*, 399.
238. Kabat, M. M.; Wicha, J. *Tetrahedron Lett.* **1991**, *32*, 1073.
239. Oka, T., et al. *Tetrahedron* **1998**, *54*, 21.
240. Shiratani, T., et al. *J. Chem. Soc., Chem. Commun.* **1996**, 21.
241. Hirama, M.; et al. *J. Org. Chem.* **1988**, *53*, 706.
242. Taber, D. F., et al. *J. Am. Chem. Soc.* **1999**, *121*, 5589.
243. Taber, D. F.; Kanai, K. *Tetrahedron*, **1998**, *54*, 11767.
244. Roush, W. R., et al. *J. Am. Chem. Soc.* **1990**, *112*, 6348.
245. Fukui, M., et al. *Chem. Pharm. Bull.* **1990**, *38*, 2890.
246. Corey, E. J.; Houpis, I. N. *J. Am. Chem. Soc.* **1990**, *112*, 8997.
247. Roush, W. R.; Palkowitz, A.D. *J. Org. Chem.* **1989**, *54*, 3009.
248. Clive, D. L. J., et al. *J. Am. Chem. Soc.* **1988**, *110*, 6914.
249. Clive, D. L. J., et al. *J. Am. Chem. Soc.* **1988**, *110*, 3018.
250. Shimizu, T., et al. *Org. Lett.* **2000**, *2*, 2153.
251. Gilbert, J. C.; Selliah, R. D. *Tetrahedron Lett.* **1992**, *33*, 6259.
252. Kende, A. S., et al. *J. Am. Chem. Soc.* **1995**, *117*, 8258.
253. Urones, et al. *Tetrahedron*, **1995**, *51*, 3691.
254. Witkowski, S., et al. *J. Am. Chem. Soc.* **1992**, *114*, 8464.
255. Boeckman, R. K., et al. *J. Am. Chem. Soc.* **1987**, *109*, 7553.
256. Boeckman, R. K., et al. *J. Am. Chem. Soc.* **1991**, *113*, 5337.
257. Chattopadhyay, S. K.; Pattenden, G. *Tetrahedron Lett.* **1995**, *36*, 5271.
258. Lee, E.; Park, C. M. *J. Chem. Soc., Chem. Commun.* **1994**, 293.
259. Shekhani, M. S., et al. *Tetrahedron Lett.* **1990**, *31*, 1669.
260. Redlich, H., et al. *Synthesis* **1992**, 112.
261. Bandini, E., et al. *Tetrahedron*: *Asymmetry* **1995**, *6*, 2127.
262. Yohannes, D.; Danishefsky, S. J. *Tetrahedron Lett.* **1992**, *33*, 7469.
263. Hayward, C. M., et al. *J. Am. Chem. Soc.* **1993**, *115*, 9345.
264. Hussain, N., et al. *Tetrahedron Lett.* **1994**, *35*, 5069.
265. Askin, D., et al. *J. Org. Chem.* **1985**, *50*, 5005.
266. Johnson, C. R., et al. *J. Am. Chem. Soc.* **1992**, *114*, 9414.
267. Blizzard, T. A., et al. *J. Org. Chem.* **1993**, *58*, 3201.
268. Sicinski, R. R., et al. *J. Med. Chem.* **1994**, *37*, 3730.
269. Keck, G. E., et al. *J. Org. Chem.* **1994**, *59*, 3113.
270. Boeckman, R. K., et al. *J. Am. Chem. Soc.* **1986**, *108*, 5549.
271. Brown, B. A., et al. *J. Am. Chem. Soc.* **1991**, *113*, 5378.
272. Smith III, A. B.; Leenay, T. *Tetrahedron Lett.* **1988**, *29*, 2791.
273. Oku, A., et al. *Chem. Lett.* **1993**, 165.
274. Curtis, N. R., et al. *Tetrahedron Lett.* **1992**, *33*, 671.
275. Hart, T. W., et al. *J. Chem. Soc., Chem. Commun.* **1979**, 156.
276. Armstrong, R. W., et al. *Tetrahedron Lett.* **1996**, *37*, 447.
277. Nakatsuka, M., et al. *J. Am. Chem. Soc.* **1990**, *112*, 5583.
278. Jones, T.K., et al. *J. Am. Chem. Soc.* **1989**, *111*, 1157.

279. Saski, M., et al. *J. Org. Chem.* **1994**, *59*, 715.
280. Evans, D. A.; Black, W. C. *J. Am. Chem. Soc.* **1993**, *115*, 4497.
281. Evans, D. A.; Black, W. C. *J. Am. Chem. Soc.* **1992**, *114*, 2260.
282. Hanamoto, T., et al. *Tetrahedron Lett.* **1987**, *28*, 6191.
283. Hanamoto, T., et al. *Bull. Chem. Soc. Jpn.* **1990**, *63*, 1039.
284. Evans, D. A., et al. *J. Am. Chem. Soc.* **1998**, *120*, 5921.
285. Matsamura, Y., et al. *Tetrahedron*, **1995**, *51*, 8771.
286. Asai, T., et al. *Tetrahedron Lett.* **1995**, *36*, 273.
287. Boschelli, D., et al. *Tetrahedron Lett.* **1985**, *26*, 5239.
288. Evans, D. A., et al. *J. Am. Chem. Soc.* **1993**, *115*, 11446.
289. Marshall, J. A.; Johns, B. *J. Org. Chem.* **1998**, *63*, 7885.
290. Magnus, P., et al. *J. Am. Chem. Soc.* **1997**, *119*, 6739.
291. White, J. D., et al. *J. Am. Chem. Soc.* **2001**, *123*, 5407.
292. Paquette, L. A.; Efremov, I. *J. Am. Chem. Soc.* **2001**, *123*, 4492.
293. Nakata, M., et al. *SynLett.* **1993**, *34*, 8439.
294. Smith III, A. B., et al. *J. Am. Chem. Soc.* **1995**, *117*, 12013.
295. Clink, R. D.; Forsyth, C. J. *J. Org. Chem.* **1997**, *62*, 5672.
296. Nicolaou, K. C., et al. *Chem. Eur. J.* **1995**, *1*, 318.
297. Corey, E. J., et al. *J. Am. Chem. Soc.* **1982**, *104*, 6818.
298. Panek, J. S.; Masse, C. E. *J. Org. Chem.* **1997**, *62*, 8290.
299. Bhatnager, S. C., et al. *Tetrahedron* **1987**, *43*, 3471.
300. Oh, J.; Cha, J. K. *SynLett.* **1994**, 967.
301. Hosoda, H., et al. *Chem. Pharm. Bull.* **1978**, *26*, 2209.
302. Baker, R., et al. *J. Chem. Soc. Chem. Commun.* **1986**, 874.
303. Hirama, M., et al. *Tetrahedron Lett.* **1986**, *27*, 5281.
304. Newton, R. F., et al. *J. Chem. Soc., Perkin Trans 1* **1981**, 2055.
305. Roberts, S. M., et al. *J. Chem. Soc., Perkin Trans 1* **1981**, 1729.
306. Goulet, M. T., et al. *Bioorg. Med. Chem. Lett.* **1994**, *4*, 921.
307. Myers, A. G., et al. *J. Am. Chem. Soc.* **1994**, *116*, 4697.
308. Mukai, C., et al. *Tetrahedron Lett.* **1995**, *36*, 5761.
309. White, J. D., et al. *J. Am. Chem. Soc.* **1986**, *108*, 8105.
310. Soll, R. M. Seitz, S. P. *Tetrahedron Lett.* **1987**, *28*, 5457.
311. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **1997**, *119*, 7974.
312. Kozikowski, A. P.; Li, C.-S. *J. Org. Chem.* **1987**, *52*, 3541.
313. Johnson, C. R., et al. *J. Org. Chem.* **1993**, *58*, 7185.
314. Johnson, C. R.; Kozak, J. *J. Org. Chem.* **1994**, *59*, 2910.
315. Kende, A. S., et al. *Tetrahedron Lett.* **1995**, *36*, 4741.
316. Ley, S. V., et al. *J. Chem. Soc., Perkin Trans. 1* **1991**, 667.
317. Hashimoto, S.-I. et al. *Chem. Lett.* **1989**, 1063.
318. Hoye, T. R.; Tan, L. *Tetrahedron Lett.* **1995**, *36*, 1981.
319. Karanewsky, D. S.; Badia, M. C. *Tetrahedron Lett.* **1993**, *34*, 39.
320. Hirama, M., et al. *J. Am. Chem. Soc.* **1991**, *113*, 1830.
321. Ireland, R. E., et al. *J. Org. Chem.* **1992**, *57*, 5071.
322. Blizzard, T. A., et al. *Tetrahedron Lett.* **1990**, *31*, 4965.
323. Mastalerz, H., et al. *Tetrahedron Lett.* **1995**, *36*, 4927.
324. Anderson, J. C.; Ley, S. V. *Tetrahedron Lett.* **1990**, *31*, 431.
325. Nishikimi, et al. *J. Org. Chem.* **1989**, *54*, 3354.
326. Nicolaou, K. C., et al. *Nature* **1994**, *367*, 630.
327. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **1995**, *117*, 634.
328. Pratt, D. V.; Hopkins, P.B. *J. Org. Chem.* **1988**, *53*, 5885.
329. Audrain, H., et al. Synlett **1993**, 20.
330. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **1998**, *120*, 8661.
331. Nemoto, H., et al. *Tetrahedron Lett.* **1995**, *36*, 8799.
332. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **1995**, *117*, 645.
333. Hanessian, S., et al. *J. Am. Chem. Soc.* **1987**, *109*, 7063.
334. Maxey, K. M.; Bundy, G. L. *Tetrahedron Lett.* **1980**, *21*, 445.
335. Spohn, R. F., et al. *Tetrahedron Lett.* **1987**, *28*, 2491.
336. Boyer, F.-D.; Lallemand, J.-Y. *SynLett.* **1992**, 969.
337. Marino, J. P., et al. *J. Org. Chem.* **1984**, *49*, 5279.
338. Marino, J. P., et al. *J. Org. Chem.* **1987**, *52*, 4898.
339. Corey, E. J.; Wu, Y.-J. *J. Am. Chem. Soc.* **1993**, *115*, 8871.
340. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **1995**, *117*, 634 and correction page 8690.
341. Kawazoe, Y., et al. *Tetrahedron Lett.* **1987**, *28*, 4307.
342. Danishefsky, S. J.; Schkeryantz, J. M. *Synlett* **1995**, 475.
343. Feigelson, G. B., et al. *J. Org. Chem.* **1988**, *53*, 3390.
344. Jung, M. E. Jung, Y. H. *Synlett* **1995**, 563.
345. Prakash, C., et al. *Tetrahedron Lett.* **1994**, *35*, 7565.
346. Collington, E. W., et al. *Tetrahedron Lett.* **1985**, *26*, 681.
347. Just, G.; Zamboni, R. *Can. J. Chem.* **1978**, *56*, 2725.
348. Schmittling, E. A.; Sawyer, J. S. *Tetrahedron Lett.* **1991**, *32*, 7207.
349. Davis, F. A., et al. *J. Org. Chem.* **1994**, *59*, 1184.
350. DeGroot, A. H., et al. *Tetrahedron* **2000**, *56*, 1541.
351. Barrett, A. G. M., et al. *J. Chem. Soc., Chem. Commun.* **1995**, 1147.
352. Shair, M. D., et al. *Angew. Chem. Int. Ed. Engl.* **1994**, *33*, 2477.
353. Evans, D. A., et al. *J. Am. Chem. Soc* **1986**, *108*, 2478.
354. Shair, M. D., et al. *J. Org. Chem.* **1994**, *59*, 3755.
355. Hangauer, D. G. *Tetrahedron Lett.* **1986**, *27*, 5799.
356. Kelly, D. R., et al. *Synth. Commun.* **1979**, *9*, 195.
357. Grieco, P. A.; Markworth, C.J. *Tetrahedron Lett.* **1999**, *40*, 665.
358. Sabitha, G., et al. *Org. Lett.* **1999**, *1*, 1701.
359. Ishiwata, H., et al. *J. Org. Chem.* **1994**, *59*, 4712.
360. Paterson, I., et al. *Tetrahedron* **1995**, *51*, 9467.
361. Paterson, I., et al. *J. Am. Chem. Soc.* **1994**, *116*, 9391.
362. Myers, A. G., et al. *J. Am. Chem. Soc.* **1991**, *113*, 9661.
363. Myers, A. G., et al. *J. Am. Chem. Soc.* **1993**, *115*, 2036.
364. Bruzik, K. S. Tsai, M.-D. *J. Am. Chem. Soc.* **1992**, *114*, 6361.
365. Pirrung, M. C.; Lee, Y. R. *J. Org. Chem.* **1993**, *58*, 6961.
366. Corey, E. J.; Link, J. O. *Tetrahedron Lett.* **1990**, *31*, 601.
367. Evans, D. A., et al. *J. Am. Chem. Soc.* **2000**, *122*, 10033.
368. Itoh, A.; Kodama, T.; Masaki, Y. *Synlett* **1999**, 357.
369. Firouzabadi, H.; Mohammadpoor-Baltork, I.; Kolagar, S. *Synth. Commun.* **2001**, *31*, 905.
370. Furkert, D. P.; Brimble, M. A. *Org. Lett.* **2002**, *4*, 3655.
371. Horwell, D. C., et al. *Tetrahedron* **1998**, *54*, 4591.
372. Kim, S., et al. *Tetrahedron Lett.* **2004**, *45*, 1973.
373. Anderson, J. C.; McDermott, B. P. *Tetrahedron Lett.* **1999**, *40*, 7135.
374. Wu, Y., et al. *Org. Lett.* **2002**, *4*, 2141.
375. Carter, R. G., et al. *Org. Lett.* **2002**, *4*, 2181.
376. Bio, M. M.; Leighton, J. L. *J. Org. Chem.* **2003**, *68*, 1693.
377. Sajiki, H., et al. *Chem. Commun.* **2003**, 654.
378. Suzuki, T., et al. *Synth. Commun.* **2001**, *31*, 2761.
379. 5Crouch, R. D., et al. *Tetrahedron Lett.* **2002**, *43*, 7151.
380. Wallace, G. A.; Scott, R. W.; Heathcock, C. H. *J. Org. Chem.* **2000**, *65*, 4145.
381. Mori, Y.; Yaegashi, K.; Furukawa, H. *J. Am. Chem. Soc.* **1997**, *119*, 4557.
382. Mori, Y.; Yaegashi, K.; Furukawa, H. *J. Org. Chem.* **1998**, *63*, 6200.
383. Nicolaou, K. C., et al. *Chem. Eur. J.* **2000**, *6*, 3116 .
384. Claffey, M. M.; Hayes, C. J.; Heathcock, C. H. *J. Org. Chem.* **1999**, *64*, 8267.
385. Hunter, R.; Hinz, W.; Richards, P. *Tetrahedron Lett.* 1999,*40*, 3643.
386. Bartoli, G., et al. *Synlett* **1998**, 209.
387. Jeong, Y. J., et al. *J. Chem. Soc., Perkin Trans. 1* **2002**, 1223.
388. Watanabe, H., et al. *Tetrahedron Lett.* **1997**, *38*, 4429.
389. Kang, S. H., et al. *Angew. Chem. Intl. Ed., Eng.* **2003**, *42*, 4779.
390. van der Boom, M. E., et al. *Chem. Mater.* **2001**, *13*, 15.

391. Xie, X.; Kozlowski, M. C. *Org. Lett.* **2001**, *3*, 2661.
392. Firouzabadi, H.; et al. *Synth. Commun.* **1999**, *29*, 4333.
393. Maiti, G.; Roy, S. C. *Tetrahedron Lett.* **1997**, *38*, 495.
394. Fukuda, Y.-i.; Shindo, M.; Shishido, K. *Org. Lett.* **2003**, *5*, 749.
395. Saitoh, T., et al. *Tetrahedron Lett.* **2003**, *44*, 3175.
396. Nakamura, T.; Shiozaki, M. *Tetrahedron Lett.* **2001**, *42*, 2701.
397. Furstner, A., et al. *J. Am. Chem. Soc.* **2003**, *125*, 13132.
398. Awakura, D.; Fujiwara, K.; Murai, A. *Synlett* **2000**, 1733.
399. Corey, E. J.; Roberts, B. E. *J. Am. Chem. Soc.* **1997**, *119*, 12425.
400. Roush, W. R., et al. *Tetrahedron* **2002**, *58*, 6433.
401. Trost, B. M.; Corte, J. R.; Gudiksen, M. S. *Angew. Chem. Intl. Ed., Eng.* **1999**, *38*, 3662.
402. Hayashi, N.; Noguchi, H.; Tsuboi, S. *Tetrahedron* **2000**, *56*, 7123.
403. Matsushima, T., et al. *Synlett* **1999**, 780.
404. Shahid, K. A., et al. *Tetrahedron Lett.* **2002**, *43*, 6377.
405. Kiyooka, S.-I., et al. *J. Org. Chem.* **2003**, *68*, 7967.
406. Kurosawa, W.; Kan, T.; Fukuyama, T. *J. Am. Chem. Soc.* **2003**, *125*, 8112.
407. a) Ohyabu, N.; Nishikawa, T.; Isobe, M. *J. Am. Chem. Soc.* **2003**, *125*, 8798. b) Fuwa, H.; Sasaki, M.; Satake, M.; Tachibana, K. *Org. Lett.* **2002**, *4*, 2981 - 2984.
408. Fuwa, H.; Kainuma, N.; Satake, M.; Sasaki, M. *Bioorg. Med. Chem. Lett.* **2003**, *13*, 2519.
409. Iimura, S.; Manabe, K.; Kobayashi, S. *J. Org. Chem.* **2003**, *68*, 8723.
410. Khan, A. T.; Mondal, E. *Synlett* **2003**, 694.
411. Ranu, B. C.; Jana, U.; Majee, A. *Tetrahedron Lett.* **1999**, *40*, 1985.
412. Chandra, K. L.; Saravanan, P.; Singh, V. K. *Tetrahedron Lett.* **2001**, *42*, 5309.
413. 5Yadav, J. S.; Reddy, R. V. S.; Madan, C. *New J. Chem.* **2000**, *24*, 853.
414. Bartoli, G., et al. *Tetrahedron Lett.* **2002**, *43*, 5945.
415. Kadota, I., et al. *Tetrahedron Lett.* **1998**, *39*, 6369.
416. Barros, M. T., et al. *Tetrahedron* **2000**, *56*, 6511.
417. Barros, M. T.; Maycock, C. D.; Thomassigny, C. *Synlett* **2001**, 1146.
418. Kartha, K. P. R.; Field, R. A. *Synlett* **1999**, 311.
419. Farras, J.; Serra, C.; Vilarussa, J. *Tetrahedron Lett.* **1998**, *39*, 327.
420. Balnaves, A. S., et al. *Tetrahedron Lett.* **2003**, *44*, 2713.
421. Sabitha, G., et al. *Org. Lett.* **2001**, *3*, 1149.
422. Reddy, C. S.; Smitha, G.; Chandrasekhar, S. *Tetrahedron Lett.* **2003**, *44*, 4693.
423. Aiguade, J.; Hao, J.; Forsyth, C. J. *Org. Lett.* **2001**, *3*, 979.
424. Toro, A.; Nowak, P.; Deslongchamps, P. *J. Am. Chem. Soc.* **2000**, *122*, 4526.
425. Gopinath, R.; Patel, B. K. *Org. Lett.* **2000**, *2*, 4177.
426. Falck, J. R., et al. *J. Am. Chem. Soc.* **1996**, *118*, 6096.
427. Corminboeuf, O.; Overman, L. E.; Pennington, L. D. *J. Am. Chem. Soc.* **2003**, *125*, 6650.
428. Higashibayashi, S., et al. *Synlett* **2000**, 1306.
429. Smith III, A. B.; Wan, Z. *J. Org. Chem.* **2000**, *65*, 3738.
430. Smith III, A. B.; Wan, Z. *Org. Lett.* **1999**, *1*, 1491.
431. Loh, T.-P.; Feng, L.-C. *Tetrahedron Lett.* **2001**, *42*, 3223.
432. Chattopadhyay, S. K.; Pattenden, G. *J. Chem. Soc., Perkin Trans. 1* **2000**, 2429.
433. Chen, G.; Ma, X. S.; Guan, Z. *J. Am. Chem. Soc.* **2003**, *125*, 6697.
434. Rodriguez, A., et al. *Tetrahedron Lett.* **1999**, *40*, 5161.
435. Nicolaou, K. C., et al. *Angew. Chem. Intl. Ed., Eng.* **1997**, *36*, 2520.
436. Heathcock, C. H., et al. *J. Am. Chem. Soc.* **2003**, *125*, 12844.
437. Bode, J. W.; Carreira, E. M. *J. Org. Chem.* **2001**, *66*, 6410.
438. Marshall, J. A.; Adams, N. D. *Org. Lett.* **2000**, *2*, 2897.
439. Ohmori, K., et al. *Angew. Chem. Intl. Ed., Eng.* **2000**, *39*, 2290.
440. Nakamura, S., et al. *Tetrahedron* **2002**, *58*, 10353.
441. Urbanek, R. A.; Sabes, S. F.; Forsyth, C. J. *J. Am. Chem. Soc.* **1998**, *120*, 2523.
442. Dykstra, K. D.; DiNinno, F. *Tetrahedron Lett.* 1998, *39*, **1865**.
443. Vanderwal, C. D.; Vosburg, D. A.; Sorensen, E. J. *Org. Lett.* **2001**, *3*, 4307.
444. Vanderwal, C. D., et al. *J. Am. Chem. Soc.* **2003**, *125*, 5393.
445. Mulzer, J.; Hanbauer, M. *Tetrahedron Lett.* **2002**, *43*, 3381.
446. Vosburg, D. A.; Vanderwal, C. D.; Sorensen, E. J. *J. Am. Chem. Soc.* **2002**, *124*, 4552.
447. Smith III, A. B., et al. *Org. Lett.* **2003**, *5*, 761.
448. Ahmed, A., et al. *J. Org. Chem.* **2003**, *68*, 3026.
449. Hellberg, M. R., et al. *Bioorg. Med. Chem.* **2002**, *10*, 2031.
450. Rodriguez, A. R.; Spur, B. W. *Tetrahedron Lett.* **2003**, *44*, 7411.
451. Anderson, J. C.; McDermott, B. P. *Tetrahedron Lett.* **1999**, *40*, 7135.
452. Jung, M. E., et al. *Org. Lett.* **2003**, *5*, 3159.
453. Evans, D. A.; Fitch, D. M. *Angew. Chem. Intl. Ed., Eng.* **2000**, *39*, 2536.
454. Boge, T. C., et al. *Bioorg. Med. Chem. Lett.* **1999**, *9*, 3047.
455. Schuppan, J., et al. *Angew. Chem. Intl. Ed., Eng.* **2001**, *40*, 2063.
456. Masuda, T., et al. *Org. Lett.* **1999**, *1*, 941.
457. Kirkland, T. A., et al. *J. Am. Chem. Soc.* **2001**, *123*, 12432.
458. Berberich, S. M., et al. *Tetrahedron* **2003**, *59*, 6819.
459. Hung, D. T.; Nerenberg, J. B.; Schreiber, S. L. *J. Am. Chem. Soc.* **1996**, *118*, 11054.
460. Marshall, J. A.; Johns, B. A. *J. Org. Chem.* **1998**, *63*, 7885.
461. Jung, M. E., et al. *Org. Lett.* **2003**, *5*, 3159.
462. Pietruszka, J.; Wilhelm, T. *Synlett* **2003**, 1698.
463. Smith III, A. B., et al. *J. Am. Chem. Soc.* **1997**, *119*, 10935.
464. Kadota, I.; Ueno, H.; Yamamoto, Y. *Tetrahedron Lett.* **2003**, *44*, 8935.
465. Kadota, I.; Yamamoto, Y. *J. Org. Chem.* **1998**, *63*, 6597.
466. a) Lellouche, J.-P.; Koeller, S. *J. Org. Chem.* **2001**, *66*, 693. b) Lellouche, J.-P.; Kotlyar, V. *Synlett*, **2004**, 564.
467. Lee, A. S.-Y.; Yeh, H.-C.; Shie, J.-J. *Tetrahedron Lett.* **1998**, *39*, 5249.
468. Hwu, J. R., et al. *J. Org. Chem.* **2000**, *65*, 5077.
469. Williams, D. R., et al. *Angew. Chem. Intl. Ed., Eng.* **2003**, *42*, 1258.
470. Paterson, I.; Tudge, M. *Tetrahedron* **2003**, *59*, 6833.
471. Chan, J.; Jamison, T. F. *J. Am. Chem. Soc.* **2003**, *125*, 11514
472. Mapp, A. K.; Heathcock, C. H. *J. Org. Chem.* **1999**, *64*, 23.
473. Thompson, C. F.; Jamison, T. F.; Jacobsen, E. N. *J. Am. Chem. Soc.* **2000**, *122*, 10482.
474. Thompson, C. F.; Jamison, T. F.; Jacobsen, E. N. *J. Am. Chem. Soc.* **2001**, *123*, 9974.
475. Ramanjulu, J. M., et al. *J. Org. Chem.* **1997**, *62*, 4961.
476. Radetich, B.; Corey, E. J. *Org. Lett.* **2002**, *4*, 3463.
477. Kim, Y.-A.; Shin, H.-N.; Park, M.-S.; Cho, S.-H.; Han, S.-Y. *Tetrahedron Lett.* **2003**, *44*, 2557 - 2560.
478. Paterson, I.; Tudge, M. *Angew. Chem. Intl. Ed., Eng.* **2003**, *42*, 343.
479. Pattenden, G., et al. *Org. Biomol. Chem.* **2003**, *1*, 4173.
480. Masse, C. E., et al. *J. Am. Chem. Soc.* **1998**, *120*, 4123.
481. Suzuki, M., et al. *Angew. Chem. Intl. Ed., Eng.* **2002**, *41*, 4686.
482. Lautens, M.; Stammers, T. A. *Synthesis* **2002**, 1993.
483. Belanger, G.; Deslongchamps, P. *J. Org. Chem.* **2000**, *65*, 7070.
484. Wender, P. A., et al. *J. Am. Chem. Soc.* **1997**, *119*, 2757.
485. Panek, J. S.; Masse, C. E. *J. Org. Chem.* **1997**, *62*, 8290.
486. Eng, H. M.; Myles, D. C. *Tetrahedron Lett.* **1999**, *40*, 2279.
487. Hilli, F.; White, J. M.; Rizzacasa, M. A. *Tetrahedron Lett.* **2002**, *43*, 8507.
488. Marino, J. P., et al. *J. Am. Chem. Soc.* **2002**, *124*, 1664.
489. Smith III, A. B., et al. *Org. Lett.* **2003**, *5*, 4405.

490. Ali, S. M.; Georg, G. I. *Tetrahedron Lett.* **1997**, *38*, 1703.
491. Eggen, M., et al. *J. Org. Chem.* **2000**, *65*, 7792.
492. Hart, B. P.; Verma, S. K.; Rapoport, H. *J. Org. Chem.* **2003**, *68*, 187.
493. Mulzer, J.; Mantoulidis, A.; Ohler, E. *J. Org. Chem.* **2000**, *65*, 7456.
494. Nicolaou, K. C., et al. *Angew. Chem. Intl. Ed., Eng.* **1998**, *37*, 81.
495. Storer, R. I., et al. *Angew. Chem. Intl. Ed., Eng.* **2003**, *42*, 2521.
496. Yakura, T., et al. *Heterocycles* **2003**, *59*, 347 - 358.
497. Ito, M., et al. *Tetrahedron Lett.* **2003**, *44*, 7949.
498. Andrus, M. B., et al. *Org. Lett.* **2002**, *4*, 3549.
499. Mulzer, J.; Mantoulidis, A.; Ohler, E. *Tetrahedron Lett.* **1998**, *39*, 8633.
500. Lee, E., et al. *J. Am. Chem. Soc.* **2002**, *124*, 384.
501. Mulzer, J.; Karig, G.; Pojarliev, P. *Tetrahedron Lett.* **2000**, *41*, 7635.
502. Baurle, S.; Hoppen, S.; Koert, U. *Angew. Chem. Intl. Ed., Eng.* **1999**, *38*, 1263.
503. Kadota, I.; Takamura, H.; Yamamoto, Y. *Tetrahedron Lett.* **2001**, *42*, 3649.
504. Baba, T.; Huang, G.; Isobe, M. *Tetrahedron* **2003**, *59*, 6851.
505. Marshall, J. A.; Adams, N. D. *J. Org. Chem.* **2002**, *67*, 733.
506. Williams, D. R.; Meyer, K. G. *J. Am. Chem. Soc.* **2001**, *123*, 765.
507. Marshall, J. A.; Ellis, K. C. *Org. Lett.* **2003**, *5*, 1729.
508. Shimano, K., et al. *Tetrahedron Lett.* **1996**, *37*, 2253.
509. Crimmins, M. T.; Stanton, M. G.; Allwein, S. P. *J. Am.Chem. Soc.* **2002**, *124*, 5958.
510. Frank, S. A.; Roush, W. R. *J. Org. Chem.* **2002**, *67*, 4316.
511. Evans, D. A.; Starr, J. T. *J. Am. Chem. Soc.* **2003**, *125*, 13531.
512. Ichikawa, S., et al. *J. Org. Chem.* **1997**, *62*, 1368.
513. Ogawa, A., et al. *J. Med. Chem.* **1998**, *41*, 5094.
514. McCormick, J., et al. *J. Am. Chem. Soc.* **1999**, *121*, 5661.
515. Chen, X., et al. *J. Org. Chem.* **2002**, *67*, 9331.
516. Dixon, D. J., et al. *J. Chem. Soc., Perkin Trans. 1* **1999**, 839.
517. Bhatt, U., et al. *J. Org. Chem.* **2001**, *66*, 1885.
518. Yang, Y.-Y., et al. *Synlett* **2000**, 1634.
519. Zhu, B.; Panek, J. S. *Eur. J. Org. Chem.* **2001**, 1701.
520. Nicolaou, K. C., et al. *Angew. Chem. Intl. Ed., Eng.* **2003**, *42*, 3515.
521. Panek, J. S.; Xu, F.; Rondon, A. C. *J. Am. Chem. Soc.* **1998**, *120*, 4113.
522. Smith III, A. B.; Safonov, I. G.; Corbett, R. M. *J. Am. Chem. Soc.* **2001**, *123*, 12426.
523. Pilli, R. A.; Victor, M. M. *Tetrahedron Lett.* **1998**, *39*, 4421.
524. Hu, T.; Takenaka, N.; Panek, J. S. *J. Am. Chem. Soc.* **1999**, *121*, 9229.
525. Smith III, A. B., et al. *Angew. Chem. Intl. Ed., Eng.* **2001**, *40*, 191.
526. Zhu, B.; Panek, J. S. *Org. Lett.* **2000**, *2*, 2575.
527. Hermitage, S. A.; Roberts, S. M.; Watson, D. J. *Tetrahedron Lett.* **1998**, *39*, 3567.
528. Feutrill, J. T., et al. *Tetrahedron Lett.* **2000**, *41*, 8569.
529. Hu, T.; Takenaka, N.; Panek, J. S. *J. Am. Chem. Soc.* **2002**, *124*, 12806.
530. Marshall, J. A., et al. *J. Org. Chem.* **2003**, *68*, 1780.
531. Smith III, A. B.; Safonov, I. G.; Corbett, R. M. *J. Am. Chem. Soc.* **2002**, *124*, 11102.
532. Xu, Y.; Prestwich, G. D. *J. Org. Chem.* **2002**, *67*, 7158.
533. Evans, D. A., et al. *Angew. Chem. Intl. Ed., Eng.* **1997**, *36*, 2744.
534. Nicolaou, K. C., et al. *Tetrahedron* **1998**, *54*, 7127.
535. Nicolaou, K. C., et al. *Chem. Commun.* **1999**, 519.
536. Harried, S. S., et al. *J. Org. Chem.* **2003**, *68*, 6646.
537. Edwards, S. D.; Lewis, T.; Taylor, R. J. K. *Tetrahedron Lett.* **1999**, *40*, 4267.
538. Crimmins, M. T.; Tabet, E. A. *J. Am. Chem. Soc.* **2000**, *122*, 5473.
539. Rozners, E.; Liu, Y. *Org. Lett.* **2003**, *5*, 181.445.
540. Xu, Y.; Qian, L.; Prestwich, G. D. *J. Org. Chem.* **2003**, *68*, 5320.
541. Shin, Y., et al. *Org. Lett.* **2002**, *4*, 4443.
542. Zhang, Q., et al. *J. Am. Chem. Soc.* **2004**, *126*, 36.
543. McCauley, J. A., et al. *J. Am. Chem. Soc.* **1998**, *120*, 7647.
544. Taber, D. F., et al. *J. Am. Chem. Soc.* **1998**, *120*, 13287.
545. Andrus, M. B.; Argade, A. B. *Tetrahedron Lett.* **1996**, *37*, 5049.
546. Harris, J. M.; O'Doherty, G. A. *Org. Lett.* **2000**, *2*, 2983.
547. Bender, D. M.; Hennings, D. D.; Williams, R. M. *Synthesis* **2000**, 399.
548. Lafontaine, J. A., et al. *J. Org. Chem.* **2003**, *68*, 4215.
549. Trauner, D.; Schwarz, J. B.; Danishefsky, S. J. *Angew. Chem. Intl. Ed., Eng.* **1999**, *38*, 3542.
550. Hollowood, C. J.; Ley, S. V.; Yamanoi, S. *Chem. Commun.* **2002**, 1624.
551. Tode, C.; Yamano, Y.; Ito, M. *J. Chem. Soc., Perkin Trans. 1* **2001**, 3338.
552. Tode, C.; Yamano, Y.; Ito, M. *J. Chem. Soc., Perkin Trans. 1* **2002**, 1581.
553. Paterson, I.; Collett, L. A. *Tetrahedron Lett.* **2001**, *42*, 1187.
554. Green, M. P.; Prodger, J. C.; Hayes, C. J. *Tetrahedron Lett.* **2002**, *43*, 6609.
555. Ishiwata, T., et al. *Org. Lett.* **2002**, *4*, 2921.
556. Kurosu, M., et al. *J. Am. Chem. Soc.* **1998**, *120*, 6627.
557. Chen, M.-Y., et al. *Tetrahedron Lett.* **2004**, *45*, 635.
558. Chen, M.-Y., et al. *Tetrahedron Lett.* **2002**, *43*, 2777.
559. Tandon, N.; Begley, T. P. *Synth. Commun.* **1997**, *27*, 2953.
560. Wender, P. A., et al. *J. Am. Chem. Soc.* **2002**, *124*, 4956.
561. Koeller, S.; Lellouche, J.-P. *Tetrahedron Lett.* **1999**, *40*, 7043.
562. Chandrasekhar, S.; Mohanty, P. K.; Takhi, M. *J. Org. Chem.***1997**, *62*, 2628.
563. Sabitha, G.; Syamala, M.; Yadav, J. S. *Org. Lett.* **1999**, *1*, 1701.
564. Vakalopoulos, A.; Lampe, T. F. J.; Hoffmann, H. M. R. *Org. Lett.* **2001**, *3*, 929.
565. Nakamura, R.; Tanino, K.; Miyashita, M. *Org. Lett.* **2003**, *5*, 3583.
566. Terauchi, T., et al. *Tetrahedron Lett.* **2003**, *44*, 7747.
567. Smith III, A. B., et al. *Angew. Chem. Intl. Ed., Eng.* **2001**, *40*, 196.
568. Tatami, A., et al. *Tetrahedron Lett.* **2003**, *44*, 5229.
569. Smith III, A. B., et al. *J. Am. Chem. Soc.* **2001**, *123*, 10942.
570. BouzBouz, S.; Cossy, J. *Org. Lett.* **2003**, *5*, 3029.
571. Munakata, R., et al. *J. Am. Chem. Soc.* **2003**, *125*, 14722.
572. Paterson, I.; C., D. S.; Tudge, M. *Org. Lett.* **2001**, *3*, 3149.
573. Evans, D. A.; Starr, J. T. *Angew. Chem. Intl. Ed., Eng.* **2002**, *41*, 1787.
574. Bouvier, E., et al. *Org. Biomol. Chem.* **2003**, *1*, 3343.
575. Mitchell, I. S.; Pattenden, G.; Stonehouse, J. P. *Tetrahedron Lett.* **2002**, *43*, 493.
576. Deba, T., et al. *Synlett* **2003**, 1500.
577. Scheidt, K. A., et al. *J. Org. Chem.* **1998**, *63*, 6436.
578. Raghavan, S.; Reddy, S. R. *J. Org. Chem.* **2003**, *68*, 5754.
579. Suh, Y.-G., et al. *Tetrahedron Lett.* **2002**, *43*, 3825.
580. Panek, J. S.; Liu, P. *J. Am. Chem. Soc.* **2000**, *122*, 11090.
581. Bio, M. M.; Leighton, J. L. *Org. Lett.* **2000**, *2*, 2905.
582. Crimmins, M. T., et al. *J. Am. Chem. Soc.* **2002**, *124*, 5661.
583. Kadota, I., et al. *Tetrahedron Lett.* **1998**, *39*, 6373.
584. Wender, P. A.; Rice, K. D.; Schnute, M. E. *J. Am. Chem. Soc.* **1997**, *119*, 7897.
585. Wender, P. A., et al. *J. Am. Chem. Soc.* **1997**, *119*, 12976.
586. Bio, M. M.; Leighton, J. L. *J. Am. Chem. Soc.* **1999**, *121*, 890.
587. Gaunt, M. J., et al. *Org. Lett.* **2003**, *5*, 4819 - 4822.
588. Martin, S. F.; Hida, T.; Kym, P. R.; Loft, M.; Hodgson, A. *J. Am. Chem. Soc.* **1997**, *119*, 3193.
589. Dounay, A. B., et al. *Angew. Chem. Intl. Ed., Eng.* **1999**, *38*, 2258.
590. Sibvakumar, M.; Borhan, B. *Tetrahedron Lett.* **2003**, *44*, 5547.
591. Arndt, H.-D.; Polborn, K.; Koert, U. *Tetrahedron Lett.* **1997**, *38*, 3879.

592. Forsyth, C. J.; Sabes, S. F.; Urbanek, R. A. *J. Am. Chem. Soc.* **1997**, *119*, 8381.
593. Sabes, S. F.; Urbanek, R. A.; Forsyth, C. J. *J. Am. Chem. Soc.* **1998**, *120*, 2534.
594. Dounay, A. B.; Forsyth, C. J. *Org. Lett.* **1999**, *1*, 451.
595. Smith III, A. B., et al. *J. Am. Chem. Soc.* **2003**, *125*, 8228.
596. Paterson, I.; Oballa, R. M. *Tetrahedron Lett.* **1997**, *38*, 8241.
597. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **1998**, *120*, 8661.
598. Kang, S. H., et al. *Angew. Chem. Intl. Ed., Eng.* **2002**, *41*, 1392.
599. Jeong, J. W., et al. *Synlett* **2003**, 393.
600. Rotulo-Sims, D.; Prunet, J. *Org. Lett.* **2002**, *4*, 4701.
601. Ishikawa, Y.; Nishiyama, S. *Tetrahedron Lett.* **2004**, *45*, 351.
602. Carter, R. G.; Graves, D. E. *Tetrahedron Lett.* **2001**, *42*, 6035.
603. Paquette, L. A.; Barriault, L.; Pissarnitski, D. *J. Am. Chem. Soc.* **1999**, *121*, 4542.
604. Paquette, L. A., et al. *J. Am. Chem. Soc.* **2000**, *122*, 619.
605. Brickmann, K.; Somfai, P.; Kihlberg, J. *Tetrahedron Lett.* **1997**, *38*, 3651.
606. Brickmann, K., et al. *Chem. Eur. J.* **1999**, *5*, 2241.
607. Makino, K., et al. *Tetrahedron Lett.* **1996**, *37*, 9073.
608. Carter, R. G.; Weldon, D. J. *Org. Lett.* **2000**, *2*, 3913.
609. Roush, W. R.; Dilley, G. J. *Tetrahedron Lett.* **1999**, *40*, 4955.
610. Winkler, J. D., et al. *J. Am. Chem. Soc.* **2002**, *124*, 9726.
611. Tanaka, A.; Oritani, T. *Tetrahedron Lett.* **1997**, *38*, 7223.
612. Fangour, S. E., et al. *Tetrahedron Lett.* **2003**, *44*, 2105.
613. Terauchi, T., et al. *Tetrahedron Lett.* **2001**, *42*, 5505.
614. Chattopadhyay, S. K.; Pattenden, G. *Tetrahedron Lett.* **1998**, *39*, 6095.
615. Zhang, J.; Xu, X. *Tetrahedron Lett.* **1998**, *39*, 6525.
616. Zhang, J.; Xu, X. *Tetrahedron Lett.* **2000**, *41*, 941.
617. Sajiki, H.; Ikawa, T.; Hirota, K. *Tetrahedron Lett.* **2003**, *44*, 7407.
618. Tanaka, N.; Masaki, Y. *Synlett* **1999**, 1960.
619. Diaz, M., et al. *Tetrahedron Lett.* **2000**, *41*, 775.
620. Smith III, A. B.; Brandt, B. M. *Org. Lett.* **2001**, *3*, 1685.
621. Shimizu, M., et al. *Bioorg. Med. Chem. Lett.* **2003**, *13*, 809.
622. Crimmins, M. T.; King, B. W. *J. Am. Chem. Soc.* **1998**, *120*, 9084.
623. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **2003**, *125*, 15443.
624. White, J. D., et al. *J. Am. Chem. Soc.* **1997**, *119*, 2404.
625. Kiyooka, S.-I.; Hena, M. A. *J. Org. Chem.* **1999**, *54*, 5511.
626. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **2003**, *125*, 15433.
627. Hoffmann, R. W.; Rolle, U.; Gottlich, R. *Liebigs Ann.* **1996**, 1717.
628. Kirsch, S.; Bach, T. *Synthesis* 2003, 1827.
629. Kirsch, S.; Bach, T. *Angew. Chem. Intl. Ed., Eng.* 2003, *42*, 4685.
630. Taylor, R. E.; Hearn, B. R.; Ciavarri, J. P. *Org. Lett.* 2002, *4*, 2953.
631. Wang, M., et al. *Tetrahedron Lett.* **2002**, *43*, 8727.
632. Ishiyama, T., et al. *Bioorg. Med. Chem. Lett.* **2002**, *12*, 2815.
633. Scheidt, K. A., et al. *J. Am. Chem. Soc.* **2002**, *124*, 6981.
634. Savall, B. M.; Blanchard, N.; Roush, W. R. *Org. Lett.* **2003**, *5*, 377.
635. McDonald, F. E.; Wu, M. *Org. Lett.* **2002**, *4*, 3979.
636. Pattenden, G.; Plowright, A. T. *Tetrahedron Lett.* **2000**, *41*, 983.
637. Carretero, J. C.; Arrayas, R. G. *Synlett* **1999**, 49.
638. Zakarian, A.; Batch, A.; Holton, R. A. *J. Am. Chem. Soc.* **2003**, *125*, 7822.
639. Evans, D. A., et al. *J. Am. Chem. Soc.* **1998**, *120*, 5921.
640. Wender, P. A., et al. *J. Am. Chem. Soc.* **1997**, *119*, 2755.
641. Coffey, D. S., et al. *J. Am. Chem. Soc.* **1999**, *121*, 6944.
642. Miyashita, K., et al. *Chem. Commun.* **2002**, 742.
643. Miyashita, K., et al. *J. Am. Chem. Soc.* **2003**, *125*, 8238.
644. Smith III, A. B., et al. J. *Org. Lett.* **1999**, *1*, 909.
645. Gaul, C.; Njardarson, J. T.; Danishefsky, S. J. *J. Am. Chem. Soc.* **2003**, *125*, 6042.
646. Micalizio, G. G.; Roush, W. R. *Tetrahedron Lett.* **1999**, *40*, 3351.
647. Paterson, I.; Oballa, R. M.; Norcross, R. D. *Tetrahedron Lett.* **1996**, *37*, 8581.
648. Williams, D. R.; Ihle, D. C.; Plummer, S. V. *Org. Lett.* **2001**, *3*, 1383.
649. Crimmins, M. T., et al. *Org. Lett.* **2001**, *3*, 949.
650. Nicolaou, K. C., et al. *Angew. Chem. Intl. Ed., Eng.* **2001**, *40*, 3854.
651. Paterson, I., et al. *Org. Lett.* **2003**, *5*, 4477.
652. Scheidt, K. A., et al. *Angew. Chem. Intl. Ed., Eng.* **1999**, *38*, 1652.
653. Martin, H. J.; Drescher, M.; Mulzer, J. *Angew. Chem. Intl. Ed., Eng.* **2000**, *39*, 581.
654. Walker, M. A., et al. *Bioorg. Med. Chem. Lett.* **2001**, *11*, 1683.
655. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **1998**, *120*, 8674.
656. Tsukano, C.; Sasaki, M. *J. Am. Chem. Soc.* **2003**, *125*, 14294.
657. Brimble, M. A.; Nairn, M. R.; Park, J. *Org. Lett.* **1999**, *1*, 1459.
658. Smith III, A. B.; Ott, G. R. *J. Am. Chem. Soc.* **1998**, *120*, 3935.
659. White, J. D.; Sundermann, K. F.; Wartmann, M. *Org. Lett.* **2002**, *4*, 995.
660. Andrus, M. B., et al. *J. Org. Chem.* **2003**, *68*, 8162.
661. Schmidt, D. R.; Park, P. K.; Leighton, J. L. *Org. Lett.* **2003**, *5*, 3535.
662. Lambert, W. T.; Burke, S. D. *Org. Lett.* **2003**, *5*, 515.
663. Paquette, L. A.; Braun, A. *Tetrahedron Lett.* **1997**, *38*, 5119.
664. Roush, W. R., et al. *J. Am. Chem. Soc.* **1996**, *118*, 7502.
665. Cink, R. D.; Forsyth, C. J. *J. Org. Chem.* **1997**, *62*, 5672.
666. Forsyth, C. J., et al. *J. Am. Chem. Soc.* **1998**, *120*, 5597.
667. Oliver, S. F., et al. *Angew. Chem. Intl. Ed., Eng.* **2003**, *42*, 5996.
668. Winkler, J. D.; Bhattacharya, S. K.; Batey, R. A. *Tetrahedron Lett.* **1996**, *37*, 8069.
669. Nicolaou, K. C., et al. *Angew. Chem. Intl. Ed., Eng.* **1999**, *38*, 3340.
670. Ghosh, A. K.; Liu, C. *J. Am. Chem. Soc.* **2003**, *125*, 2374.
671. Nishii, T., et al. *Tetrahedron Lett.* **2003**, *44*, 7829.
672. Tsunoda, T., et al. *Tetrahedron Lett.* **2000**, *41*, 7667.
673. Mandal, A. K. *Org. Lett.* **2002**, *4*, 2043.
674. Harried, S. S., et al. *J. Org. Chem.* **1997**, *62*, 6098.
675. Myers, A. G., et al. *Angew. Chem. Intl. Ed., Eng.* **2002**, *41*, 1062.
676. Xu, Y.; Johnson, C. R. *Tetrahedron Lett.* **1997**, *38*, 1117.
677. Paterson, I., et al. *J. Am. Chem. Soc.* **2001**, *123*, 9535.
678. Kwon, O., et al. *Angew. Chem. Intl. Ed., Eng.* **1998**, *37*, 1880.
679. Meng, D.; Danishefsky, S. J. *Angew. Chem. Intl. Ed., Eng.* **1999**, *38*, 1485.
680. Hassfeld, J.; Kalesse, M. *Synlett* **2002**, **2007**.
681. Takahashi, T., et al. *Angew. Chem. Intl. Ed., Eng.* **1997**, *36*, 1524.
682. Toshima, K., et al. *Angew. Chem. Intl. Ed., Eng.* **2000**, *39*, 3656.
683. Paterson, I.; Davies, R. D. M.; Marquez, R. *Angew. Chem. Intl. Ed., Eng.* **2001**, *40*, 603.
684. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **1997**, *119*, 7974.
685. White, J. D.; Sundermann, K. F.; Carter, R. G. *Org. Lett.* **1999**, *1*, 1431.
686. Taylor, R. E.; Chen, Y. *Org. Lett.* **2001**, *3*, 2221.
687. Burke, S. D., et al. *J. Org. Chem.* **2000**, *65*, 4070.
688. Evans, D. A., et al. *J. Am. Chem. Soc.* **2002**, *124*, 5654.
689. Moore, C. G., et al. *Tetrahedron Lett.* **2003**, *44*, 251.
690. Lepage, O.; Deslongchamps, P. *J. Org. Chem.* **2003**, *68*, 2183.
691. Paquette, L. A., et al. *Tetrahedron Lett.* **1997**, *38*, 1271.
692. Paquette, L. A.; Collado, I.; Purdie, M. *J. Am. Chem. Soc.* **1998**, *120*, 2553.
693. Paquette, L. A., et al. *J. Am. Chem. Soc.* **1998**, *120*, 2543.
694. Williams, D. R., et al. *Org. Lett.* **2000**, *2*, 3023.

695. Liu, P.; Panek, J. S. *J. Am. Chem. Soc.* **2000**, *122*, 1235.
696. Williams, D. R.; Plummer, S. V.; Patnaik, S. *Angew. Chem. Intl. Ed., Eng.* **2003**, *42*, 3934.
697. Williams, D. R.; Clark, M. P.; Berliner, M. A. *Tetrahedron Lett.* **1999**, *40*, 2287.
698. Harris, J. M.; O'Doherty, G. A. *Tetrahedron Lett.* **2002**, *43*, 8195.
699. Oriyama, T.; Kobayashi, Y.; Noda, K. *Synlett* **1998**, 1047.
700. Churcher, I.; Hallett, D.; Magnus, P. *J. Am. Chem. Soc.* **1998**, *120*, 3518.
701. Terauchi, T., et al. *Tetrahedron Lett.* **2003**, *44*, 7741.
702. Takahashi, T.; Watanabe, H.; Kitahara, T. *Tetrahedron Lett.* **2003**, *44*, 9219.
703. Magnus, P., et al. *J. Am. Chem. Soc.* **1997**, *119*, 6739.
704. Semmelhack, M. F.; Gu, Y.; Ho, D. M. *Tetrahedron Lett.* **1997**, *38*, 5583.
705. Lenz, R.; Giese, B. *J. Am. Chem. Soc.* **1997**, *119*, 2784.
706. Takamura, M., et al. *Synlett* **2003**, 353.
707. Mori, Y., et al. *J. Org. Chem.* **2003**, *68*, 9050.
708. Mori, Y.; Takase, T.; Noyori, R. *Tetrahedron Lett.* **2003**, *44*, 2319.
709. Lampe, T. F. J.; Hoffmann, H. M. R. *Tetrahedron Lett.* **1996**, *37*, 7695.
710. Taber, D. F., et al. *J. Am. Chem. Soc.* **1999**, *121*, 5589.
711. Smith III, A. B., et al. *J. Am. Chem. Soc.* **1997**, *119*, 962.
712. Blaehr, L. K. A., et al. *J. Org. Chem.* **2003**, *68*, 1367.
713. Kim, S., et al. *J. Am. Chem. Soc.* **1999**, *121*, 2056.
714. Kim, S.; Sutton, S. C.; Fuchs, P. L. *Tetrahedron Lett.* **1995**, *36*, 2427.
715. Crimmins, M. T., et al. *J. Am. Chem. Soc.* **1996**, *118*, 7513.
716. Boyer, F.-D., et al. *Org. Lett.* **2001**, *3*, 3095.
717. Tohma, H., et al. *J. Am. Chem. Soc.* **2003**, *125*, 11235.
718. Yang, Z.-Q.; Danishefsky, S. J. *J. Am. Chem. Soc.* **2003**, *125*, 9602.
719. Shen, R., et al. *J. Am. Chem. Soc.* **2003**, *125*, 7889.
720. Drake, D. J., et al. *J. Med. Chem.* **1998**, *41*, 3596.
721. Melnick, M., et al. *J. Med. Chem.* **1996**, *39*, 2795.
722. Blass, B. E.; Harris, C. L.; Portlock, D. E. *Tetrahedron Lett.* **2001**, *42*, 1611.
723. Oriyama, T.; Noda, K.; Yatabe, K. *Synlett* **1997**, 701.
724. Wilson, N. S.; Keay, B. A. *Tetrahedron Lett.* **1997**, *38*, 187.
725. Jiang, Z.-Y.; Wang, Y.-G. *Tetrahedron Lett.* **2003**, *44*, 3859.
726. Zubaidha, P. K.; Bhosale, S. V.; Hashmi, A. M. *Tetrahedron Lett.* **2002**, *43*, 7277.
727. Ankala, S. V.; Fenteany, G. *Tetrahedron Lett.* **2002**, *43*, 4729.
728. Crouch, R. D., et al.*Tetrahedron Lett.* **1999**, *40*, 3133.
729. Jiang, Z.-Y.; Wang, Y.-G. *Chem. Lett.* **2003**, *32*, 568.
730. Ankala, S. V.; Fenteany, G. *Synlett* **2003**, 825.
731. Oyama, K.-I.; Kondo, T. *Org. Lett.* **2003**, *5*, 209.
732. Angle, S. R.; Wada, T. *Tetrahedron Lett.* **1997**, *38*, 7955.
733. Schwarz, S., et al. *Steroids* **1999**, *64*, 460.
734. Smith III, A. B.; Zheng, J. *Tetrahedron* **2002**, *58*, 6455.
735. Nicolaou, K. C., et al. *Angew. Chem. Intl. Ed., Eng.* **2000**, *39*, 1084.
736. Suzuki, E., et al. *Steroids* **1999**, *64*, 551.
737. Nicolaou, K. C., et al. *Angew. Chem. Intl. Ed., Eng.* **1999**, *38*, 240.
738. Layton, M. E.; Morales, C. A.; Shair, M. D. *J. Am. Chem. Soc.* **2002**, *124*, 773.
739. Rani, S.; Babu, J. L.; Vankar, Y. D. *Synth. Commun.* **2003**, *33*, 4043.
740. Grieco, P. A.; Markworth, C. J. *Tetrahedron Lett.* **1999**, *40*, 665.
741. Suzuki, T.; Oriyama, T. *Synthesis* **2001**, 555.
742. Bajwa, J. S., et al. *Tetrahedron Lett.* **2000**, *41*, 6021.
743. Sabitha, G., et al. *Adv. Synth. Catal.* **2001**, *343*, 169.
744. Lipshutz, B. H.; Keith, J. *Tetrahedron Lett.* **1998**, *39*, 2495.
745. Karimi, B.; et al. *Tetrahedron Lett.* **2004**, *45*, 9139.
746. Feldman, K. S.; Cutarelli, T. D.; Di Florio, R. *J. Org. Chem.* **2002**, *67*, 8528.
747. Jackson, S. R., et al. *Angew. Chem. Intl. Ed., Eng.* **2001**, *40*, 2694.
748. Crouch, R. D., et al. *Tetrahedron Lett.* **2004**, *45*, 1279.
749. Ghosh, A. K.; Liu, C. *Org. Lett.* **2001**, *3*, 635.
750. Kojima, A., et al. *Synthesis* **1998**, 581.
751. Li, C.; Johnson, R. P.; Porco, J. A., Jr. *J. Am. Chem. Soc.* **2003**, *125*, 5095.
752. Uchiyama, M.; Kimura, Y.; Ohta, A. *Tetrahedron Lett.* **2000**, *41*, 10013.
753. Holloway, G. A.; Hugel, H. M.; Rizzacasa, M. A. *J. Org. Chem.* **2003**, *68*, 2200.
754. Gloria, P. M. C., et al. *Tetrahedron Lett.* **2003**, *44*, 8819.
755. DeGroot, A. H.; Dommisse, R. A.; Lemiere, G. L. *Tetrahedron* **2000**, *56*, 1541.
756. Tichkowsky, I.; Lett, R. *Tetrahedron Lett.* **2002**, *43*, 3997.
757. Ito, H., et al. *J. Polym. Sci. A: Polym. Chem.* **2000**, *38*, 2415.
758. Pearson, W. H.; Hines, J. V. *J. Org. Chem.* **2000**, *65*, 5785.
759. Benningshof, J. C. J., et al. *J. Chem. Soc., Perkin Trans. 1* **2002**, 1693.
760. Benningshof, J. C. J., et al. *J. Chem. Soc., Perkin Trans. 1* **2002**, 1701.
761. Mukai, C.; Miyakoshi, N.; Hanaoka, M. *J. Org. Chem.* **2001**, *66*, 5875.
762. Nomura, I.; Mukai, C. *Org. Lett.* **2002**, *4*, 4301.
763. Gilsing, H.-D.; Angerer, J.; Prescher, D. *Monatsh. Chem.* **2002**, *133*, 1147.
764. Miyakoshi, N.; Mukai, C. *Org. Lett.* **2003**, *5*, 2335.
765. Furstner, A., et al. *Angew. Chem. Intl. Ed., Eng.* **2002**, *41*, 4763.
766. Aissa, C., et al. *J. Am. Chem. Soc.* **2003**, *125*, 15512.
767. Tietze, L. F.; Volkel, L. *Angew. Chem. Intl. Ed., Eng.* **2001**, *40*, 901.
768. Hunter, R.; Richards, P. *Tetrahedron Lett.* **2000**, *41*, 3755.
769. Hunter, R.; Richards, P. *Org. Biomol. Chem.* **2003**, *1*, 2348.
770. Ramasamy, K. S.; Averett, D. *Synlett* **1999**, 709 - 712.
771. Yokoshima, S., et al. *J. Am. Chem. Soc.* **2002**, *124*, 2137.
772. Chemier, S. R.; Danishefsky, S. J. *Org. Lett.* **2000**, *2*, 2695.
773. Drouet, K. E.; Ling, T.; Tran, H. V.; Theodorakis, E. A. *Org. Lett.* **2000**, *2*, 207.
774. Hirashima, S.; Aoyagi, S.; Kibayashi, C. *J. Am. Chem. Soc.* **1999**, *121*, 9873.
775. Knight, D. W.; Staples, E. R. *Tetrahedron Lett.* **2002**, *43*, 6771.
776. Firouzabadi, H.; Iranpoor, N.; Hazarkhani, H. *Tetrahedron Lett.* **2002**, *43*, 7139.
777. Chen, Y.-J.; De Clerq, P.; Vandewalle, M. *Tetrahedron Lett.* **1996**, *37*, 9361.
778. Nicolaou, K. C., et al. *J. Am. Chem. Soc.* **1997**, *119*, 11353.
779. Evans, P. A.; Cui, H.; Gharpure, S. J. *Org. Lett.* **2003**, *5*, 3883.
780. Hattori, K.; Sajiki, H.; Hirota, K. *Tetrahedron* **2001**, *57*, 2109.
781. Wang, Y.-G.; Kobayashi, Y. *Org. Lett.* **2002**, *4*, 4615.
782. Liang, H.; Hu, L.; Corey, E. J. *Org. Lett.* **2011**, *13*, 4120.

Acknowledgements:

Sincere thanks are given to Georg Thieme Verlag, Stuttgart, Germany, http://www.thieme.de/chemistry/journals.html, publishers to Synthesis, for permission to use data from the article Selective Deprotection of Silyl Ethers, T.D. Nelson and R.D. Crouch, Synthesis, **1996**, 1031.

Silicon-Based Reducing Agents

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Materials for the reduction of:

Aldehydes
Ketones
Acetals
Ketals
Esters
Lactones
Thioesters
Enamines
Imines
Acids
Amides
Halides
Olefins
Metal Halides

SILICON-BASED REDUCING AGENTS

Introduction

The widely used organometallic-based reducing agents can be broadly classified as either ionic, such as lithium aluminum hydride and sodium borohydride, or free-radical such as tri-n-butyltin hydride. The mechanistic differences between these two classes of reducing agents very often complement one another in their ability to reduce organic substrates. Organosilanes have been found to possess the ability to serve as both ionic and free-radical reducing agents. These reagents and their reaction by-products are safer and more easily handled and disposed of than other reagents. Their reductive abilities are accomplished by changes in the nature of the groups attached to silicon, which can modify the character of the Si-H bond in the silane. For example, the combination of a triethylsilane and an acid has proven to be excellent for the reduction of substrates that can generate a "stable" carbenium ion intermediate. Examples of substrates that fall into this class are olefins, alcohols, esters, lactones, aldehydes, ketones, acetals, ketals, and other like materials. On the other hand triphenylsilane and especially tris(trimethylsilyl)silane have proven to be free-radical reducing agents that can substitute for tri-n-butyltin hydride. The reductions with silanes can take place with acid catalysis in which the silane provides the hydride to a carbenium ion intermediate. This is often the situation in the reduction of carbonyls, ketals, acetals and similar species. Additionally, the silane reductions can also be carried out with fluoride ion catalysis to generate a silane with more hydridic character.

Some of the key reductions possible with silanes are summarized in **Table 1**.

General Considerations

Hydridosilanes are readily produced on an industrial scale through the use of Grignard chemistry starting with trichlorosilane, methyldichlorosilane, and dimethylchlorosilane, among others, as key raw materials. Alternatively, the Si-X (X = primarily Cl or OR) bond can be reduced to Si-H.

The organosilanes are basically hydrocarbon-like in that they are stable to water, are, in general, flammable and are lipophilic. In contrast to hydrocarbons, the low molecular weight silanes such as monosilane, methylsilane, and dichlorosilane are pyrophoric. The silanes will react with base or, more slowly, with acid to give the corresponding siloxane with the evolution of hydrogen gas. They show a strong, characteristic, carbonyl-like absorption in the infrared at about 2200 cm^{-1}.[1]

The metallic nature of silicon and its low electronegativity relative to hydrogen - 1.8 versus 2.1 on the Pauling scale - lead to polarization of the Si-H bond such that the hydrogen is hydridic in nature. This provides an ionic, hydridic reducing agent that is milder than the usual aluminum-, boron-, and other metal-based hydrides. Thus, triethylsilane, among others, has been used to provide the hydride in Lewis acid-catalyzed reductions of various carbenium ion precursors. In addition, the Si-H bond can be employed in various radical reductions wherein the silane provides the hydrogen radical.

Table 2 shows the Si-H bond strengths for several silanes. From these data the rather wide variation in the Si-H bond strengths from tris(trimethylsilyl)silane on the low-energy end to trifluorosilane on the high-energy end can be noted. This is yet

TABLE 1 SILANE REDUCTION OF ORGANIC FUNCTIONAL GROUPS

TRANSFORMATION	Cl_3Si-H	Et_3Si-H	Ph_3SiH	Ph_2SiH_2	$PhSiH_3$	$(Me_3Si)_3Si$-H	PMHS
$R_2C=CR_2 \rightarrow R_2CH\text{-}CHR_2$		+ +		+ +[a]	+[a]		
R-OH → R-H		+	+ +	+			
R-X → R-H		+	+			+ +	
RCHO → RCH_2OH		+ +			+		
$R_2C=0 \rightarrow R_2CHOH$		+ +	+	+			+
$RCO_2R' \rightarrow RCH_2OH$		+ +		+ +			+
RCOCl → RCH_2OH'		+ +					
RCHO → RCH_2OR							
$RR'C(OR'')_2 \rightarrow RR'CHOR''$		+ +	+ +[b]				
$RR'C=NHR'' \rightarrow RR'CHNHR''$		+		+ +			+
RCN → RCH_2NH_2		+ +					
$RCH_2NR_2' \rightarrow RCH_2OH$		+		+			
$R_3P=O \rightarrow R_3P$:	+		+	+ +			+
$ArNO_2 \rightarrow ArNH_2$							+

a. Reduces C=C of enones to saturated ketones.
b. Especially good for reduction of cyclic ketals and acetals.

another example of the extraordinary effect that groups attached to silicon can have on the chemistry of the silane and that these effects can go beyond the simple steric effects that have been so successfully applied with the silicon-based blocking agents.[2-4]

Table 2 Bond Strengths Of Various Hydridosilanes

Compound	Product Code	Bond Strength kJ mol^{-1}	Bond Strength kcal mol^{-1}	Ref
F_3Si-H	SIT8373.0	419	100	5
Et_3Si-H	SIT8330.0	398	95	6
Me_3Si-H	SIT8570.0	398	95	7
H_3Si-H	SIS6950.0	384	92	6
Cl_3Si-H	SIT8155.0	382	91	5
PhMeHSi-H	SIP6742.0	382	91	6
$Me_3SiSiMe_2$-H	not offered	378	90	6
PhH_2Si-H	SIP6750.0	377	90	6
$(MeS)_3$Si-H	not offered	366	87	6
H_3SiSiH_2-H	SID4594.0	361	86	5
$(Me_3Si)_3$Si-H	SIT8724.0	351	84	6

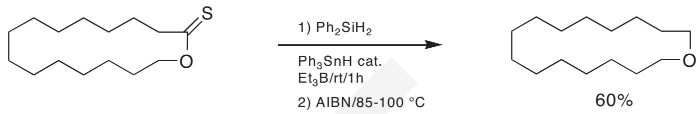
Although triethylsilane has been the most popular of the silicon-based reducing agents, in principal any Si-H-containing system can provide the hydride for many or most of these reductions. Considerations would include availability, economics, and silicon-containing by-products. The silicon-containing by-products are usually the silanol or disiloxane in the case of the trisubstituted silanes, or silicones in the case of the di- or monosubstituted silane reducing agents. Such considerations can result in greater ease of handling and purification of the final product.

Silicon-based reductions have been reviewed, though never in a comprehensive manner.[6,8-13] A comprehensive review has been published.[14]

Silicon-Based Radical Reductions

Griller and Chatgilialoglu[6] realized that the low bond energy of the Si-H bond in tris(trimethylsilyl)silane compared well with that of the Sn-H bond in tri-n-butyltin hydride (322 kJmol^{-1}; 77 kcal mol^{-1}), and that this reagent should, therefore, be a viable alternative for radical reductions and one that would avoid the potential problems of working with toxic tin materials and trace tin-containing impurities in the final product. This proved to be the case, and a number of radical reductions with tris(trimethylsilyl) silane have been reported and reviewed.[15,16] Included among these are the reductions of organic halides, [17-19] esters,[20] xanthates, selenides, sulfides, thioethers, and isonitriles.[21]

As an example of a free radical reduction, the diphenylsilane reduction of thioesters to ethers has been recently reported.[22] This reaction uses the catalytic triphenyltin hydride as the actual reducing agent.



Ionic Reductions with Silanes—General Considerations

As pointed out above the silanes provide a mild form of the hydride and as such can be useful in various hydridic reductions. The general and, admittedly simplified, view of such reductions can be visualized as shown below where a carbenium ion is reduced by a silane. In this scenario, the carbenium ion receives the hydride from the silane, and the silane takes on the leaving group from the carbon center.

$$R_3C\text{-}X + R_3Si\text{-}H \longrightarrow R_3C\text{-}H + R_3Si\text{-}X$$

It has been shown that in the gas phase the reaction shown below is exothermic by approximately 8 kcal/mol indicating that the trimethylsilicenium ion is, at least in the gas phase, more stable than the tert-butyl carbenium ion.[23] Although the existence of free silicenium ions do not exist in solution under normal, “unbiased” conditions, it can be assumed that the silicon center is free to take on considerable positive charge in its reactions. Reductions based on this premise include those of olefins, ketones, aldehydes, esters, organic halides, acid chlorides, acetals, ketals, alcohols as well as metal salts.

$$(CH_3)_3C^+ + (CH_3)_3Si\text{-}H \longrightarrow (CH_3)_3C\text{-}H + (CH_3)_3Si^+$$

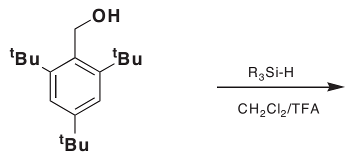
Silane Reduction of Alcohols to Alkanes

The general equation for the silane reduction of alcohols to alkanes is illustrated below. The reaction proceeds best when the alcohol can lead to a stabilized carbenium ion. Thus, secondary and tertiary aliphatic alcohols and benzylic alcohols are readily reduced. Trialkyl substituted silanes are more reactive than dialkylsilanes and di- or triarylsilanes. Typical and highly effective conditions for these reductions are treatment of the alcohol with the silane and trifluoroacetic acid in dichloromethane. Triethylsilane is often the silane of choice due to its ease of handling and high reactivity.[23,24]

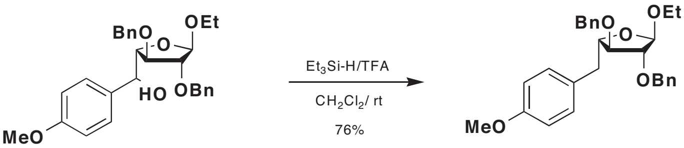
$$R_3C\text{-}OH + R_3Si\text{-}H \xrightarrow[\text{catalyst}]{\text{Acid}} R_3C\text{-}H + R_3Si\text{-}OH \text{ and/or } R_3Si\text{-}O\text{-}SiR_3$$

The reduction of secondary alcohols with a silane and a protic acid does not occur. These reductions require the use of a strong Lewis acid such as boron trifluoride or aluminum chloride.[25,26]

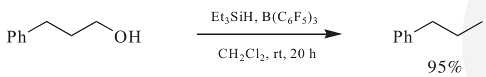
Primary aliphatic alcohols are not reduced with silanes.[27] Benzylic alcohols, on the other hand, are reduced under rather mild conditions to the corresponding toluene derivative.[28]

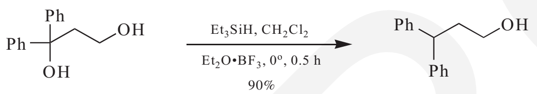


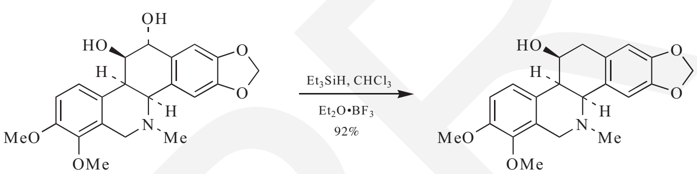
The selective reduction of a benzylic alcohol in the presence of benzyl ethers, a tetrahydrofuran and an acetal has been reported.[29]



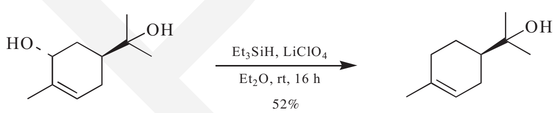
Primary alcohols can be reduced to the alkane when the reaction is catalyzed by the very strong Lews acid, tris(pentafluorophenyl)borane. The reaction requires two equivalents of the silane as the first equivalent serves to silylate the alcohol. It is believed that the silylated alcohol is nucleophilically displaced in these transformations.[30] On the other hand, with boron trifluoride etherate as the catalyst, the benzylic alcohol can be reduced in the presence of a primary or secondary alcohol.[31,32]





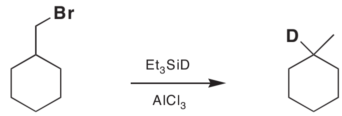


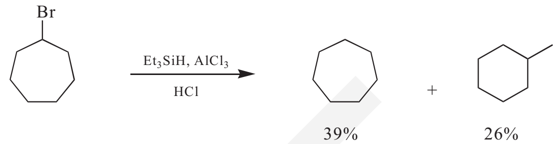
The reduction of an allylic alcohol in the presence of a tertiary alcohol is possible.[33]

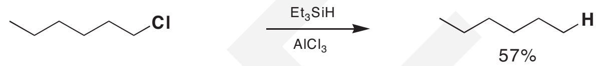


Silane Reduction of Alkyl Halides

As with the reduction of alcohols to alkanes, the acid-catalyzed reduction of alkyl halides to alkanes requires the formation of a relatively stable carbenium ion intermediate that can accept the hydride from the silane. Thus, tertiary, secondary, allylic and benzylic halides lend themselves to this type of reduction. Under certain conditions primary halides can be reduced, but carbenium ion rearrangements are a problem.[34,35]



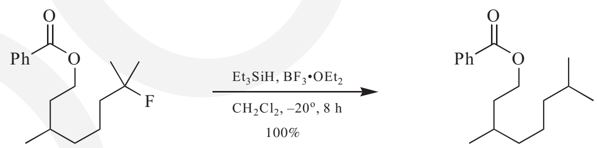


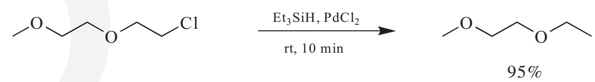


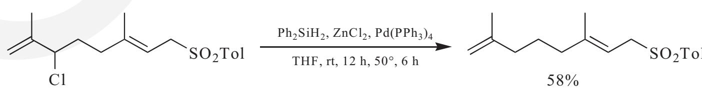
Trialkylsilanes, being better hydride donors, provide less rearranged product in these reductions than their dialkyl or monoalkyl counterparts.[35]

The reduction of organic halides with pentacoordinate hydridosilanes has been reported.[36]

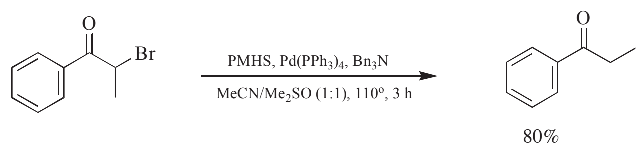
Tertiary alkyl fluorides can be reduced to the alkane in excellent yield.[37] β-Chloro ethyl ethers are cleanly reduced to the alkane.[38] An allyl chloride was reduced in the presence of an allylic tosylate.[39]



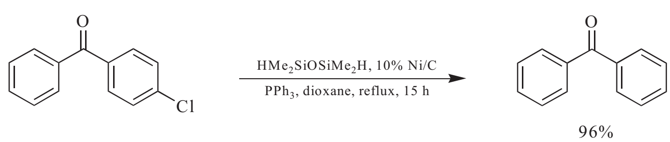


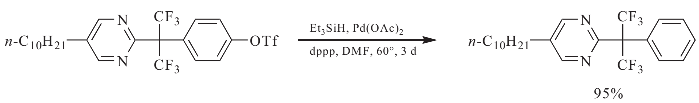


The reduction of α-halo ketones and α-halo esters has been reported to occur with the combinations of $PhSiH_3/Mo(CO)_6$,[40] $Ph_2SiH_2/ZnCl_2/(PPh_3)_4Pd$,[40] and $Et_3SiH/PdCl_2$[38] with the first of these proving to be the best. 2-Bromopropiophenone was reduced to propiophenone with polymethylhydrogensiloxane, PMHS, without reduction of the carbonyl.[41]



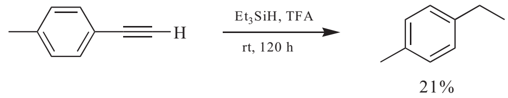
The tetramethyldisiloxane reduction of an aryl chloride in the presence of a benzophenone moiety was carried out in high yield.[42] The high-yield reduction of an aryl triflate has been reported.[43]



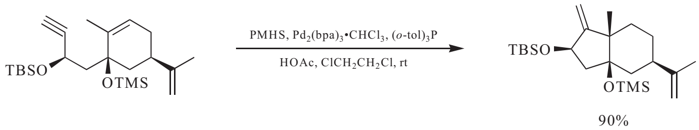


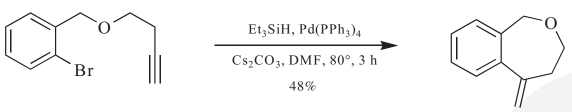
Silane Reduction of Alkynes

The reduction of *p*-tolylacetylene with triethylsilane gave *p*-ethyltoluene although in low yield.[44]



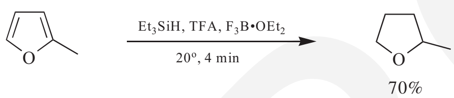
Most of the alkyne reductions have been carried out on suitable enynes, diynes, or bromo acetylene derivatives to produce cyclic products.[45-47]

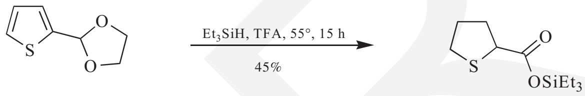




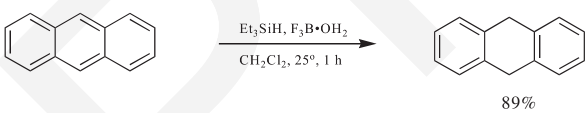
Silane Reduction of Aromatics

Furans are reduced to tetrahydrofurans with triethylsilane under suitable catalysis.[48] Thiophenes can be similarly reduced.[49]

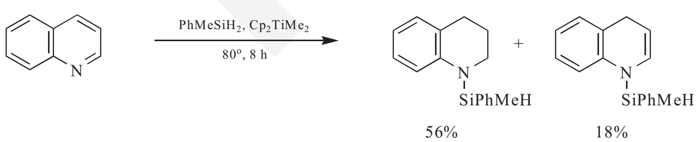




Anthracene was reduced to 9,10-dihydroanthracene in good yield with triethylsilane and boron trifluoride hydrate.[50] The partial reduction of other polyaromatics was reported.[50]

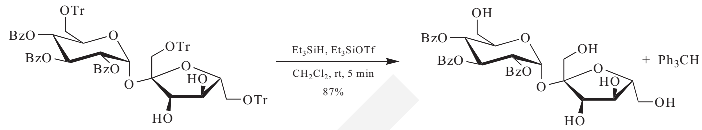


The pyridine ring of quinoline was reduced in preference to the benzene ring. The isolated product was the N-silylated derivative. Some of the dihydroreduction product was also observed.[51,52]

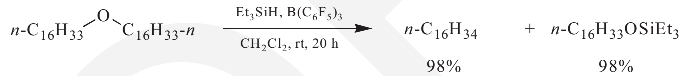


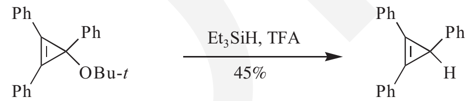
Silane Reduction of Ethers

Trityl ethers are readily removed as triphenylmethane with triethylsilane and triethylsilyltriflate as the catalyst.[53]



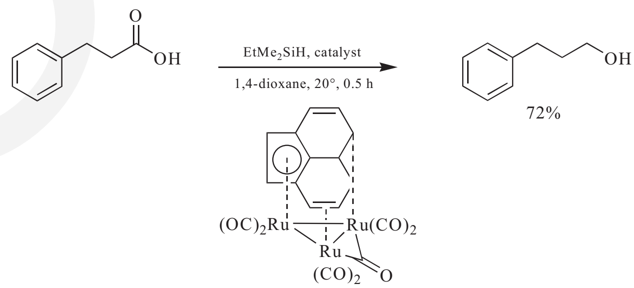
Under the influence of the strong Lewis acid, tris(pentafluorophenyl)borane, dialkyl ethers were cleaved in high yield.[54] A tertiarybutylcyclopropenyl ether was reduced to give the cyclopropene.[55]

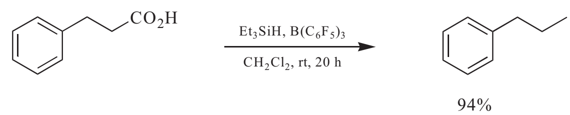




Silane Reduction of Carboxylic Acids

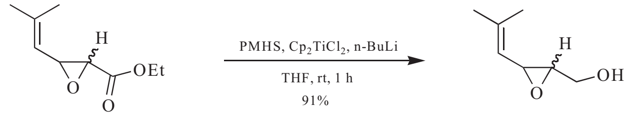
Ethyldimethylsilane and a ruthenium catalyst were used to reduce aliphatic carboxylic acids to the corresponding alcohol.[56] With tris(pentafluorophenyl)borane as catalyst, triethylsilane reduces carboxylic acids to the alkane.[57,58]

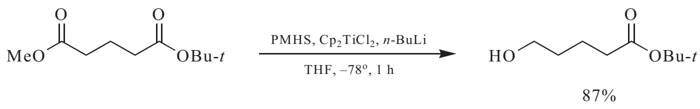


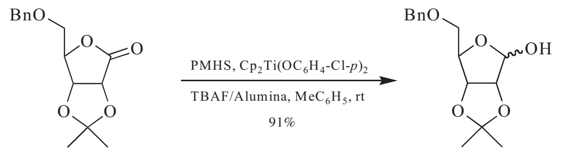


Silane Reduction of Esters and Lactones

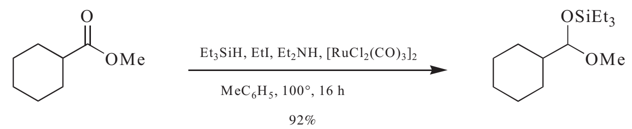
The reduction of esters and lactones has proven to be possible with the isolation of the corresponding alcohol, ether, hemiacetal, or monosilyl acetal. Thus, an ester was reduced to the alcohol in good yield in the presence of an epoxide.[59] A methyl ester was selectively reduced to the alcohol in the presence of a tert-butyl ester.[60] A butyrolactone was reduced to the tetrahydrofuran,[56] as well as to a hemiacetal.[56,61,62]

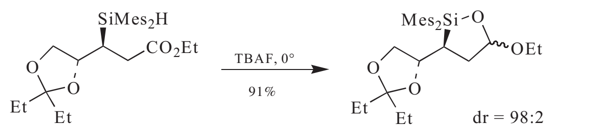




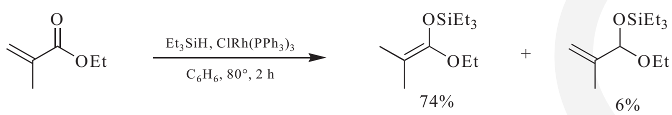


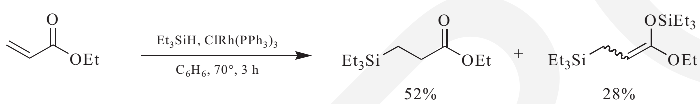
Both an intermolecular[63] and an intramolecular version of the conversion of an ester to a silyl acetal have been reported.[64,65]

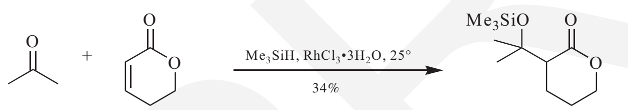


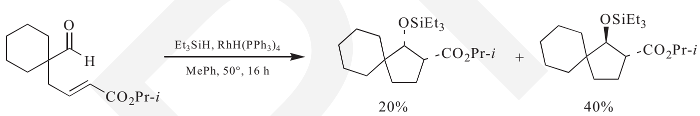


The reduction of α,β-unsaturated esters can occur with 1,4-adddition to provide the silyl ketene acetal or the β-silyl ester.[66] The intermediate silyl ketene acetal can be trapped with a suitable electrophile either in an intermolecular or intramolecular fashion.[67,68]



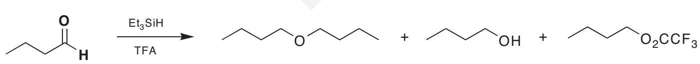


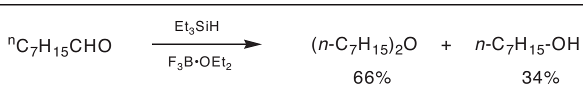


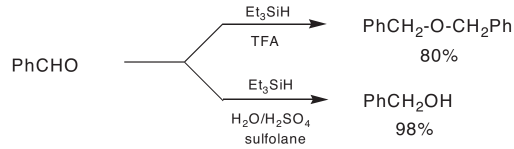


Silane Reduction of Aldehydes

The acid-catalyzed reduction of aldehydes with silanes works best in the presence of water.[69] In addition esters can be formed when an organic acid is the catalyst employed.[70]

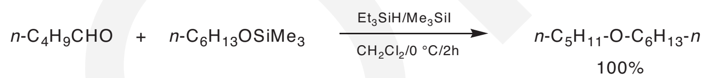




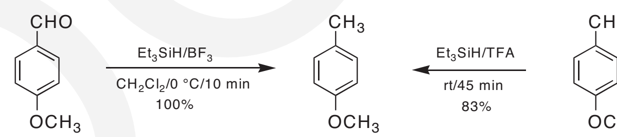


An excellent alternative for the reduction of aldehydes to alcohols is through the use of triethylsilane with uncomplexed boron trifluoride in dichloromethane.[71] This method gives the corresponding alcohol in high yield and very short reaction times.

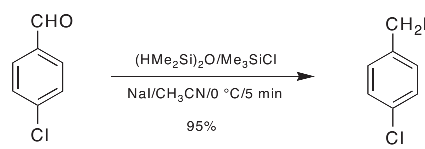
An extremely high-yield reductive conversion of aldehydes to unsymmetrical ethers involves the reaction of the aldehyde with a trimethylsilyl ether in the presence of a silane and a strong Lewis acid, with trimethylsilyl triflate being especially efficient.[72] Such silicon-based reductive-condensation chemistry should be applicable to combinatorial chemistry where product isolation is a crucial issue.



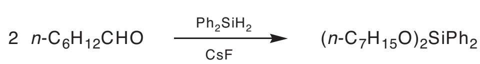
Aromatic aldehydes can be fully reduced to the corresponding toluene derivative.[71,73]



The conversion of aromatic aldehydes to benzylic halides has also been shown.[74-76] The best reducing agent for this seems to be tetramethyldisiloxane.

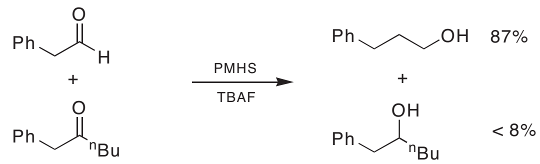


Under catalysis by fluoride ion aldehydes are reduced to the corresponding silyl ether of the alcohol. Hydrolysis of the silyl ethers provides the unprotected alcohols. Cesium fluoride has been shown to be an excellent promoter for these conversions,[77,78] as have tetra-n-butyl ammonium fluoride (TBAF) and tris(diethylamino) sulfonium difluorotrimethylsilicate (TASF).[79] This can also be used as a route to trimethylsilyl-protected alcohols from aldehydes.

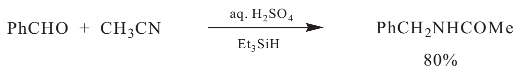


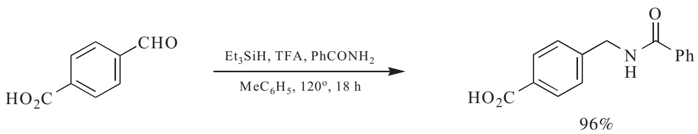
The reduction of aldehydes to alcohols has also been carried out with polylmethylhydrogensiloxane (PMHS) as the hydride source. In this case, the work-up includes reaction with methanol to release the free alcohol.[80]

The selective reduction of aldehydes over ketones can be realized with polymethylhydrogensiloxane as the reducing agent with fluoride ion-catalysis.[81]

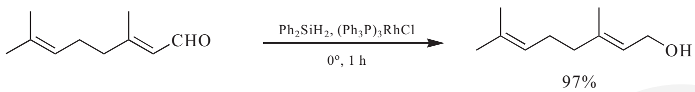


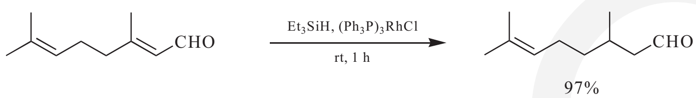
The reductive amidation of aldehydes proved possible via the acid-catalyzed triethylsilane reduction in the presence of a nitrile or a primary amide.[82,83]





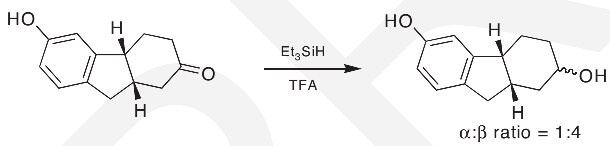
The reduction of α,β-unsaturated aldehydes can occur in a 1,2- or 1,4-fashion.[84]

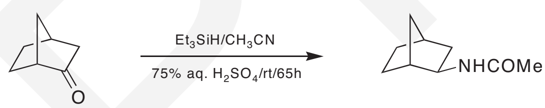




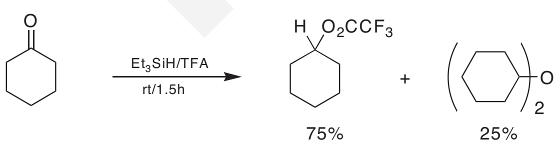
Silane Reduction of Ketones

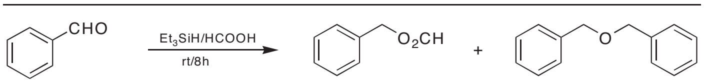
Silanes have been used for the reduction of ketones to alcohols with excellent results.[85] The reduction of ketones or aldehydes in the presence of acetonitrile and an acid provides an alkyl acetamide.[82] The comparable reduction of aldehydes to alkyl acetamides is also possible.[82]



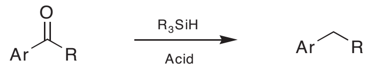


In a similar manner, the reduction of ketones and aldehydes to esters has been reported.[82] This reaction is always accompanied with the formation of the symmetrical ether.



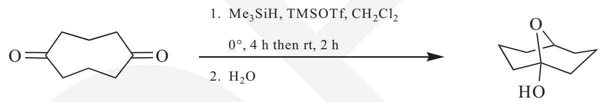


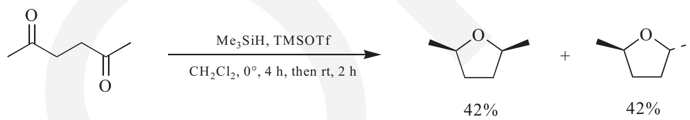
The reduction of aryl ketones (acetophenone derivatives) to the methylene is readily accomplished.[86] Triethylsilane with titanium tetrachloride works best for this transformation, though other systems also work well.

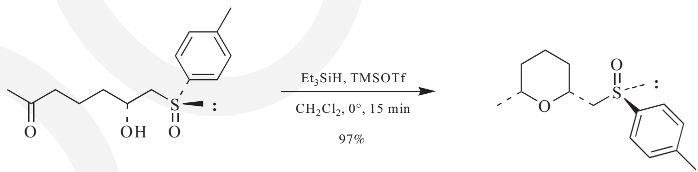


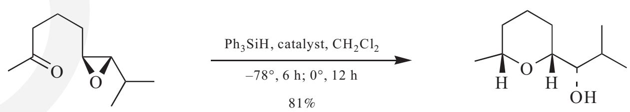
The selective reduction of aryl ketones to alcohols over dialkyl ketones can be carried out with phenyldimethylsilane in the presence of cuprous chloride or cuprous acetate.[87]

Cyclic ethers can be formed in the reduction of diketones or hydroxyketones.[88-90] Epoxy ketones can lead to ethers as well.[91]

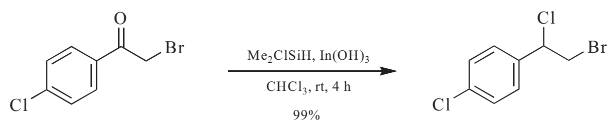


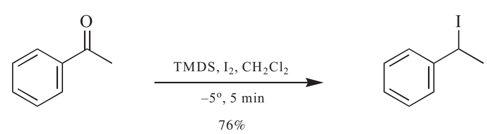


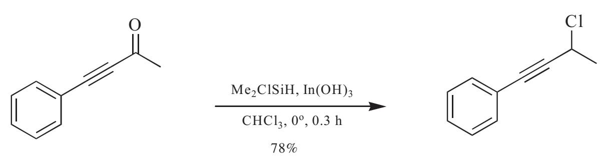




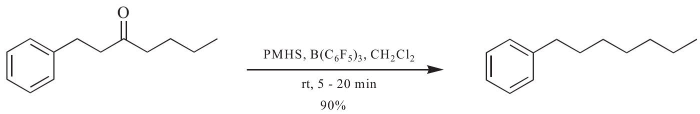
The reductive halogenation of ketones has been shown. Thus, acetophenone derivatives are converted to benzylic halides.[92,93] An ynone was converted to the propargyl chloride in good yield.[92]



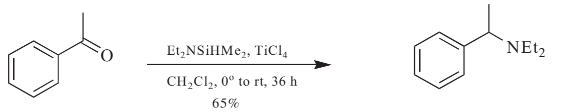




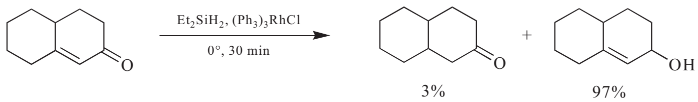
The reduction of aliphatic ketones to the methylene is best accomplished with the tris(pentafluorophenyl)borane catalyst.[94]

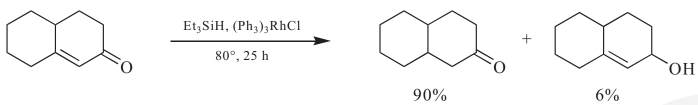


Dimethyl(diethylamino)silane served as the reducing agent and the amine source in the reductive amination of acetophenone.[95]

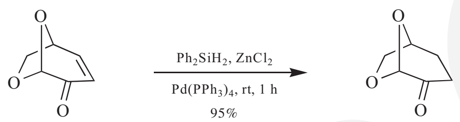


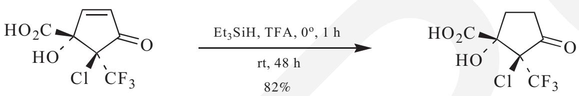
The reduction of α,β-unsaturated ketones can occur in a 1,2- or 1,4-fashion.[84]





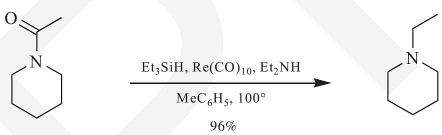
Some selectivity was seen in the reduction of an enone in the presence of a ketal[96] and an acid, allyl alcohol, and halide.[97]



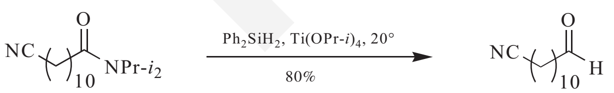


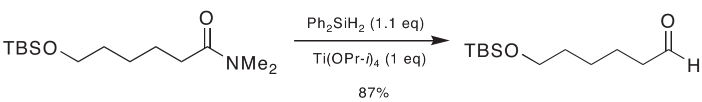
Silane Reduction of Other Carbonyl Systems

The reduction of amides to the amine has been shown to occur in high yields employing triethylsilane or diphenylsilane.[98,99]

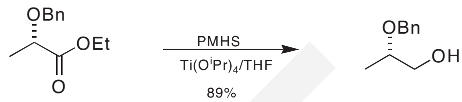


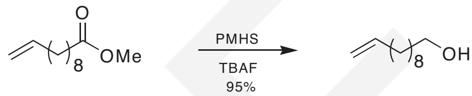
The one-pot reduction of amides to aldehydes with diphenylsilane has been reported.[99] This provides a potentially highly-useful, non-oxidative entry into aldehydes.



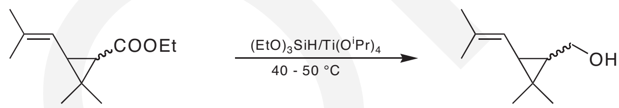


The reduction of acids and esters to alcohols with polymethylhydrogensiloxane occurs in good yields in the presence of titanium tetraisopropoxide[100] or tetrabutylammonium fluoride.[101] The reduction of esters has also been carried out with diphenylsilane and rhodium catalysis.[102]

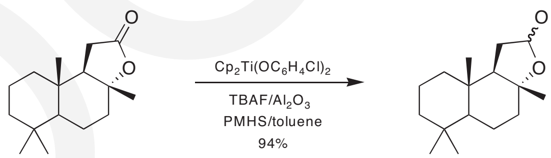




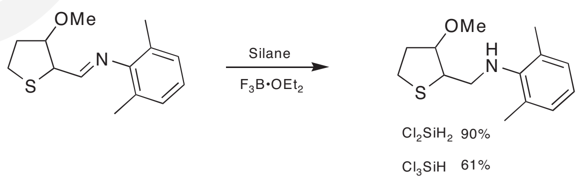
The triethoxysilane reduction of esters to alcohols in high yields is possible.[103] This transformation also takes place with PMHS as the reducing agent.[104,105]



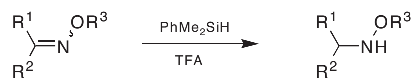
The conversion of lactones to lactols was accomplished via a titanium-catalyzed reduction with PMHS.[106]



The reduction of imines to amines with trichlorosilane and dichlorosilane was reported. Dichlorosilane gave the best results.[107]

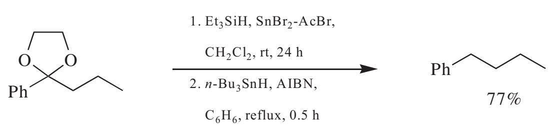


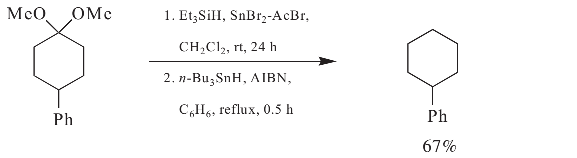
The reduction of oximes to alkoxyamines is accomplished with phenyldimethylsilane and trifluoroacetic acid.[108]



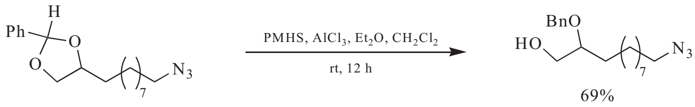
Silane Reduction of Acetals, Ketals and Aminals

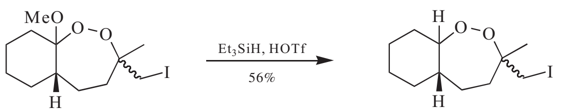
The silane reduction of acetals and ketals occurs readily in the presence of a variety of silanes and acid catalysts. Both arylalkyl and dialkyl ketals can be reduced to the methylene group.[107]

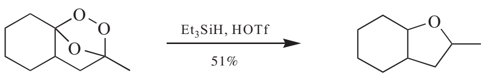




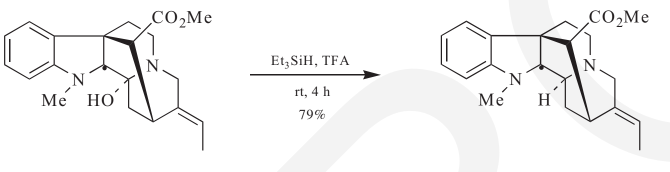
The reduction of the acetal of benzaldehyde was carried out in good yield in the presence of an alkyl azide.[109] The reduction of a peroxymethyl ketal occurred to give triethylmethoxysilane and keep the peroxide group as well as a primary alkyl iodide.[110] In another similar example the peroxide functionality was lost.[110]

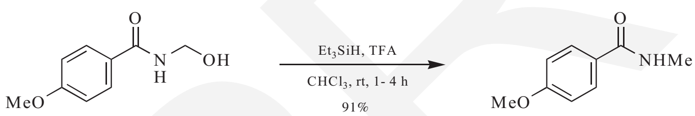


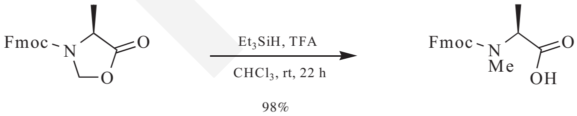




Aminals and hemiaminals are reduced to amines.[111] N-Trimethylsilyloxymethylimines can be reduced to the corresponding imine.[112] Related reactions are also possible.[113,114]

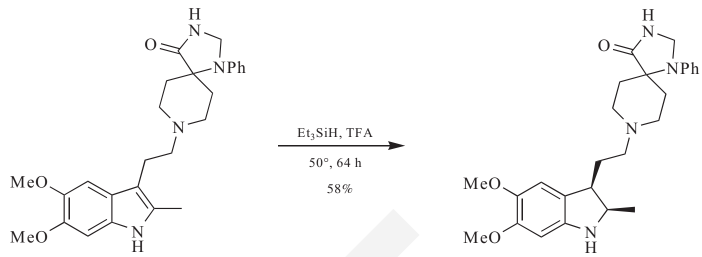


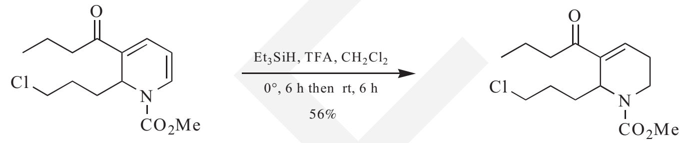




Silane Reduction of Enamines and Enamides

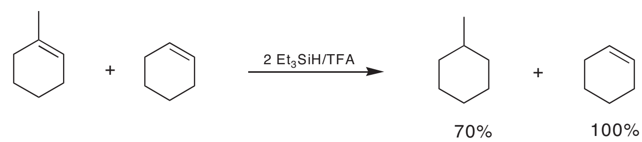
The organosilane reduction of enamines has been reported.[116] The reduction of enamides can be carried out selectively in the presence of enones.[117,118]



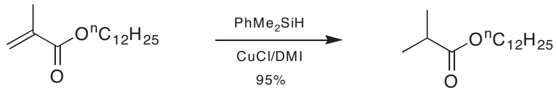


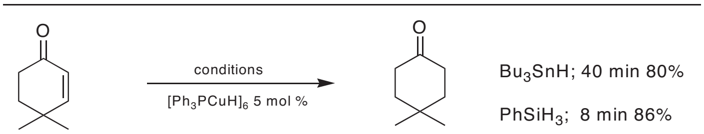
Silane Reduction of Olefins

Not surprisingly the ionic reduction of suitable olefins, i.e. those which can generate a relatively stable carbenium ion, can be carried out by silanes in the presence of an acid catalyst. The ability to generate the carbenium ion is essential to the success of the reaction. For example, 1-methylcyclohexene is readily reduced to methylcyclohexane whereas cyclohexene itself is not reduced under the same and even more forcing conditions.[118] The most common set of conditions for these reductions is an excess of trifluoroacetic acid, a strong acid with a conjugate base of low nucleophilicity, and triethylsilane.[119-123] Likewise, terminal olefins that are not styrenic in nature and 1,2-disubstituted olefins are not reduced with silanes, again, due to the inability to form a suitable carbenium ion intermediate. On the other hand, the reduction of enol ethers and similar olefins which can form good carbenium ions is possible.[122,124]

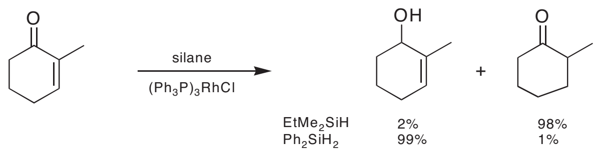


The reduction of α,β-unsaturated carbonyls to their saturated counterparts is conveniently carried out with silanes in the presence of a rhodium or copper catalyst.[125,126]

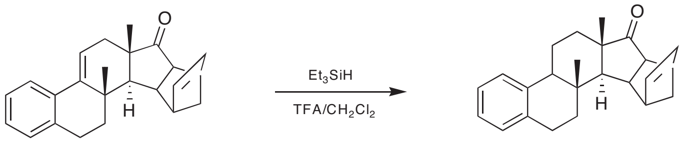


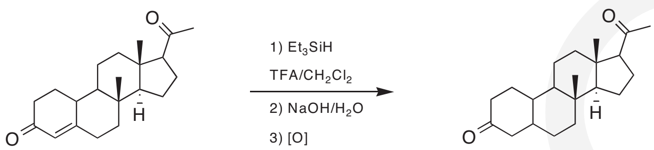


Ojima and Kogure[84] have shown that the reduction of α,β-unsaturated ketones or aldehydes with triethylsilane or ethyldimethylsilane gives 1,4-addition resulting in reduction of the double bond whereas diphenylsilane gives 1,2-addition and straight reduction of the carbonyl.

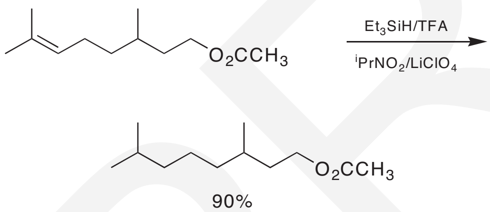


An example of the reduction of a styrenic double bond in the presence of another double bond and a ketone is shown below.[127] The double bond of an α,β-unsaturated ketone was reduced with the triethylsilane/acid combination, though regeneration of the ketones was necessary.[128]

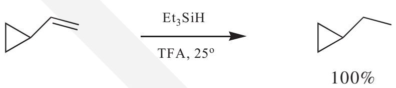


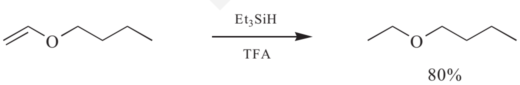


The reduction of a trisubstituted olefin in the presence of an ester was shown.[129]



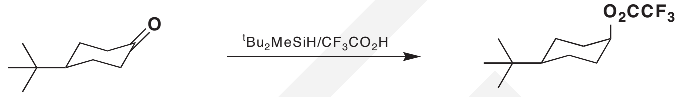
The silane reduction of acetylenes to alkanes is not a practical approach to this transformation.[130] The reduction of vinylcyclopropane gave ethylcyclopropane in quantitative yield.[131] Vinyl ethers are reduced to the corresponding alkyl ether.[132]

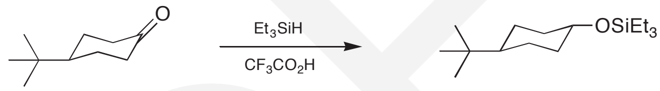




Stereoselective Silane-Based Reductions

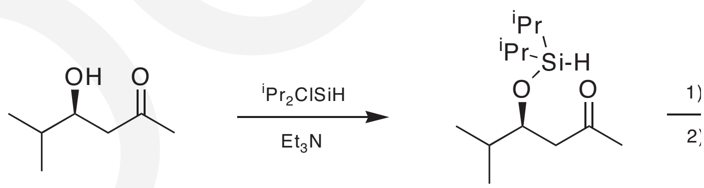
Doyle and West[133] demonstrated that the acid-catalyzed reduction of alkyl-substituted cyclohexanones with di-tert-butylsilane, di-tert-butylmethylsilane and tri-tert-butylsilane proceeds with predominant formation of the less stable isomer as the trifluoroacetate. For example, 4-tert-butylcyclohexanone gives 67% of the *cis*-4-tert-butylcyclohexyl trifluoroacetate.



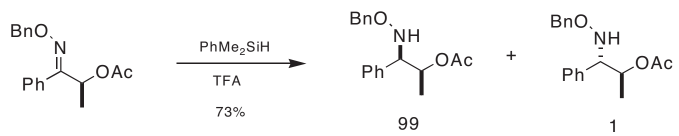


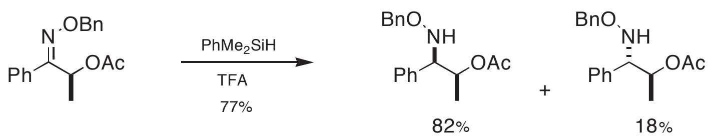
The reduction of 4-tert-butylcyclohexanone with triethylsilane or dimethylphenylsilane preferentially gives the trans product. Very high trans to cis stereoselectivity of this transformation with triethoxysilane and TBAF was reported as was the reduction of 3-phenyl-2-butanone to anti 3-phenyl-2-butanol.[134]

The stereoselective silane reduction of β-hydroxy ketones with diisopropylchlorosilane has been demonstrated.[135-137]

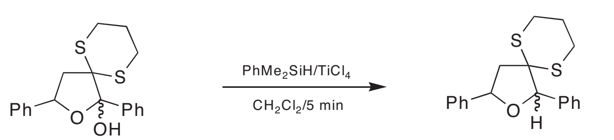


The highly diastereoselective reduction of oximes has been reported.[108] The diastereoselectivity was much higher than that reported for the corresponding reduction with lithium aluminum hydride in diethyl ether.





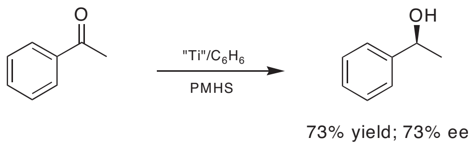
The Lewis acid-catalyzed triphenylsilane reduction of hemiketals was shown to occur with high stereoselectivity.[140]



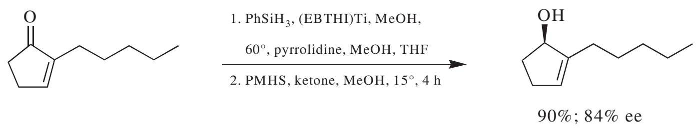
cis:trans = 82:1

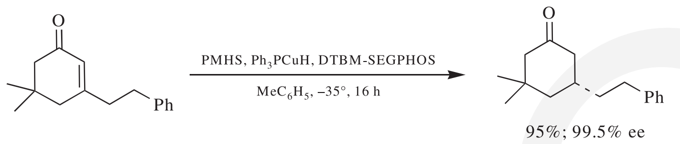
Asymmetric silane reductions

A very efficient asymmetric reduction of arylalkyl ketones has been shown. The reaction, which does not work well for prochiral dialkyl ketones, is carried out with PMHS in the presence of a chiral titanium catalyst.[138]

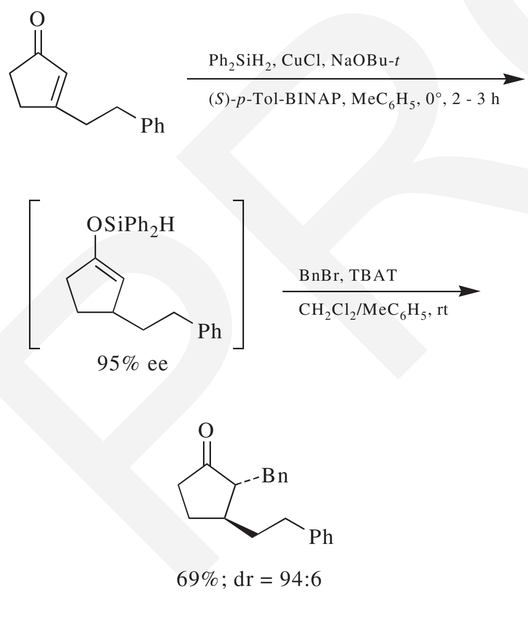


A number of asymmetric, silane-based reductions have been reported. In many cases these result in very high enantioselectivity and offer an alternative to the asymmetric hydrogenation protocol. Enones have been reduced in a 1,2-fashion, as well as in a 1,4-manner, with high ee values.[141,142]

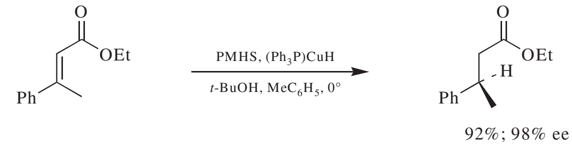


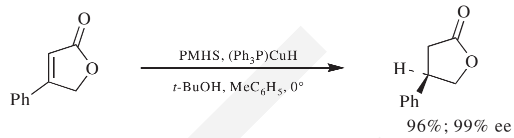


The intermediate enol silyl ether from the reduction of an enone can be trapped with benzyl bromide.[143]

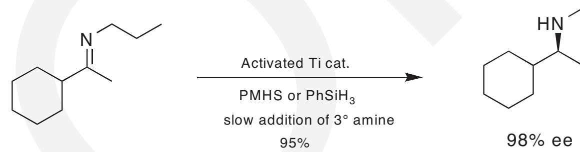


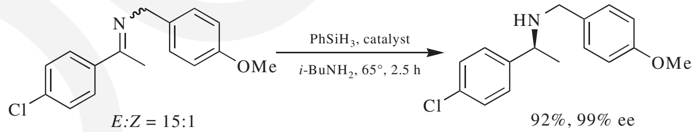
The DTBM-SEGPHOS-catalyzed PMHS reduction of α,β-unsaturated esters provides the saturated ester in high enantiomeric excess.[144]





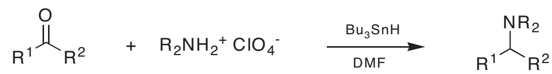
Buchwald and coworkers[139] have reported the reduction of imines in very high enantiomeric excess through the use of a titanium catalyst activated with phenylsilane and the reduction with polymethylhydrogen siloxane or phenylsilane. The asymmetric reduction of imines has been reported in very high enantiomeric excesses.[139,145-147]



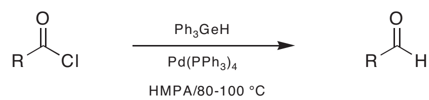


Reductions With Other Group 14 Hydrides

The tri-n-butyltin hydride reductions are well-known and have been reviewed.[148] A recent report shows that tri-n-butyltin hydride can provide the hydrogen for the reductive amination of ketones and aldehydes, thus providing an alternative to sodium cyanoborohydride for this transformation.[149] This same transformation was reported using polymethylhydrogen siloxane, PMHS, as the reducing agent.[150]



Triphenylgermane has been shown to reduce acid chlorides to aldehydes with palladium(0) catalysis.[151]



Tri-n-butylgermane has been employed in the reductive alkylation of active olefins, in particular acrylonitrile.[152]

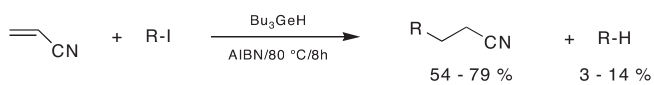


Table 3
Tri-Substituted Silane Reducing Agents

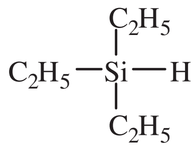
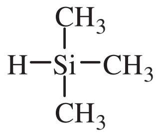
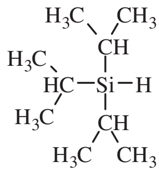
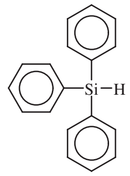
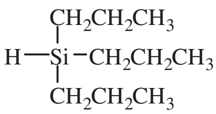
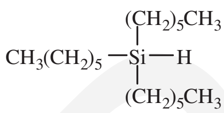
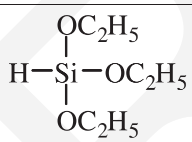
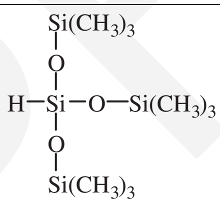
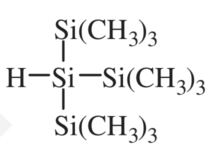
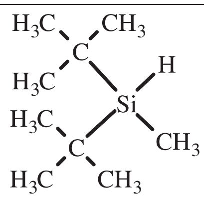
Reducing Agent	Structure	Comments	Pricing
SIT8330.0 TRIETHYLSILANE [617-86-7] TSCA		Used to reduce metal salts.[153] Enhances deprotection of t-butoxycarbonyl-protected amines and tert-butylesters.[154] Used in the reductive amidation of oxazolidinones with amino acids to provide dipeptides.[155] Converts aldehydes to symmetrical and unsymmetrical ethers.[156] Used in the 'in-situ' preparation of diborane and haloboranes.[157]	25g ¥6,500 250g ¥32,300 2.5kg inquire
SIT8570.0 TRIMETHYLSILANE [993-07-7] TSCA		Potential reducing agent that will produce low boiling hexamethyldisiloxane by-product. in cylinder	100g inquire 1kg inquire
SIT8385.0 TRIISOPROPYLSILANE [6485-79-6]		Very sterically-hindered silane. Used as a cation scavenger in the deprotection of peptides.[158]	25g ¥10,000 100g ¥22,600 1.5kg inquire
SIT8665.0 TRIPHENYLSILANE [789-25-3] TSCA		More effective radical-based reagent for reduction of organic halides than the trialkylsilanes.[156] Compares well with tri-n-butyltin hydride in reduction of enones to ketones.[63] Shows good selectivity in the reduction of cyclic hemiacetals.[77] Converts O-acetyl furanoses and pyranoses to deoxy sugars.[159]	25g ¥17,200 100g ¥55,400 2kg inquire
SIT8709.0 TRI-n-PROPYLSILANE [998-29-8] TSCA		Reactivity similar to that of triethylsilane.	10g ¥13,000 50g ¥34,500
SIT8376.0 TRI-n-HEXYLSILANE [2929-52-4] TSCA		Reactivity similar to that of triethylsilane but has higher boiling point and produces a higher boiling by-product.	25g ¥19,900 100g ¥57,000
SIT8185.0 TRIETHOXYSILANE [998-30-1]		Reduces esters in the presence of zinc hydride catalyst.[52] Reduces aldehydes and ketones to alcohols via the silyl ethers in presence of fluoride ion.[160] Gives 1,2-reduction of enones to allyl alcohols.[161]	25g ¥11,900 100g ¥31,000 2kg inquire
SIT8721.0 TRIS(TRIMETHYLSILOXY) SILANE [1873-89-8]		Gives highly stereoselective reduction of substituted cyclohexanones.[51]	25g ¥14,100 100g ¥37,900 2kg inquire
SIT8724.0 TRIS(TRIMETHYLSILYL) SILANE [1873-77-4]		Undergoes exothermic decomposition at >100 °C. Radical-based reducing agent for organic halides, selenides, xanthates and isocyanides and ketones in high yields.[20] Can provide complementary stereoselectivity to tri-n-butyltin hydride in the reduction of gem dihalides.[162] Mild reducing agent in nucleoside chemistry.[163]	2.5g ¥11,900 10g ¥31,000
SID3258.0 DI-tert-BUTYLMETHYLSI- LANE [56310-20-4]		Used in reductive trifluoroacetolysis of ketones. Reacts faster than di-tert-butylsilane.[72]	10g ¥25,200

Table 3 *(continued)*

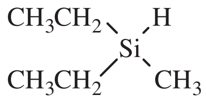
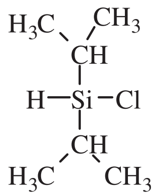
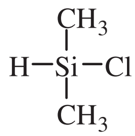
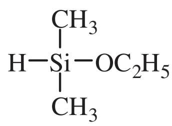
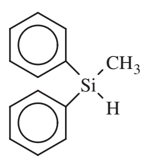
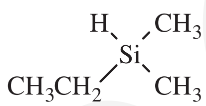
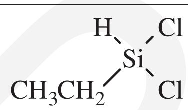
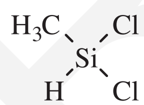
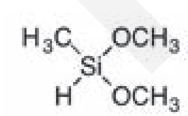
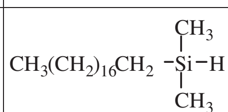
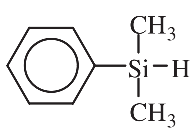
SID3410.0 DIETHYLMETHYLSILANE [760-32-7] TSCA		Similar to triethylsilane with lower boiling point.	25g ¥13,500 100g ¥36,300
SID3535.0 DIISOPROPYLCHLOROSI-LANE [2227-29-4] TSCA		Used in a silylation-reduction-allylation sequence of β-hydroxy esters to homoallylic-substituted 1,3-diols.[164] Used in the silylation-hydrosilation-oxidation of allyl alcohols to 1,3-diols.[165] Reaction carried out in diastereoselective manner. Reduces β-hydroxy ketones to anti-1,3 diols.[166]	5g ¥14,100 25g ¥45,900 2kg inquire
SID4070.0 DIMETHYLCHLOROSILANE [1066-35-9] TSCA		Will form high-boiling polymeric by-products with aqueous work-up.	25g ¥4,900 500g ¥30,700 750g inquire
SID4125.0 DIMETHYLETHOXYSILANE [14857-34-2] TSCA		Will form high-boiling polymeric by-products with aqueous work-up.	25g ¥13,000 100g ¥34,200 2.5kg inquire
SID4555.0 DIPHENYLMETHYLSILANE [776-76-1] TSCA		Used to reduce α-alkoxy ketones to diols and α-amino ketones to aminoethanols with high stereoselectivity.[167]	25g ¥14,100 100g ¥37,900 2kg inquire
SIE4894.0 ETHYLDIMETHYLSILANE [758-21-4] TSCA		Similar to triethylsilane with lower boiling point.	10g ¥20,400
SIE4890.0 ETHYLDICHLOROSILANE [1789-58-8] TSCA		Will form high-boiling polymeric by-products with aqueous work-up.	25g ¥24,100 100g ¥70,800 2kg inquire
SIM6504.0 METHYLDICHLOROSILANE [75-54-7] TSCA		Provides better diastereoselective reductive aldol reaction between an aldehyde and an acrylate ester than other silanes.[168] Forms high-boiling polymeric by-products upon aqueous work-up.	25g ¥4,300 750g ¥78,000 2kg inquire 20kg inquire
SIM6506.0 METHYLDIETHOXYSILANE [2031-62-1] TSCA		Will form high-boiling polymeric by-products with aqueous work-up.	25g ¥11,400 100g ¥37,900
SIO6619.0 OCTADECYLDIMETHYLSI-LANE [32395-58-7]		Similar to triethylsilane with much higher boiling point.	5g ¥15,100 25g ¥50,700
SIP6729.0 PHENYLDIMETHYLSILANE [766-77-8] TSCA		Used to reduce α-amino ketones to aminoethanols with high stereoselectivity.[167] Used in the fluoride ion-catalyzed reduction of aldehydes and ketones, and α-substituted alkanones to threo products.[42] Erythro reduction of a-substituted alkanones to diols and aminoethanols.[169] Together with CuCl reduces aryl ketones, but not dialkyl ketones.[170] Used in the silylformylation of acetylenes.[171] Excellent reducing agent for the reduction of enones to saturated ketones.[172] Shows better selectivity than LAH in the reduction of oximes to alkoxyamines.[57]	25g ¥14,600 100g ¥39,500 2kg inquire

Table 3 *(continued)*

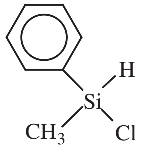
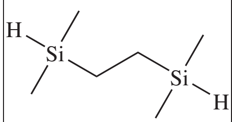
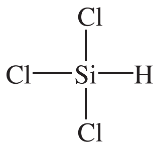
SIP6737.0 PHENYLMETHYLCHLO- ROSILANE [1631-82-9] TSCA		Will form high-boiling polymeric by-products with aqueous work-up.	10g ¥20,400 50g ¥71,300
SIT7537.0 1,1,4,4-TETRAMETHYL-1,4- DISILABUTANE		Contains two available hydrides for reduction. Has potential for stereoselective reduction of dicarbonyls.	5g ¥15,100
SIT8155.0 TRICHLOROSILANE [10025-78-2] TSCA		Will form high-boiling polymeric by-products with aqueous work-up. Reduces aromatic carbonyl systems to give benzyltrichlorosilanes, which can be desilylated to toluenes.[173-175] Reduces phosphine oxides to phosphines.[176] Cylinder packaging recommended	25g inquire 2kg inquire 20kg inquire

Table 4
Dialkylsilyl Reducing Agents

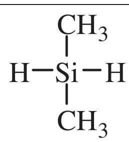
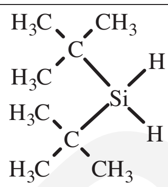
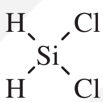
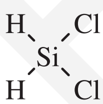
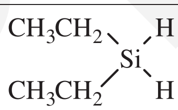
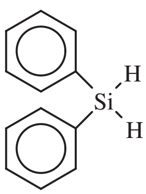
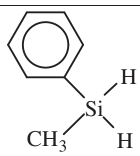
Reducing Agent	Structure	Comments	Pricing
SID4230.0 DIMETHYLSILANE [1111-74-6] TSCA		Very low boiling point silane that is a gas at atmospheric conditions. includes gas cylinder	50g inquire
SID3342.0 DI-tert-BUTYLSILANE [30736-07-3]		Sterically-hindered silane reducing agent.	5g ¥19,400
SID3368.0 DICHLOROSILANE [4109-96-0] TSCA		Gives improved yields in reduction of imines over that of trichlorosilane.[56] includes gas cylinder	250g inquire 2kg inquire
SID3368.2 DICHLOROSILANE, 25% in xylene [4109-96-0] TSCA		Easier to handle form of dichlorosilane. includes gas cylinder	400g inquire 2kg inquire
SID3415.0 DIETHYLSILANE [542-91-6] TSCA		Used in the 'in-situ' preparation of diborane and haloboranes.[157]	10g ¥15,100 50g ¥50,100 2kg inquire
SID4559.0 DIPHENYLSILANE [775-12-2] TSCA		Used in the preparation of silyl-substituted alkylidene complexes of tantalum.[177] Used in the ionic reduction of enones to saturated ketones.[178] Used in the reductive cyclization of unsaturated ketones.[179,180] Reduces esters in the presence of zinc hydride catalyst.[53] Reduces α-halo ketones in presence of Mo(0).[181] Reduces thio esters to ethers.[22] Reduces esters to alcohols with Rh catalysis.[49] Employed in the asymmetric reduction of methyl ketones[114] and other ketones.[182,183] Reductively cleaves allyl acetates.[184]	25g ¥19,400 100g ¥55,200 2kg inquire
SIP6742.0 PHENYLMETHYLSILANE [766-08-5] TSCA		Used in the preparation of silyl-substituted alkylidene complexes of tantalum.[177]	10g ¥15,100 50g ¥50,100 2kg inquire

Table 5
Mono-Substituted Silane Reducing Agents

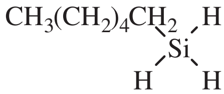
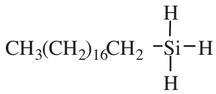
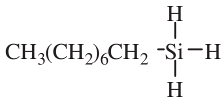
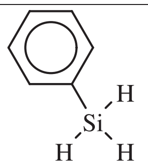
Reducing Agent	Structure	Comments	Pricing
SIH6166.2 n-HEXYLSILANE [1072-14-6] TSCA			10g ¥22,000 50g ¥77,700
SIO6635.0 n-OCTADECYLSILANE [18623-11-5] TSCA			25g ¥15,600 100g ¥43,200
SIO6712.5 n-OCTYLSILANE [871-92-1] TSCA			10g ¥17,800 50g ¥60,700 1.5kg inquire
SIP6750.0 PHENYLSILANE [694-53-1] TSCA		Employed in the reduction of esters to ethers.[185] Reduces α,β-unsaturated ketones to saturated ketones in the presence of tri-n-butyltin hydride.[186] Reduces tin amides to tin hydrides.[187] Used in the tin-catalyzed reduction of nitroalkanes to alkanes.[188] Reduces α-halo ketones in presence of Mo(0).[181]	5g ¥14,600 25g ¥48,000 2kg inquire

Table 6
Siloxane-Based Silane Reducing Agents

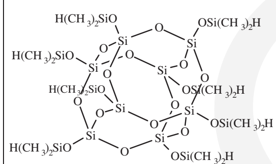
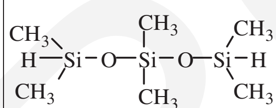
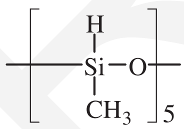
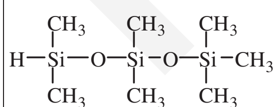
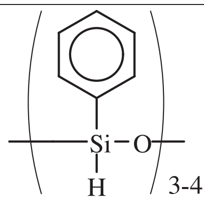
Reducing Agent	Structure	Comments	Pricing
SIO6696.5 OCTAKIS-(DIMETHYLSILOXY)-T8-SILSESQUIOXANE [125756-69-6]		Solid siloxane reducing agent. Offers 8 Si-H bonds. Potential for easy removal of silicon by-products.	2.5g ¥13,800 10g ¥36,900
SIH6117.0 1,1,3,3,5,5-HEXAMETHYL TRISILOXANE [1189-93-1] TSCA		High molecular weight silane reducing agent.	10g ¥8,500 50g ¥23,600 2kg inquire
SIP6718.0 PENTAMETHYLCYCLOPEN-TASILOXANE, 90% [6166-86-5] TSCA			25g ¥13,800 100g ¥36,900 2kg inquire
SIH5844.0 HEPTAMETHYLTRISILOX-ANE [2895-07-0]			10g ¥31,000
SIP6736.5 PHENYLHYDRO-CYCLOSI-LOXANES, contains linears.		High-boiling siloxane reducing agent.	5g ¥19,400 25g ¥67,100

Table 6 *(continued)*

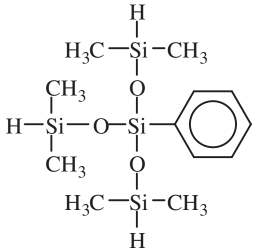
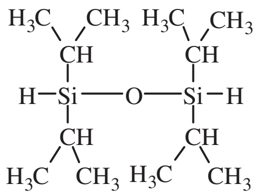
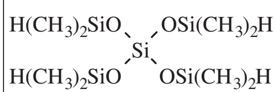
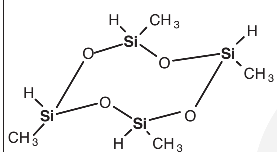
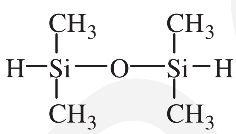
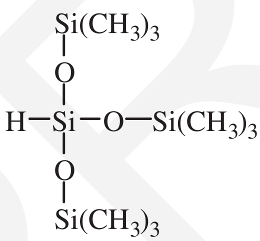
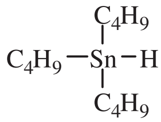
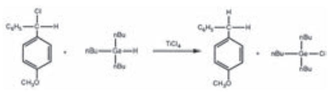
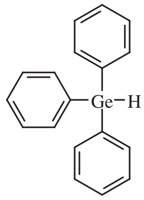
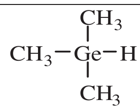
SIP6826.0 PHENYLTRIS(DIMETHYLSILOXY)SILANE, 95% [18027-45-7] TSCA		High molecular weight silane reducing agent.	25g ¥13,000 100g ¥35,000 2kg inquire
SIT7274.0 1,1,3,3-TETRAISOPROPYL-DISILOXANE [18043-71-5]		Sterically-hindered silane reducing agent with potential for diastereoselective reductions.	5g ¥14,600 25g ¥46,900 2kg inquire
SIT7278.0 TETRAKIS(DIMETHYLSILOXY)SILANE [17082-47-2] TSCA		High molecular weight silane reducing agent.	25g ¥14,100 100g ¥37,900
SIT7530.0 1,3,5,7-TETRAMETHYL-CYCLO-TETRASILOXANE [2370-88-9] TSCA		High molecular weight silane reducing agent.	25g ¥13,100 100g ¥34,600 3kg inquire
SIT7546.0 1,1,3,3-TETRAMETHYL-DISILOXANE [30110-74-8] TSCA		Reduces aromatic aldehydes to benzyl halides.[38] Used in the reductive halogenation of aldehydes and epoxides.[189]	25g ¥4,300 250g ¥21,500 1.5kg inquire
SIT8721.0 TRIS(TRIMETHYLSILOXY)-SILANE [1873-89-8]		High molecular weight silane reducing agent.	25g ¥14,100 100g ¥37,900 2kg inquire
METHYLHYDROSILOXANE-DIMETHYLSILOXANE COPOLYMERS HMS-013 through HMS-501 having various MW's, viscosities, and hydride content. [68037-59-2] TSCA		Potential reducing agents in the mode of HMS-991 or HMS-992.	100g ¥8,500-20,400
HMS-991 or HMS-992 POLYMETHYL-HYDROSILOXANE [63148-57-2] TSCA		Reduces lactones to lactols.[55] Reduces aldehydes, ketones, esters, lactones, triglycerides and epoxides to alcohols with zinc hydride catalysis.[52] With titanium tetraisopropoxide catalysis, carries out reductive amination of ketones and aldehydes[82] and the reduction of acids or esters to 1° alcohols.[50] With TBAF catalysis, selectively reduces aldehydes over ketones.[43] Used to generate tri-n-butyltin hydride 'in-situ' and in a one-pot hydrostannylation/Stille coupling sequence.[190] Reduces esters to alcohols.[54]	HMS-991 100g ¥7,700 3kg ¥40,600 HMS-992 100g ¥8,500 3kg ¥47,000

Table 7
Germanium And Tin-Based Reducing Agents

Reducing Agent	Structure	Comments	Pricing
SNT8130 TRI-n-BUTYLTIN HYDRIDE [688-73-3] TSCA		Has been reviewed.[80] Catalyzes the Si-H reduction of a,β-unsaturated ketones.[186] Useful in the reductive amination of ketones and aldehydes to form 3° amines.[81]	10g ¥9,300 250g ¥23,500 50g inquire 1kg inquire 3kg inquire
GET8100 TRI-n-BUTYLGERMANE [998-39-0]		Reduces acid chlorides to aldehydes in presence of Pd(0).[83] Effects free-radical reductive addition of alkyl halides to olefins.[191] Reduces benzylic chlorides 70x faster than silyl hydrides.[192]	2.5g ¥23,500 10g ¥66,300
GET8660 TRIPHENYLGERMANE [2816-43-5]		Readily adds to terminal acetylenes and olefins.[193] Used in the reductive alkylation of acrylonitrile and enones.[84]	2.5g ¥21,500 10g ¥59,500
GET8560 TRIMETHYLGERMANE [1449-63-4]		Effects halogen displacement of alkyl halides with hydrogen when exposed to UV.[194]	2.5g ¥33,500 10g ¥99,000

REFERENCES

1. Arkles, B., Silanes, In *The Kirk Othmer Encyclopedia of Chemical Technology*, 4th Ed., Kroschwitz, J. I., Howe-Grant, M., Eds.; Wiley: New York, 1997, Vol. 22, p38.
2. Lalonde, M.; Chan, T. H. *Synthesis*, **1985**, 817.
3. Nelson, T. D.; Crouch, R. D. *Synthesis*, **1996**, 1031.
4. "Silicon-Based Blocking Agents", Larson, G. L. Ed.; Gelest, Inc. 1999.
5. Walsh, R. *Acc. Chem. Res.*, **1981**, *14*, 246. Walsh, R. *Bond* Dissociation Energies in Organosilicon Compounds, In *Silicon, Germanium, Tin & Metal Alkoxides Diketonates and Carboxylates*, Arkles, B. Ed.; Gelest, Inc. 1998, pp 92-99.
6. Chatgilialoglu, C. *Chem. Rev*. **1995**, *95*, 1229.
7. Ding, L.; Marshall, P. *J. Am. Chem. Soc.* **1992**, *114*, 5754. Brook, M. A. "*Silicon in Organic, Organometallic, and Polymer Chemistry*" John Wiley and Sons, Inc.: New York, 2000, pp 171-188.
8. Colvin, E. *Silicon in Organic Synthesis,* pp 325-336, Butterworths, New York, 1981.
9. Weber, W. P. *Silicon Reagents for Organic Synthesis*, Springer-Verlag, New York, 1983, pp 288-297.
10. Kursanov, D. N.; Parnes, Z. N. *Russ. Chem. Rev*. (Engl. Transl.) **1969**, *38*, 812.
11. Kursanov, D. N.; Parnes, Z. N.; Loim, N.M. *Synthesis*, **1974**, 633.
12. Kursanov, D.N. et al. *Ionic Hydrogenation and Related Reactions*; Harwood Academic Publishers, Chur, Switzerland, 1985.
13. Nagai, Y. Org. Prep. Proced. Int. **1980**, *12*, 13.
14. Larson, G. L.; Fry, J. L. "*Ionic and Organometallic-Catalyzed Organosilane Reductions*", Denmark, S. E. Ed.; John Wiley and Sons, **2008**, *71*, 1-737.
15. Chatgilialoglu, C.; Ferreri, C.; Gimisis, T. *Tris(trimethylsilyl) silane in Organic Synthesis*, In The *Chemistry of Organic Silicon Compounds*, Rappoport, Z.; Apeloig, Y. Eds., Wiley Chichester, 1998, Vol. 2 Chap. 25, p. 1539 ff.
16. Chatgilialoglu, C. *Acc. Chem. Res*. **1992**, *25*, 188.
17. Chatgilialoglu, C.; Griller, D.; Lesage, M. *J. Org. Chem.* **1988**, *53*, 3641.
18. Chatgilialoglu, C.; Griller, D.; Lesage, M. *J. Org. Chem.* **1989**, *54*, 2492.
19. Sano, H.; Ogata, M.; Migita, T. *Chem. Lett.* **1986**, 77.
20. Gimisis, T. et al. *Tetrahedron Lett.* **1995**, *36*, 3897.
21. Ballestri, M. et al. *J. Org. Chem.* **1991**, *56*, 678.
22. Jang, D. O.; Song, S. H. *Synlett*. **2000**, 811.
23. Carey, F. A.; Tremper, H. S. *J. Am. Chem. Soc.* **1968**, *90*, 2578.
24. Carey. F. A.; Tremper, H. S. *J. Org. Chem.* **1971**, *36*, 758.

25. Adlington, M. G.; Orfanopoulos, M.; Fry, J. L. *Tetrahedron Lett.* **1976**, 2955.

26. Fry, J. L. U.S. Patent 4,130,574, **1978**.

27. Fry, J. L. private communication.

28. Barclay, L. R. C.; Sonawane, H. R.; MacDonald, M. C. *Can. J. Chem.* **1972**, *50*, 281.

29. Baer, H. H.; Zamkanei, M. *J. Org. Chem.* **1988**, *53*, 4786.

30. Gevorgyan, V.; Rubin, M.; Benson, S.; Liu, J.-X.; Yamamoto, Y. *J. Org. Chem.* **2000**, *65*, 6179.

31. Orfanopoulos, M.; Smonou, I. *Synth. Commun.* **1988**, *18*, 833.

32. Hanaoka, M.; Yoshida, S.; Mukai, C. *Tetrahedron Lett.* **1985**, *26*, 5163.

33. Wustrow, D. J.; Smith, III, W. J.; Wise, L. D. *Tetrahedron Lett.* **1994**, *35*, 61.

34. Whitmore, F. C.; Pietrusza, E. W. Sommer, L. H. *J. Am. Chem. Soc.* **1947**, *69*, 2108.

35. Doyle, M. P. et al. *J. Organomet. Chem.* **1976**, *117*, 129.

36. Becker, B.; Corriu, R. J. P.; Guérin, C.; Henner, B.; Wang, Q. *J. Organomet. Chem.* **1989**, *359*, C33.

37. Hirano, K.; Fujita, K.; Yorimitsu, H.; Shinokubo, H.; Oshima, K. *Tetrahedron Lett.* **2004**, *45*, 2555.

38. Boukherroub, R.; Chatgilialoglu, C.; Manuel, G. *Organometallics* **1996**, *15*, 1508.

39. Keinan, E.; Greenspoon, N. *Israel J. Chem.* **1984**, *24*, 82.

40. Perez, D.; Greenspoon, N.; Keinan, E. *J. Org. Chem.* **1987**, *52*, 5570.

41. Pri-Bar, I.; Buchman, O. *J. Org. Chem.* **1986**, *51*, 734.

42. Lipshutz, B. H.; Tomioka, T.; Sato, K. *Synlett* **2001**, 970.

43. Kotsuki, H.; Datta, P. K.; Hayakawa, H.; Suenaga, H. *Synthesis* **1995**, 1348.

44. Zdanovich, V. I.; Kudryavtsev, R. V.; Kursanov, D. N. *Bull. Acad. Sci. USSR, Div. Chem. Sci. (Engl. Transl.)* **1970**, *19*, 427; *Chem. Abstr.* **1970**, *73*, 3550.

45. Trost, B. M.; Rise, F. *J. Am. Chem. Soc.* **1987**, *109*, 3161.

46. Trost, B. M.; Lee, D. C. *J. Am. Chem. Soc.* **1988**, *110*, 7255.

47. Oh, C. H.; Park, S. J. *Tetrahedron Lett.* **2003**, *44*, 3785.

48. Bolestova, G. I.; Parnes, Z. N.; Kursanov, D. N. *J. Org. Chem. USSR (Engl. Transl.)* **1979**, *15*, 1129; *Chem. Abstr.* **1979**, *91*, 140651.

49. Roy, G. *Synth. Commun.* **1983**, *13*, 459.

50. Larsen, J. W.; Chang, L. W. *J. Org. Chem.* **1979**, *44*, 1168.

51. Harrod, J. F.; Shu, R.; Woo, H.-G.; Samuel, E. *Can. J. Chem.* **2001**, *79*, 1075.

52. Hao, L.; Harrod, J. F.; Lebuis, A.-M.; Mu, Y.; Shu, R.; Samuel, E.; Woo, H.-G. *Angew. Chem.*, *Int. Ed. Engl.* **1998**, *37*, 3126.

53. Imagawa, H.; Tsuchihashi, T.; Singh, R. K.; Yamamoto, H.; Sugihara, T.; Nishizawa, M. *Org. Lett.* **2003**, *5*, 153.

54. Gevorgyan, V.; Rubin, M.; Benson, S.; Liu, J.-X.; Yamamoto, Y. *J. Org. Chem.* **2000**, *65*, 6179.

55. Harvey, J. A.; Ogliaruso, M. A. *J. Org. Chem.* **1976**, *41*, 3374.

56. Matsubara, K.; Iura, T.; Maki, T.; Nagashima, H. J. *J. Org. Chem.* **2002**, *67*, 4985.

57. Bajracharya, G. B.; Nogami, T.; Jin, T.; Matsuda, K.; Gevorgyan, V.; Yamamoto, Y. *Synthesis* **2004**, 308.

58. Gevorgyan, V.; Rubin, M.; Liu, J-X.; Yamamoto, Y. *J. Org. Chem.* **2001**, *66*, 1672.

59. Barr, K. J.; Berk, S. C.; Buchwald, S. L. *J. Org. Chem.* **1994**, *59*, 4323.

60. Berk, S. C.; Kreutzer, K. A.; Buchwald, S. L. *J. Am. Chem. Soc.* **1991**, *113*, 5093.

61. Verdaguer, X.; Hansen, M. C.; Berk, S. C.; Buchwald, S. L. *J. Org. Chem.* **1997**, *62*, 8522.

62. Verdaguer, X.; Berk, S. C.; Buchwald, S. L. *J. Am. Chem. Soc.* **1995**, *117*, 12641.

63. Igarashi, M.; Mizuno, R.; Fuchikami, T. *Tetrahedron Lett.* **2001**, *42*, 2149.

64. Davis, A. P.; Hegarty, S. C. *J. Am. Chem. Soc.* **1992**, *114*, 2745.

65. Newman, M. S.; Kanakarajan, K. *J. Org. Chem.* **1980**, *45*, 2301.

66. Ojima, I.; Kumagai, M. *J. Organomet. Chem.* **1976**, *111*, 43.

67. Revis, A.; Hilty, T. K. *Tetrahedron Lett.* **1987**, *28*, 4809.

68. Freiría, M.; Whitehead, A. J.; Tocher, D. A.; Motherwell, W. B. *Tetrahedron* **2004**, *60*, 2673.

69. Kursanov, D. N. et al. *Dokl. Chem.* (Engl. Transl.) **1968**, *179*, 328.

70. Doyle, M. P. et al. *J. Org. Chem.* **1974**, *39*, 2740.

71. Fry, J. L. et al. *J. Org. Chem.* **1978**, *43*, 374.

72. Sassaman, M. B. et al. *J. Org. Chem.* **1987**, *52*, 4314.

73. West, C. T. et al. *J. Org. Chem.* **1973**, *38*, 2675.

74. Aizpurua, J. M.; Lecea, B.; Palomo, C. *Can. J. Chem.* **1986**, *64*, 2342.

75. Aizpurua, J. M.; Palomo, C. *Tetrahedron Lett.* **1984**, *25*, 1103.

76. Lecea, B.; Aizpurua, J. M.; Palomo, C. *Tetrahedron* **1985**, *41*, 4657.

77. Akhrem, I. S.; Dene, M.; Vol'pin, M. E. *Bull. Acad. Sci. USSR, Div. Chem. Sci.* (Engl. Transl.) **1973**, *21*, 897.

78. Deneux, M. et al. *Bull. Soc. Chim. Fr.* **1973**, 2638.

79. Fujita, M.; Hiyama, T. *J. Org. Chem.* **1988**, *53*, 5405.

80. Chuit, C. et al. *Synthesis* **1982**, 981.
81. Kobayashi, Y.; et al. *Tetrahedron* **1997**, *53*, 1627.
82. Doyle, M. P.; DeBruyn, D. J.; Donnelly, S. J.; Kooistra, D. A.; Odubela, A. A.; West, C. T.; Zonnebelt, S. M. *J. Org. Chem.* **1974**, *39*, 2740.
83. Dubé, D.; Scholte, A. A. *Tetrahedron Lett.* **1999**, *40*, 2295.
84. Ojima, I.; Kogure, T. *Organometallics* **1982**, *1*, 1390.
85. Rupprecht, K. M. et al. *J. Org. Chem.* **1991**, *56*, 6180.
86. Yato, M.; Homma, K.; Ishida, A. *Heterocycles* **1998**, *49*, 233.
87. Ito, H. et al. Synlett. **2000**, 475.
88. Sassaman, M. B.; Prakash, G. K. S.; Olah, G. A. *Tetrahedron* **1988**, *44*, 3771.
89. Nicolaou, K. C.; Hwang, C.-K.; Nugeil, D. A. *J. Am. Chem. Soc.* **1989**, *111*, 4136.
90. Carreño, M. C.; Mazery, R. D.; Urbano, A.; Colobert, F.; Solladié, G. *Org. Lett.* **2004**, *6*, 297.
91. Mulholland, R. L.; Chamberlin, A. R. *J. Org. Chem.* **1988**, *53*, 1082.
92. Onishi, Y.; Ogawa, D.; Yasuda, M.; Baba, A. *J. Am. Chem. Soc.* **2002**, *124*, 13690.
93. Lecea, B.; Aizpurua, J. M.; Palomo, C. *Tetrahedron* **1985**, *41*, 4657.
94. Chandrasekhar, S.; Reddy, Ch. R.; Babu, B. N. *J. Org. Chem.* **2002**, *67*, 9080.
95. Miura, K.; Ootsuka, K.; Suda, S.; Nishikori, H.; Hosomi, A. *Synlett* **2001**, 1617.
96. Keinan, E.; Greenspoon, N. *J. Am. Chem. Soc.* **1986**, *108*, 7314.
97. Blazejewski, J. C.; Dorme, R.; Wakselman, C. *J. Chem. Soc., Perkin Trans. 1* **1987**, 1861.
98. Igarashi, M.; Fuchikami, T. *Tetrahedron Lett.* **2001**, *42*, 1945.
99. Bower, S.; Kreutzer, K. A.; Buchwald, S. L. *Angew. Chem., Int. Ed. Engl.* **1996**, *35*, 1515.
100. Ohta, T. et al. *Tetrahedron Lett.* **1999**, *40*, 6963.
101. Breedon, S. W.; Lawrence, N. J. *Synlett.* **1994**, 833.
102. Drew, M. D. et al. *Synlett.* **1997**, 989.
103. Mimoun, H.; *J. Org. Chem.* **1999**, *64*, 2583.
104. Barr, K. J.; Berk, S. C.; Buchwald, S. L. *J. Org. Chem.* **1994**, *59*, 4323.
105. Reding, M. T.; Buchwald, S. L. *J. Org. Chem.* **1995**, *60*, 7884.
106. Verdaguer, X. et al. *J. Org. Chem.* **1997**, *62*, 8522.
107. Okamoto, H.; Kato, S. *Bull. Chem. Soc. Jpn.* **1991**, *64*, 3466.
108. Fujita, M.; Oishi, H.; Hiyama, T. *Chem. Lett.* **1986**, 837.
109. Chandrasekhar, S.; Reddy, Y. R.; Reddy, Ch. R. *Chem. Lett.* **1998**, 1273.
110. Tokuyasu, T.; Ito, T.; Masuyama, A.; Nojima, M. *Heterocycles* **2000**, *53*, 1293.
111. Hinman, M. M.; Heathcock, C. H. *J. Org. Chem.* **2001**, *66*, 7751.
112. Billard, T.; Langlois, B. R. *J. Org. Chem.* **2002**, *67*, 997.
113. Auerbach, J.; Zamore, M.; Weinreb, S. M. *J. Org. Chem.* **1976**, *41*, 725.
114. Freidinger, R. M.; Hinkle, J. S.; Perlow, D. S.; Arison, B. H. *J. Org. Chem.* **1983**, *48*, 77.
115. Lanzilotti, A. E.; Littell, R.; Fanshawe, W. J.; McKenzie. T. C.; Lovell, F. M. *J. Org. Chem.* **1979**, *44*, 4809.
116. Comins, D. L.; Myoung, Y. C. *J. Org. Chem.* **1990**, *55*, 292.
117. Akhrem, A. A.; Moiseenkov, A. M.; Krivoruchko, V. A. *Bull. Acad. Sci. USSR, Div. Chem. Sci. (Engl. Transl.)* **1973**, *22*, 1745; *Chem. Abstr.* **1979**, *79*, 105102.
118. Kursanov, D. N.; Parnes, Z. N.; Bolestova, G. I. *Dokl. Chem.* (Engl. Transl.) **1968**, *181*, 726.
119. Parnes, Z. N. et al. *Dokl. Chem.* (Engl. Transl.) **1966**, *166*, 32.
120. Kursanov, D. N. et al. *Tetrahedron* **1967**, *23*, 2235.
121. Doyle, M. P.; McOsker, C. C. *J. Org. Chem.* **1978**, *43*, 693.
122. Kursanov, D. N. et al. *Dokl. Chem.* (Engl. Transl.) **1972**, *205*, 562.
123. Carey, F. A.; Tremper, H. S. *J. Org. Chem.* **1969**, *34*, 4.
124. Kursanov, D. N. et al. *Bull. Acad. Sci. USSR, Div. Chem. Sci.* (Engl. Transl.) **1979**, *28*, 746.
125. Lipshutz, B. H. et al. *Tetrahedron Lett.* **1998**, *39*, 4627.
126. Ito, H. et al. *Tetrahedron Lett.* **1997**, *38*, 8887.
127. Takano, S.; Moriya, M.; Ogasawara, K. *Tetrahedron Lett.* **1992**, *33*, 1909.
128. Serebryankova, T. A. et al. *Bull. Acad. Sci. USSR, Div. Chem. Sci.* (Engl. Transl.) **1972**, *21*, 1633.
129. Julia, M. Roy, P. *Tetrahedron* **1986**, *42*, 4991.
130. Zdanovich, V. I.; Kudryatsev, R. V.; Kursanov, D. N. *Bull. Acad. Sci. USSR, Div. Chem. Sci. (Engl. Transl.)* **1970**, *19*, 427.
131. Parnes, Z. N.; Khotimskaya, G. A.; Kudryavtsev, R. V.; Kursanov, D. N. *Bull. Acad. Sci. USSR, Div. Chem. Sci. (Engl. Transl.)* **1972**, *21*, 854; *Chem. Abstr.* **1972**, *77*, 87932.
132. Parnes, Z. N.; Bolestova, G. I.; Kursanov, D. N. *Bull. Acad. Sci. USSR, Div. Chem. Sci. (Engl. Transl.)* **1972**, *21*, 1927; *Chem. Abstr.* **1973**, *78*, 28811.
133. Doyle, M. P.; West, C. T. *J. Org. Chem.* **1975**, *40*, 3829.
134. Semmelhack, M. F.; Misra, R. N. *J. Org. Chem.* **1982**, 47, 2469.

135. Kobayashi, Y.; Ito, Y.; Terashima, S. *Bull. Chem. Soc. Jpn.* **1989**, *62*, 3041.

136. Smonou, I. *Tetrahedron Lett.* **1994**, *35*, 2071.

137. Lewis, M. D.; Cha, J. K.; Kishi, Y. *J. Am. Chem. Soc.* **1982**, *104*, 4976.

138. Nishiyama, Y. et al. *Chem. Lett.* **1997**, 165.

139. Carter, M. B. et al. *J. Am. Chem. Soc.* **1994**, *116*, 11667.

140. Yun, J.; Buchwald, S. L. *J. Am. Chem. Soc.* **1999**, *121*, 5640.

141. Lipshutz, B. H.; Servesko, J. M.; Petersen, T. B.; Papa, P. P.; Lover, A. A. *Org. Lett.* **2004**, *6*, 1273.

142. Yun, J.; Buchwald, S. L. *Org. Lett.* **2001**, *3*, 1129.

143. Lipshsutz, B. H.; Servesko, J. M.; Taft, B. R. *J. Am. Chem. Soc.* **2004**, *126*, 8352.

144. Verdaguer, X.; Lange, U. E. W.; Buchwald, S.L. *Angew. Chem. Int. Ed. Engl.* **1998**, *37*, 1103.

145. Verdaguer, X.; Lange, U. E. W.; Reding, M. T.; Buchwald, S. L. *J. Am. Chem. Soc.* **1996**, *118*, 6784.

146. Reding, M. T.; Buchwald, S. L. *J. Org. Chem.* **1998**, *63*, 6344.

147. Willoughby, C. A.; Buchwald, S. L. *J. Org. Chem.* **1993**, *58*, 7627.

148. Neumann, W. P. *Synthesis*, **1987**, 665.

149. Suwa, T. et al. *Synlett.* **2000**, 556.

150. Chandrasekhar. S.; Reddy, Ch. R.; Ahmed, M. *Synlett.* **2000**, 1655.

151. Geng, L.; Lu, X. *J. Organomet. Chem.* **1989**, *376*, 41.

152. Pike, P.; Hershberger, S.; Hershberger, J. *Tetrahedron.* **1988**, *44*, 6295.

153. Anderson, H. H. *J. Am. Chem. Soc.* **1958**, *80*, 5083.

154. Mehta, A. et al. *Tetrahedron Lett.* **1992**, *33*, 5441.

155. Dorow, R. L.; Gingrich, D. E. *Tetrahedron Lett.* **1999**, *40*, 467.

156. Kato, J.; Iwasawa, N.; Mukaiyama, T. *Chem. Lett.* **1985**, 743.

157. Soundararajan, R.; Matteson, D. S. *Organometallics*, **1995**, *14*, 4157.

158. Pearson, D. A. et al. *Tetrahedron Lett.* **1989**, *30*, 2739.

159. Sano, H.; Toshimitsu, T.; Migita, T. *Synthesis*, **1988**, 402.

160. Boyer, J. et al. *Tetrahedron*, **1981**, *37*, 2165.

161. Corriu, R. J. P.; Perz, R.; Reye, C. *Tetrahedron*, **1983**, *39*, 999.

162. Apeloig, Y.; Nakash, M. *J. Am. Chem. Soc.* **1994**, *116*, 10781.

163. Gimisis, T. et al. *Tetrahedron Lett.* **1995**, *36*, 6781.

164. Davis, A. P.; Hegaarty, S. C. *J. Am. Chem. Soc.* **1992**, *114*, 2745.

165. Bergen, S. H. et al. *J. Am. Chem. Soc.* **1992**, *114*, 2121.

166. Anwar, S.; Davis, A. P. *Tetrahedron* **1988**, *44*, 3761.

167. Fujita, M.; Hiyama, T. *J. Am. Chem. Soc.* **1984**, *106*, 4629.

168. Taylor, S. J.; Morken, J. P. *J. Am. Chem. Soc.* **1999**, *121*, 12202.

169. Fujita, M.; Hiyama, T. *J. Org. Chem.* **1988**, *53*, 5415.

170. Ito, H. et al. *Synlett.* **2000**, 479.

171. Eguchi, M. et al. *Tetrahedron Lett.* **1993**, *34*, 915.

172. Mori, A. et al. *Tetrahedron*, **1999**, *55*, 4573.

173. Benkeser, R. A. *Acc. Chem. Res.* **1971**, *4*, 94.

174. Benkeser, R. A.; Gaul, J. M. *J. Am. Chem. Soc.* **1970**, *92*, 720.

175. Benkeser, R. A. et al. *J. Am. Chem. Soc.* **1970**, *92*, 3232.

176. Fry, J. L. *Chem. Commun.* **1974**, 501.

177. Diminnie, J. B.; Xue, Z. *J. Am. Chem. Soc.* **1997**, *119*, 12657.

178. Kablaoni, N. M.; Buchwald, S. L. *J. Am. Chem. Soc.* **1995**, *117*, 6785.

179. Kablaoni, N. M.; Buchwald, S. L. *J. Am. Chem. Soc.* **1996**, *118*, 3182.

180. Perez, D.; Greenspoon, N.; Keinan, E. *J. Org. Chem.* **1987**, *52*, 5570.

181. Enders, D.; Gielen, H.; Breuer, K. *Tetrahedron: Asymmetry* **1997**, *8*, 3571.

182. Lee, S. et al. *Tetrahedron: Asymmetry* **1997**, *8*, 4027.

183. Sudo, A.; Yoshida, H.; Saigo, K. *Tetrahedron: Asymmetry* **1997**, *8*, 3205.

184. Keinan, E.; Greenspoon, N. *J. Org. Chem.* **1983**, *48*, 3545.

185. Mao, Z.; Gregg, B. T.; Cutler, A. R. *J. Am. Chem. Soc.* **1995**, *117*, 10139.

186. Hays, D. S.; Scholl, M.; Fu, G. C. *J. Org. Chem.* **1996**, *61*, 6751.

187. Hays, D. S.; Fu, G. C. *J. Org. Chem.* **1997**, *62*, 7070.

188. Tormo, J.; Hays, D. S.; Fu, G. C. *J. Org. Chem.* **1998**, *63*, 5296.

189. Fujisawa, T.; Kawashima, M.; Ando, S. *Tetrahedron Lett.* **1984**, *25*, 3123.

190. Maleczka, Jr., R. E. et al. *Org. Lett.* **2000**, *2*, 3655.

191. Hersberger, J. *Tetrahedron Lett.* **1986**, *26*, 6289.

192. Mayr, H. et al. *Angew. Chem. Int. Ed. Engl.* **1992**, *31*, 1046.

193. Nozaki, K. et al. *Bull. Chem. Soc. Jpn.* **1990**, *63*, 2268.

194. Coates, et al. *J. Chem. Soc. Perk. Trans. II* **1978**, 725.

Silanes and Surfaces: Hydrophobicity, Hydrophilicity and Coupling Agents

by Barry Arkles

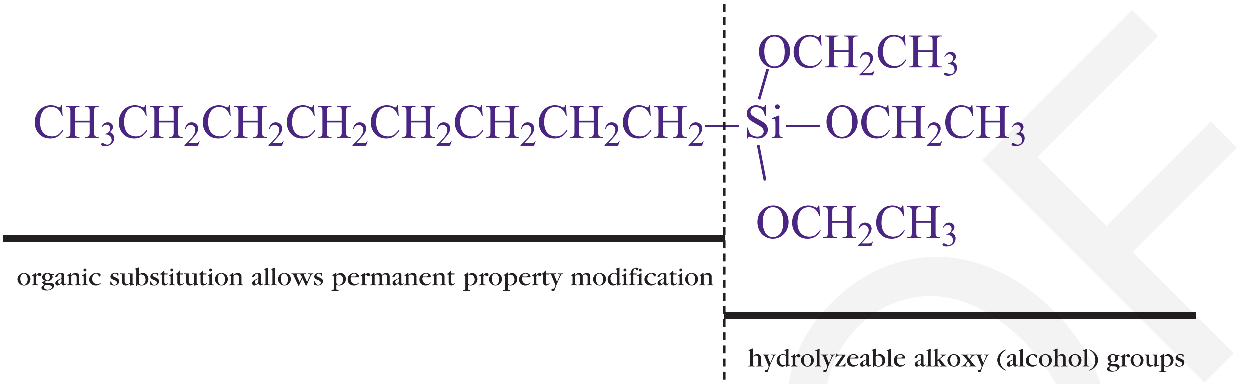
TABLE OF CONTENTS

Special Topics

Selection Guides

Silanes and Surface Modification

Silanes are silicon chemicals that possess a hydrolytically sensitive center that can react with inorganic substrates such as glass to form stable covalent bonds and possess an organic substitution that alters the physical interactions of treated substrates.



Property modifications include:

- Hydrophobicity
- Release
- Dielectric
- Absorption
- Orientation
- Hydrophilicity
- Charge Conduction

Applications include:

- Architectural Coatings
- Water-Repellents
- Anti-stiction Coatings for MEMs
- Mineral Surface Treatments
- Fillers for Composites
- Pigment Dispersants
- Dielectric Coatings
- Anti-fog Coatings
- Release Coatings
- Optical (LCD) Coatings
- Bonded Phases
- Self-Assembled Monolayers (SAMs)
- Crosslinkers for Silicones
- Nanoparticle Synthesis

In contrast with silanes utilized as coupling agents in adhesive applications, silanes used to modify the surface energy or wettability of substrates under normal conditions do not impart chemical reactivity to the substrate. They are often referred to as non-functional silanes. The main classes of silanes utilized to effect surface energy modification without imparting reactivity are:

Hydrophobic Silanes

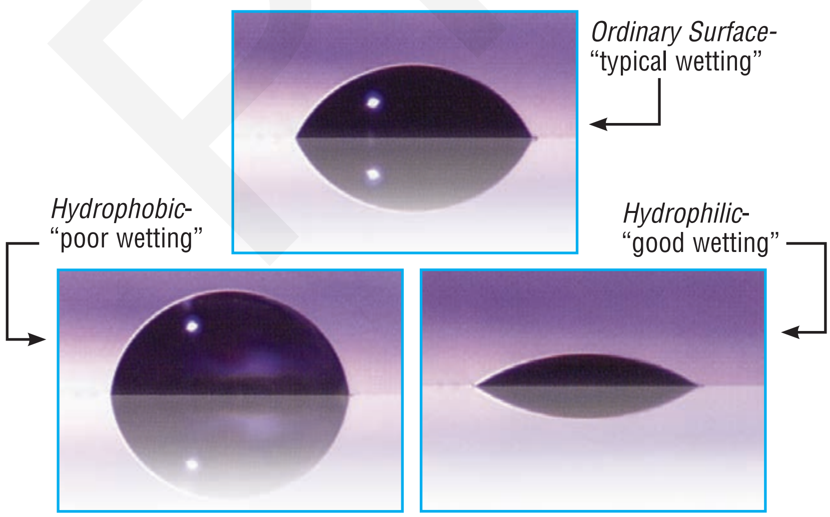
- Methyl
- Linear Alkyl
- Branched Alkyl
- Fluorinated Alkyl
- Aryl
- Dipodal

Hydrophilic Silanes

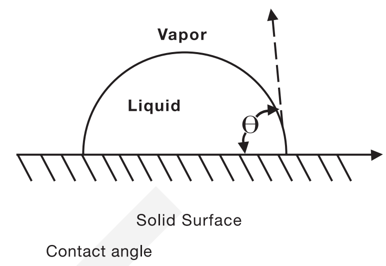
- Polar
- Hydroxylic
- Ionic
- Charge inducible/charge switchable
- Embedded Hydrophilicity
- Masked

Wettability and Contact Angle

A surface is said to be wetted if a liquid spreads over the surface evenly without the formation of droplets. When the liquid is water and it spreads over the surface without the formation of droplets, the surface is said to be hydrophilic. In terms of energetics, this implies that the forces associated with the interaction of water with the surface are greater than the cohesive forces associated with bulk liquid water. Water droplets form on hydrophobic surfaces, implying that the cohesive forces associated with bulk water are greater than the forces associated with the interaction of water with the surface. Practically, hydrophobicity and hydrophilicity are relative terms. A simple quantitative method for defining the relative degree of interaction of a liquid with a solid surface is the contact angle of a liquid droplet on a solid substrate. If the contact angle of water is less than 30°, the surface is designated hydrophilic since the forces of interaction between water and the surface nearly equal the cohesive forces of bulk water and water does not cleanly drain from the surface. If water spreads over a surface and the contact angle at the spreading front edge of the water is less than 10°, the surface is often designated as superhydrophilic (provided that the surface is not absorbing the water, dissolving in the water or reacting with the water). On a hydrophobic surface, water forms distinct droplets. As the hydrophobicity increases, the contact angle of the droplets with the surface increases. Surfaces with contact angles greater than 90° are designated as hydrophobic. The theoretical maximum contact angle for water on a smooth surface is 120°. Micro-textured or micro-patterned surfaces with hydrophobic asperities can exhibit apparent contact angles exceeding 150° and are associated with superhydrophobicity and the "lotus effect".



Contact Angle Defines Wettability



Contact Angle of Water on Smooth Surfaces

	θ
heptadecafluorodecyltrimethoxysilane*	115°
(heptafluoroisopropoxy)propyl-trichlorosilane*	109-111°
poly(tetrafluoroethylene)	108-112°
poly(propylene)	108°
octadecyldimethylchlorosilane*	110°
octadecyltrichlorosilane*	102-109°
tris(trimethylsiloxy)-silylethyldimethylchlorosilane	104°
octyldimethylchlorosilane*	104°
dimethyldichlorosilane*	95-105°
butyldimethylchlorosilane*	100°
trimethylchlorosilane*	90-100°
poly(ethylene)	88-103°
poly(styrene)	94°
poly(chlorotrifluoroethylene)	90°
human skin	75-90°
diamond	87°
graphite	86°
silicon (etched)	86-88°
talc	50-55°
chitosan	80-81°
steel	70-75°
methacryloxypropyltrimethoxysilane	70°
gold, typical (see gold, clean)	66°
triethoxysilylpropoxy(triethylenoxy)-dodecanoate*	61-2°
intestinal mucosa	50-60°
glycidoxypropyltrimethoxysilane*	49°
kaolin	42-46°
platinum	40°
silicon nitride	28-30°
silver iodide	17°
methoxy(polyethyleneoxy)propyl-trimethoxysilane*	15.5°
soda-lime glass	<15°
gold, clean	<10°

***Note:** Contact angles for silanes refer to smooth treated surfaces.

Critical Surface Tension and Adhesion

While the contact angle of water on a substrate is a good indicator of the relative hydrophobicity or hydrophilicity of a substrate, it is not a good indicator for the wettability of the substrate by other liquids. The contact angle is given by Young's equation:

$$\gamma sv - \gamma sl = \gamma lv \bullet \cos\theta e$$

where γsl = interfacial surface tension, γlv = surface tension of liquid.

Critical surface tension is associated with the wettability or release properties of a solid. It serves as a better predictor of the behavior of a solid with a range of liquids.

Liquids with a surface tension below the critical surface tension (γc) of a substrate will wet the surface, i.e., show a contact angle of 0 ($\cos\theta_e = 1$). The critical surface tension is unique for any solid and is determined by plotting the cosine of the contact angles of liquids of different surface tensions and extrapolating to 1.

Hydrophilic behavior is generally observed by surfaces with critical surface tensions greater than 45 dynes/cm. As the critical surface tension increases, the expected decrease in contact angle is accompanied with stronger adsorptive behavior and with increased exotherms.

Hydrophobic behavior is generally observed by surfaces with critical surface tensions less than 35 dynes/cm. At first, the decrease in critical surface tension is associated with oleophilic behavior, i.e. the wetting of the surfaces by hydrocarbon oils. As the critical surface tensions decrease below 20 dynes/cm, the surfaces resist wetting by hydrocarbon oils and are considered oleophobic as well as hydrophobic.

In the reinforcement of thermosets and thermoplastics with glass fibers, one approach for optimizing reinforcement is to match the critical surface tension of the silylated glass surface to the surface tension of the polymer in its melt or uncured condition. This has been most helpful in resins with no obvious functionality such as polyethylene and polystyrene. Silane treatment has allowed control of thixotropic activity of silica and clays in paint and coating applications. Immobilization of cellular organelles, including mitochondria, chloroplasts, and microsomes, has been effected by treating silica with alkylsilanes of C_8 or greater substitution.

Critical surface tensions

	γ_c mN/m
heneicosafluorododecyltrichlorosilane	6-7
heptadecafluorodecyltrichlorosilane	12.0
poly(tetrafluoroethylene)	18.5
octadecyltrichlorosilane	20-24
methyltrimethoxysilane	22.5
nonafluorohexyltrimethoxysilane	23.0
vinyltriethoxysilane	25
paraffin wax	25.5
ethyltrimethoxysilane	27.0
propyltrimethoxysilane	28.5
glass, soda-lime (wet)	30.0
poly(chlorotrifluoroethylene)	31.0
poly(propylene)	31.0
poly(propylene oxide)	32
polyethylene	33.0
trifluoropropyltrimethoxysilane	33.5
3-(2-aminoethyl)-aminopropyltrimethoxysilane	33.5
poly(styrene)	34
p-tolyltrimethoxysilane	34
cyanoethyltrimethoxysilane	34
aminopropyltriethoxysilane	35
acetoxypropyltrimethoxylsilane	37.5
polymethylmethacrylate	39
polyvinylchloride	39
phenyltrimethoxysilane	40.0
chloropropyltrimethoxysilane	40.5
mercaptopropyltrimethoxysilane	41
glycidoxypropyltrimethoxysilane	42.5
poly(ethyleneterephthalate)	43
poly(ethylene oxide)	43-45
copper (dry)	44
aluminum (dry)	45
iron (dry)	46
nylon 6/6	45-6
glass, soda-lime (dry)	47
silica, fused	78
titanium dioxide (anatase)	91
ferric oxide	107
tin oxide	111

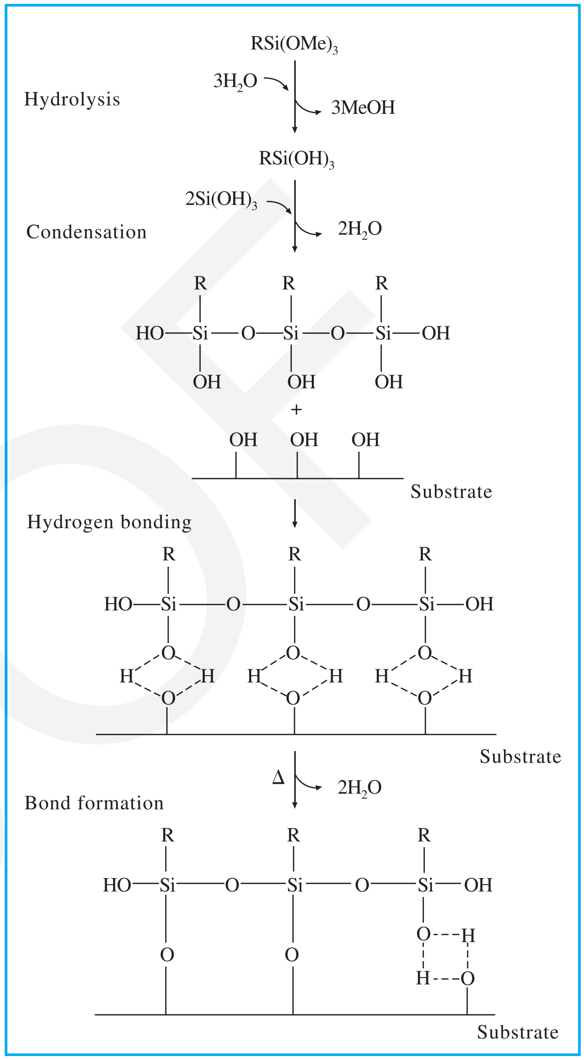
Note: Critical surface tensions for silanes refer to smooth treated surfaces.

How does a Silane Modify a Surface?

Most of the widely used organosilanes have one organic substituent and three hydrolyzable substituents. In the vast majority of surface treatment applications, the alkoxy groups of the trialkoxysilanes are hydrolyzed to form silanol-containing species. Reaction of these silanes involves four steps. Initially, hydrolysis of the three labile groups occurs. Condensation to oligomers follows. The oligomers then hydrogen bond with OH groups of the substrate. Finally, during drying or curing, a covalent linkage is formed with the substrate with concomitant loss of water. Although described sequentially, these reactions can occur simultaneously after the initial hydrolysis step. At the interface, there is usually only one bond from each silicon of the organosilane to the substrate surface. The two remaining silanol groups are present either in condensed or free form. The R group remains available for covalent reaction or physical interaction with other phases.

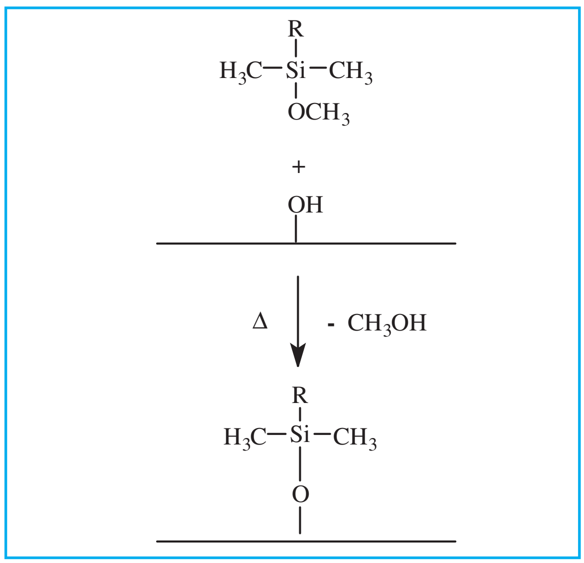
Silanes can modify surfaces under anhydrous conditions consistent with monolayer and vapor phase deposition requirements. Extended reaction times (4-12 hours) at elevated temperatures (50°-120°C) are typical. Of the alkoxysilanes, only methoxysilanes are effective without catalysis. The most effective silanes for vapor phase deposition are cyclic azasilanes.

Hydrolytic Deposition of Silanes



B. Arkles, CHEMTECH, 7, 766, 1977

Anhydrous Deposition of Silanes



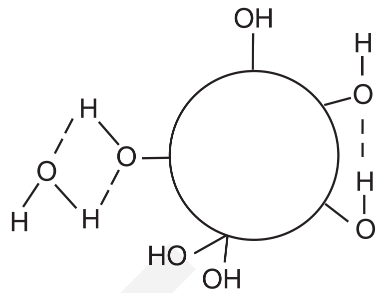
Hydrolysis Considerations

Water for hydrolysis may come from several sources. It may be added, it may be present on the substrate surface, or it may come from the atmosphere. The degree of polymerization of the silanes is determined by the amount of water available and the organic substituent. If the silane is added to water and has low solubility, a high degree of polymerization is favored. Multiple organic substitution, particularly if phenyl or tertiary butyl groups are involved, favors formation of stable monomeric silanols.

The thickness of a polysiloxane layer is also determined by the concentration of the siloxane solution. Although a monolayer is generally desired, multilayer adsorption results from solutions customarily used. It has been calculated that deposition from a 0.25% silane solution onto glass could result in three to eight molecular layers. These multilayers could be either inter-connected through a loose network structure, or intermixed, or both, and are, in fact, formed by most deposition techniques. The orientation of functional groups is generally horizontal, but not necessarily planar, on the surface of the substrate.

The formation of covalent bonds to the surface proceeds with a certain amount of reversibility. As water is removed, generally by heating to 120°C for 30 to 90 minutes or evacuation for 2 to 6 hours, bonds may form, break, and reform to relieve internal stress.

Selecting A Silane for Surface Modification -
Inorganic Substrate Perspective



Factors influencing silane surface modification selection include:

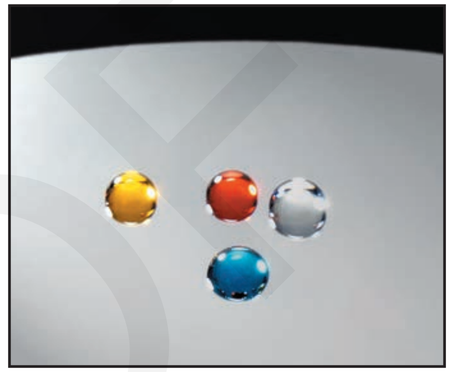
Concentration of surface hydroxyl groups
Type of surface hydroxyl groups
Hydrolytic Stability of the bond formed
Physical dimensions of the substrate or substrate features

Surface modification is maximized when silanes react with the substrate surface and present the maximum number of accessible sites with appropriate surface energies. An additional consideration is the physical and chemical properties of the interphase region. The interphase can promote or detract from total system properties depending on its physical properties such as modulus or chemical properties such as water/hydroxyl content.

Hydroxyl-containing substrates vary widely in concentration and type of hydroxyl groups present. Freshly fused substrates stored under neutral conditions have a minimum number of hydroxyls. Hydrolytically derived oxides aged in moist air have significant amounts of physically adsorbed water which can interfere with coupling. Hydrogen bonded vicinal silanols react more readily with silane coupling agents, while isolated or free hydroxyls react reluctantly.

Silanes with three alkoxy groups are the usual starting point for substrate modification. These materials tend to deposit as polymeric films, effecting total coverage and maximizing the introduction of organic functionality. They are the primary materials utilized in composites, adhesives, sealants, and coatings. Limitations intrinsic in the utilization of a polylayer deposition are significant for nano-particles or nano-composites where the interphase dimensions generated by polylayer deposition may approach those of the substrate. Residual (non-condensed) hydroxyl groups from alkoxysilanes can also interfere in activity. Monoalkoxy-silanes provide a frequently used alternative for nano-featured substrates since deposition is limited to a monolayer.

If the hydrolytic stability of the oxane bond between the silane and the substrate is poor or the application is in an aggressive aqueous environment, dipodal silanes often exhibit substantial performance improvements. These materials form tighter networks and may offer up to 10^5x greater hydrolysis resistance making them particularly appropriate for primer applications.



Water droplets on a (heptadecafluoro-1,1,2,2-tetrahydrodecyl)trimethoxysilane-treated silicon wafer exhibit high contact angles, indicative of the low surface energy. Surfaces are both hydrophobic and resist wetting by hydrocarbon oils. *(water droplets contain dye for photographic purposes).*

Silane Effectiveness on Inorganics

	SUBSTRATES
EXCELLENT	Silica
	Quartz
	Glass
	Aluminum (AlO(OH))
	Alumino-silicates (e.g. clays)
	Silicon
GOOD	Copper
	Tin (SnO)
	Talc
	Inorganic Oxides (e.g. Fe_2O_3, TiO_2, Cr_2O_3)
	Steel, Iron
	Asbestos
	Nickel
	Zinc
	Lead
SLIGHT	Marble, Chalk ($CaCO_3$)
	Gypsum ($CaSO_4$)
	Barytes ($BaSO_4$)
POOR	Graphite
	Carbon Black

Estimates for Silane Loading on Siliceous Fillers

Average Particle Size	Amount of Silane (minimum of monolayer coverage)
<1 micron	1.5%
1-10 microns	1.0%
10-20 microns	0.75%
>100 microns	0.1% or less

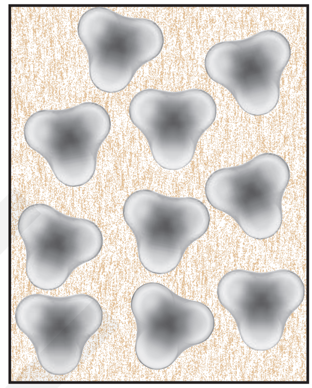
Hydrophobic Silane Surface Treatments

Factors which contribute to the ability of an organosilane to generate a hydrophobic surface are its organic substitution, the extent of surface coverage, residual unreacted groups (both from the silane and the surface) and the distribution of the silane on the surface.

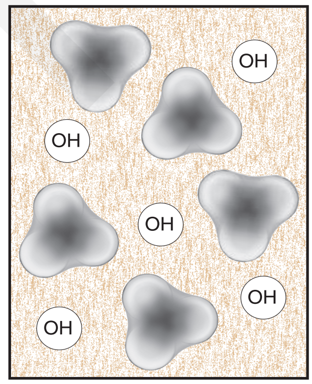
Aliphatic hydrocarbon substituents or fluorinated hydrocarbon substituents are the hydrophobic entities which enable silanes to induce surface hydrophobicity. Beyond the simple attribute that in order to generate a hydrophobic surface the organic substitution of the silane must be non-polar, more subtle distinctions can be made. The hydrophobic effect of the organic substitution can be related to the free energy of transfer of hydrocarbon molecules from an aqueous phase to a homogeneous hydrocarbon phase. For non-polar entities, van der Waals interactions are predominant factors in interactions with water and such interactions compete with hydrogen bonding in ordering of water molecules. Van der Waals interactions for solid surfaces are primarily related to the instantaneous polarizeability of the solid which is proportional to the dielectric constant or permittivity at the primary UV absorption frequency and the refractive index of the solid. Entities which present sterically closed structures that minimize van der Waals contact are more hydrophobic than open structures that allow van der Waals contact. Thus, in comparison to polyethylene, polypropylene and polytetrafluoroethylene are more hydrophobic. Similarly methyl-substituted alkylsilanes and fluorinated alkylsilanes provide better hydrophobic surface treatments than linear alkyl silanes.

Surfaces to be rendered hydrophobic usually are polar with a distribution of hydrogen bonding sites. A successful hydrophobic coating must eliminate or mitigate hydrogen bonding and shield polar surfaces from interaction with water by creating a non-polar interphase. Hydroxyl groups are the most common sites for hydrogen bonding. The hydrogens of hydroxyl groups can be eliminated by oxane bond formation with an organosilane. The effectiveness of a silane in reacting with hydroxyls impacts hydrophobic behavior not only by eliminating the hydroxyls as water adsorbing sites, but also by providing anchor points for the non-polar organic substitution of the silane which shields the polar substrates from interaction with water.

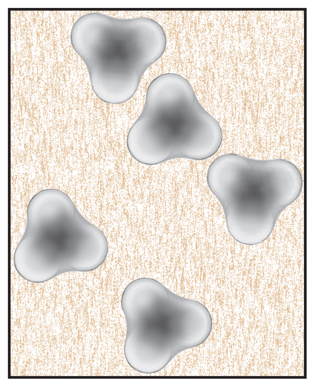
Strategies for silane surface treatment depend on the population of hydroxyl groups and their accessibility for bonding. A simple conceptual case is the reaction of organosilanes to form a monolayer. If all hydroxyl groups are capped by the silanes and the surface is effectively shielded, a hydrophobic surface is achieved. Practically, not all of the hydroxyl groups may react leaving residual sites for hydrogen bonding. Further, there may not be enough anchor points on the surface to allow the organic substituents to effectively shield the substrate. Thus the substrate reactive groups of the silane, the conditions of deposition, the ability of the silane to form monomeric or polymeric layers and the nature of the organic substitution all play a role in rendering a surface hydrophobic. The minimum requirements of hydrophobicity and economic restrictions for different applications further complicate selection.



complete coverage



incomplete hydroxyl reaction



few bonding opportunities

 = $(CH_3)_3Si$ = trimethylsilyl

Hypothetical Trimethylsilylated Surfaces

Pyrogenic silica has 4.4-4.6 OH/nm^2. Typically less than 50% are reacted. Other substrates have fewer opportunities for reaction.

Superhydrophobicity and Oleophobicity

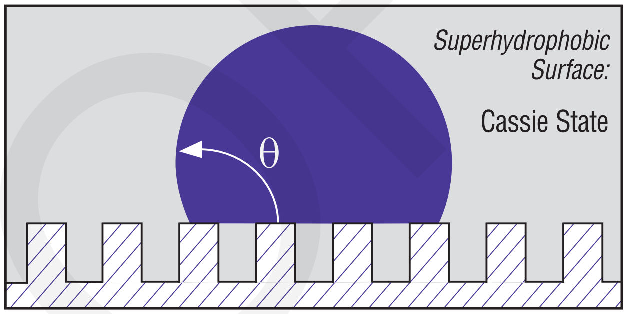
Hydrophobicity is frequently associated with oleophilicity, the affinity of a substance for oils, since non-polar organic substitution is often hydrocarbon in nature and shares structural similarities with many oils. The hydrophobic and oleophilic effect can be differentiated and controlled. At critical surface tensions of 20-30 mN/m, surfaces are wetted by hydrocarbon oils and are water repellent. At critical surface tensions below 20, hydrocarbon oils no longer spread and the surfaces are both hydrophobic and oleophobic. The most oleophobic silane surface treatments have fluorinated long-chain alkyl silanes and methylated medium chain alkyl silanes.

Superhydrophobic surfaces are those surfaces that present apparent contact angles that exceed the theoretical limit for smooth surfaces, i.e. >120°. The most common examples of superhydrophobicity are associated with surfaces that are rough on a sub-micron scale and contact angle measurements are composites of solid surface asperities and air; denoted as the *Cassie state.* Perfectly hydrophobic surfaces (contact angles of 180°) have been prepared by hydrolytic deposition of methylchlorosilanes as microfibrillar structures.

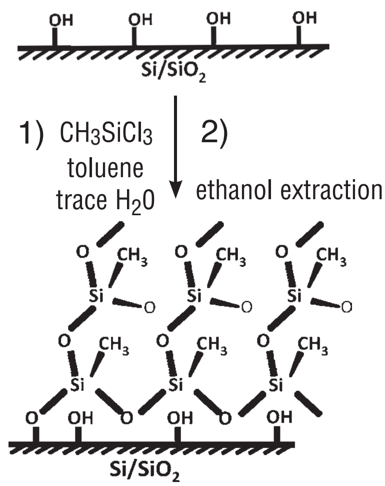
Automotive side windows *are treated with fluoroalkylsilanes to provide self-cleaning properties. Water beads remove soil as they are blown over the glass substrate during acceleration.*

Hydrophobicity vs Water Permeability

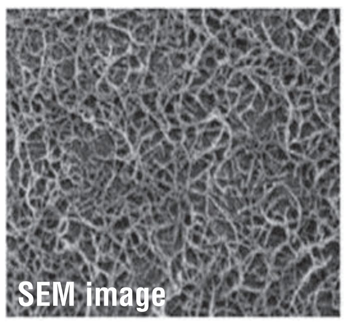
Although silane and silicone derived coatings are in general the most hydrophobic, they maintain a high degree of permeability to water vapor. This allows coatings to breathe and reduce deterioration at the coating interface associated with entrapped water. Since ions are not transported through non-polar silane and silicone coatings, they offer protection to composite structures ranging from pigmented coatings to rebar reinforced concrete.



Perfect Hydrophobicity-180°



toluene-swollen crosslinked covalently attached methylsilicone



The methylsilicone phase separates in ethanol to form a covalently attached fibrillar network. Fiber diameter is ~20 nm. Ellipsometry indicates a film thickness of ~20 nm.

T. McCarthy, J. Am. Chem. Soc., 2006, 128, 9052.

Hydrophilic Silane Surface Treatments

The vast majority of surfaces are hydrophilic. Water is omnipresent in the environment, yet the precise nature of interaction of water with specific surfaces is largely unknown. Water adsorption may be uniform or in isolated patches. It may be driven by a number of different physical and chemical processes. The adsorption of water by a surface may be assisted or retarded by other adsorbents present in the environment. The purpose of applying a hydrophilic surface treatment is to control both the nature and extent of interaction of water with a surface.

The controlled interaction of water with substrates can offer various degrees of hydrophilicity ranging from physi-sorption to chemi-sorption and centers for ion-interaction. The utility of hydrophilic surfaces varies widely. Anti-fog coatings exploit high surface energies to flatten water droplets rather than allowing them to form light-scattering droplets. In biological systems hydrophilic surfaces can reduce nonspecific bonding of proteins. Hydrophilic coatings with hydrogen bonding sites allow formation of tightly adherent layers of water with high lubricity in biological systems and the ability to resist oil adsorption in anti-graffiti coatings. They can also be used to disperse particles in aqueous coatings and oil-in-water emulsions. Hydrophilic coatings with ionic sites form antistatic coatings, dye receptive surfaces and can generate conductive or electrophoretic pathways. Thick films can behave as polymeric electrolytes in battery and ion conduction applications.

In general, surfaces become more hydrophilic in the series: **non-polar < polar, no hydrogen-bonding < polar, hydrogen-bonding < hydroxylic < ionic.** The number of sites and the structure and density of the interphase area also have significant influence on hydrophilicity.

Much of the discussion of hydrophobicity centers around high contact angles and their measurement. As a corollary, low or 0° contact angles of water are associated with hydrophilicity, but practically the collection of consistent data is more difficult. Discriminating between surfaces with a 0° contact angle is impossible. The use of heat of immersion is a method that generates more consistent data for solid surfaces, provided the surface does not react with, dissolve or absorb the tested liquid. Another important consideraton is whether the water adsorbed is "free" or "bound." Free water is water that is readily desorbed under conditions of less than 100% relative humidity. If water remains bound to a substrate under conditions of less than 100% relative humidity, the surface is considered hygroscopic. Another description of hygroscopic water is a boundary layer of water adsorbed on a surface less than 200nm thick that cannot be removed without heating. A measure of the relative hygroscopic nature of surfaces is given by the water activity, the ratio of the fugacity, or escaping tendency, of water from a surface compared to the fugacity of pure water.

The hydrophilicity of a surface as measured or determined by contact angle is subject to interference by loosely bound oils and other contaminants. Heats of immersion and water activity measurements are less subject to this interference. Measurements of silane-modified surfaces demonstrate true modification of the intrinsic surface properties of substrates. If the immobilized hydrophilic layer is in fact a thin hydrogel film, then swelling ratios at equilibrium water absorbtion can provide useful comparative data.

Anti-fog coatings applied to one side of a visor can be prepared from combinations of polyalkylene oxide functional silanes and film-forming hydrophilic silanes.

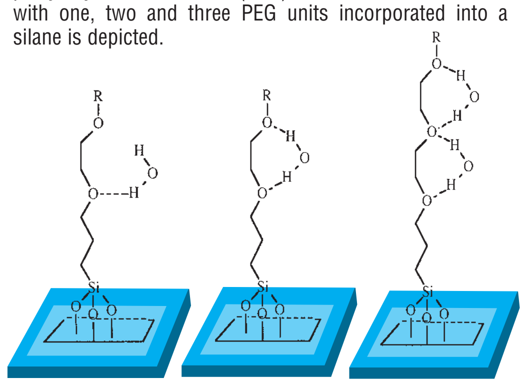
Heats of Immersion in Water, mJ/m$_2$

titanium dioxide	225-250
talc	220-260
aminopropyltriethoxysilane*	230-270
silicon dioxide	210-225
glass	200-205
vinyltris(methoxyethoxy)silane*	110-190
mercaptopropyltrimethoxysilane*	80-170
graphite	32-35
polytetrafluoroethylene	24-25

*Data for silane treated surfaces in this table is primarily from B. Marciniec et al, Colloid & Polymer Science, *261*, 1435, 1983 recalculated for surface area.

Water Interaction with PEGylated Silanes

The most common strategy for non-hydroxylic polar modification of organic molecules is the incorporation of poleyethylene oxide units (PEG). The interaction of water with one, two and three PEG units incorporated into a silane is depicted.

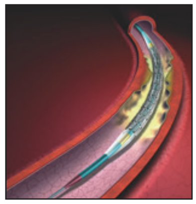


1 water molecule (single bridge bonded, ≈ 20 kJ/mole) | 1 water molecule (double bridge bonded, ≈ 34 kJ/mole) | 1.5 water molecules per EG unit (per molecule 34 kJ/mole)

Hydrophilic Silane Surface Treatments (continued)

Controlling hydrophilic interaction with silane surface treatments is accomplished by the selection of a silane with the appropriate hydrophilic substitution. The classes of substitution are:

- Polar, Non-Hydrogen Bonding
- Polar, Hydrogen-Bonding
- Hydroxylic
- Ionic-Charged



Aortic stents are coated to promote hydrophilicity, coupling to polymers and drug delivery systems.

The selection of the class of hydrophilic subsitution is dependent on the application. If it is sufficient for water to spread evenly over a surface to form a thin film that washes away and dries off quickly without leaving 'drying spots', then a polar aprotic silane is preferred. If a coating is desired that reduces non-specific binding of proteins or other biofoulants, then a polar hydrogen-bonding material such as a polyether functional silane is preferred. A very different application for a polar non-hydroxylic materials is thin film proton conduction electrolytes. Lubricious coatings are usually hydroxylic since they require a restrained adsorbed phase of water. Antistatic coatings are usually charged or charge-inducible as are ion-conductive coatings used in the construction of thin-film batteries. A combination of hydrophilicity and hydrophobicity may be a requirement in coatings which are used as primers or in selective adsorption applications such as chromatography. Formulation limitations may require that hydrophilicity is latent and becomes unmasked after application.

Factors affecting the intrinsic hydrolytic stability of silane treated surfaces are magnified when the water is drawn directly into the interface. Even pure silicon dioxide is ultimately soluble in water (at a level of 2-6ppm), but the kinetics, low concentration for saturation and phase separation, make this a negligible consideration in most applications. The equilibrium constant for the rupture of a Si-O-Si bond by water to two Si-OH bonds is estimated at 10^{-3}. Since at minimum 3 Si-O-Si bonds must be simultaneously broken under equilibrium conditions to dissociate an organosilane from a surface, in hydrophobic environments the long-term stability is a minor consideration. Depending on the conditions of exposure to water of a hydrophilic coating, the long-term stability can be an important consideration. Selection of a dipodal, polypodal or other network forming silane as the basis for inducing hydrophilicity or as a component in the hydrophilic surface treatment is often obligatory.

Range of Water Interaction with Surfaces

interaction	description	surface example	measurement - parameter
low	superhydrophobic		contact angle
	oleophobic	fluorocarbon	
	lipophobic		
	oleophilic		water-sliding angle
	lipophilic	hydrocarbon	critical surface tension
	hydrophobic		
moderate	polar	polymer	heat of immersion
	hydrophilic	oxide surface	
	hygroscopic	polyhydroxylic	water activity
strong	hydrogel film		equilibrium water absorption swell

Reacting with the Substrate

Leaving Groups

The reaction of an organofunctional silane with a surface bearing hydroxyl group results in a substitution reaction at silicon and the formation of the silylated surface where the silicon is covalently attached to the surface via an oxygen linkage. This connection may be formed directly or in the presence of water through a reactive silanol intermediate. In general the reactivity of hydroxylated surfaces with organo-functional silanes decreases in the order: $Si\text{-}NR_2 > Si\text{-}Cl > Si\text{-}NH\text{-}Si > Si\text{-}O_2CCH_3 > Si\text{-}OCH_3 > Si\text{-}OCH_2CH_3$. An analysis of the relevant bond energies indicates that the formation of the Si-O-surface bond is the driving force for the reaction under dry and aprotic conditions. Secondary factors contributing to the reactivity of organofunctional silanes with a surface are the volatility of the byproducts, the ability of the byproduct to hydrogen bond with the hydroxyls on the surface, the ability of the byproduct to catalyze further reactions, e.g. HCl or acetic acid, and the steric bulk of the groups on the silicon atom.

Although they are not the most reactive organosilanes, the methoxy and ethoxysilanes are the most widely used organofunctional silanes for surface modification. The reasons for this include the fact that they are easily handled and the alcohol byproducts are non-corrosive and volatile. The methoxysilanes are capable of reacting with substrates under dry, aprotic conditions, while the less reactive ethoxysilanes require catalysis for suitable reactivity. The low toxicity of ethanol as a byproduct of the reaction favors the ethoxysilanes in many commercial applications. The vast majority of organofunctional silane surface treatments are performed under conditions in which water is a part of the reaction medium, either directly added or contributed by adsorbed water on the substrate or atmospheric moisture.

Bond Dissociation Energies

Bond	Dissociation Energy (kcal/mole)
$Me_3Si\text{-}NMe_2$	98
$Me_3Si\text{-}N(SiMe_3)_2$	109
$Me_3Si\text{-}Cl$	117
$Me_3Si\text{-}OMe$	123
$Me_3Si\text{-}OEt$	122
$Me_3Si\text{-}OSiMe_3$	136

Common Leaving Groups

Type	Advantage	Disadvantage
dimethylamine	reactive, volatile byproduct	toxic
hydrogen chloride	reactive, volatile byproduct	corrosive
silazane (NH_3)	volatile	limited availability
methoxy	moderate reactivity, neutral byproduct	moderate toxicity
ethoxy	low toxicity	lower reactivity

Surface Area of Common Substrates, m^2/g

Type	m^2/g
E-Glass	0.10-0.12
Silica, ground	1-2
Silica, diatomaceous	1-3.5
Calcium silicate	2.6
Clay, kaolin	7
Talc	7
Silica, fumed	150-250

Silane Requirements for Surface Coverage

Hydrolytic Deposition – creating a minimum uniform coverage

The majority of surface modifications are affected by the hydrolytic deposition of trialkoxysilanes. Specific Wetting Surface (SWS) is a value determined empirically for the amount of silane required to obtain minimum uniform multilayer coverage on a substrate.

$$\text{amount of silane (g)} = \frac{\text{amount of substrate (g)} \times \text{surface area of filler } (m^2/g)}{\text{specific wetting surface}}$$

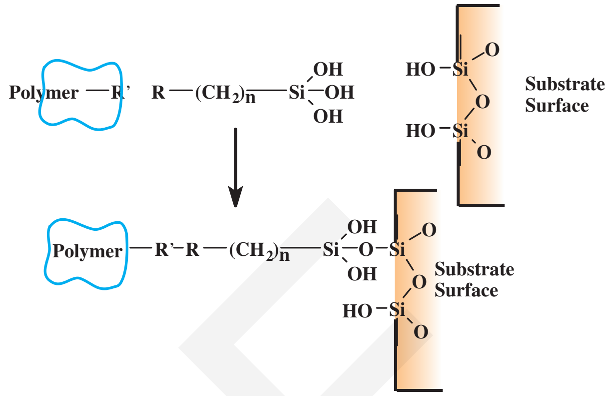
Specific Wetting Surface (SWS) numbers are found throughout the catalog.

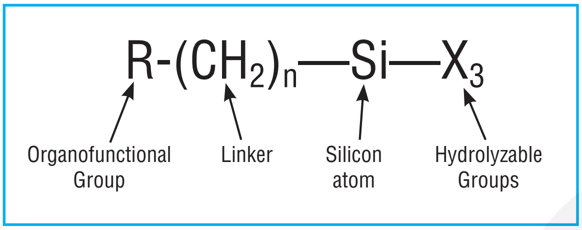
Monolayer Deposition

Monolayer deposition is a widely used term, but the definition of a monolayer is usually contextual. The simplest definition is that there is an attachment of a surface treatment molecule to every surface atom. However coverage of this type is probably never the case. In general, monolayer coverage refers to the reaction of the surface treatment molecule with available hydroxyl groups on the surface, but this is also almost never achieved. For example, hydrated fumed silica has 4.4-4.6 $–OH/nm^2$. A high surface fumed silica contains has a surface area of 3.25×10^{20} nm^2/gram and thus 1.5×10^{21} hydroxyls. If this is divided by Avogadro's number, 6.02×10^{23}, 2.4×10^{-3} moles of silane are required to provide coverage on 1 gram of fumed silica. Monolayer bonding of a silane with a molecular weight of 200 would deposit 0.5 g silane per gram of silica. In fact, most monolayer depositions of silanes result in about 10% of the calculated requirement, i.e. 0.5g silane per gram of fumed silica.

Silane Coupling Agents

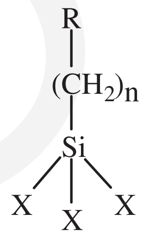
Silane coupling agents have the ability to form a durable bond between organic and inorganic materials. Encounters between dissimilar materials often involveat least one member that's siliceous or has surface chemistry with siliceous properties; silicates, aluminates, borates, etc., are the principal components of the earth's crust. Interfaces involving such materials have become a dynamic area of chemistry in which surfaces have been modified in order to generate desired heterogeneous environments or to incorporate the bulk properties of different phases into a uniform composite structure.



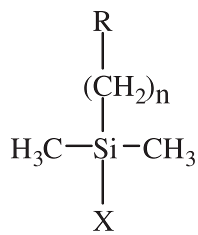


The general formula for a silane coupling agent typically shows the two classes of functionality. X is a hydrolyzable group typically alkoxy, acyloxy, halogen or amine. Following hydrolysis, a reactive silanol group is formed, which can condense with other silanol groups, for example, those on the surface of siliceous fillers, to form siloxane linkages. Stable condensation products are also formed with other oxides such as those of aluminum, zirconium, tin, titanium, and nickel. Less stable bonds are formed with oxides of boron, iron, and carbon. Alkali metal oxides and carbonates do not form stable bonds with Si-O-. The R group is a nonhydrolyzable organic radical that may posses a functionality that imparts desired characteristics.

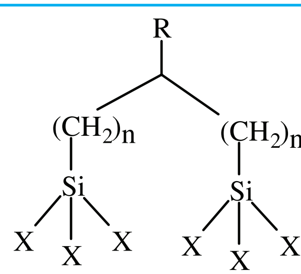
The final result of reacting an organosilane with a substrate ranges from altering the wetting or adhesion characteristics of the substrate, utilizing the substrate to catalyze chemical transformations at the heterogeneous interface, ordering the interfacial region, and modifying its partition characteristics. Significantly, it includes the ability to effect a covalent bond between organic and inorganic materials.



Trialkoxysilane



Monoalkoxysilane



Dipodal Silane

Selecting A Silane Coupling Agent -

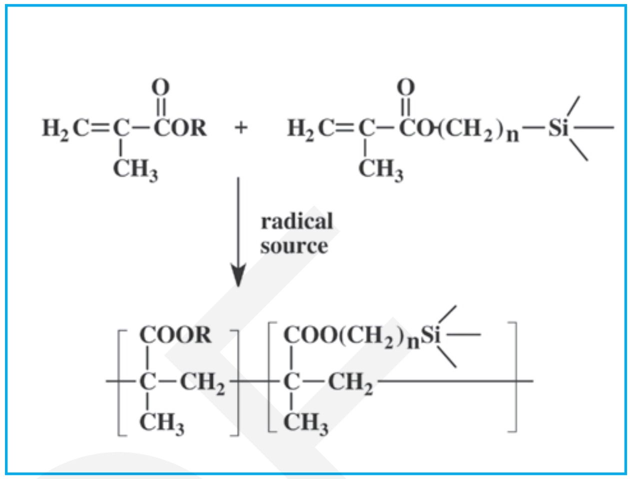
Polymer Applications

Coupling agents find their largest application in the area of polymers. Since any silane that enhances the adhesion of a polymer is often termed a coupling agent, regardless of whether or not a covalent bond is formed, the definition becomes vague. In this discussion, the parochial outlook will be adopted, and only silanes that form covalent bonds directly to the polymer will be considered. The covalent bond may be formed by reaction with the finished polymer or copolymerized with the monomer. Thermoplastic bonding is achieved through both routes, although principally the former. Thermosets are almost entirely limited to the latter. The mechanism and performance of silane coupling agents is best discussed with reference to specific systems. The most important substrate is E-type fiberglass, which has 6-15 silanol groups per $m\mu^2$.

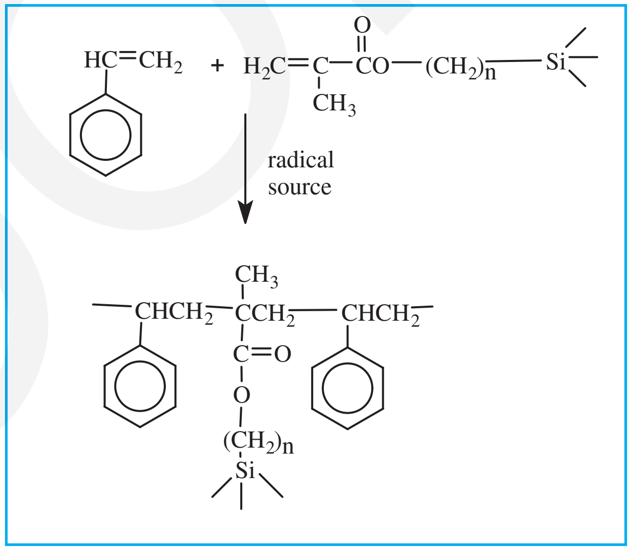
Thermosets

Acrylates, methacrylates and Unsaturated Polyesters, owing to their facility for undergoing free-radical polymerization, can be modified by copolymerization with silanes that have unsaturated organic substitution. The usual coupling agents for thermoset polyesters undergo radical copolymerization in such systems. These resins, usually of loosely defined structure, often have had their viscosity reduced by addition of a second monomer, typically styrene. In general, better reinforcement is obtained when the silane monomer matches the reactivity of the styrene rather than the maleate portion of the polyester.

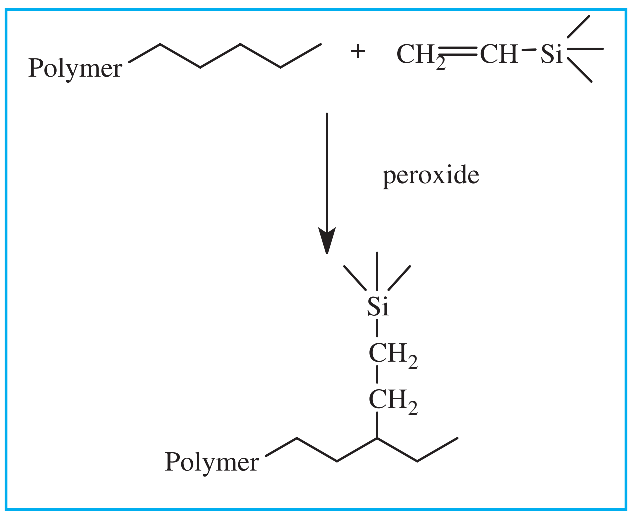
Methacrylyl and styryl functional silanes undergo addition much more readily than vinylsilanes. A direct approach to selecting the optimum silane uses the e and Q parameters of the Alfrey-Price treatment of polymerization. Here e indicates the polarity of the monomer radical that forms at the end of a growing chain, while Q represents the resonance stabilization of a radical by adjacent groups. Optimum random copolymerization is obtained from monomers with similar orders of reactivity. Vinyl functional silanes mismatch the reactionary parameters of most unsaturated polyesters. However, they can be used in direct high pressure polymerization with olefins such as ethylene, propylene and dienes.



Acrylate Coupling Reaction



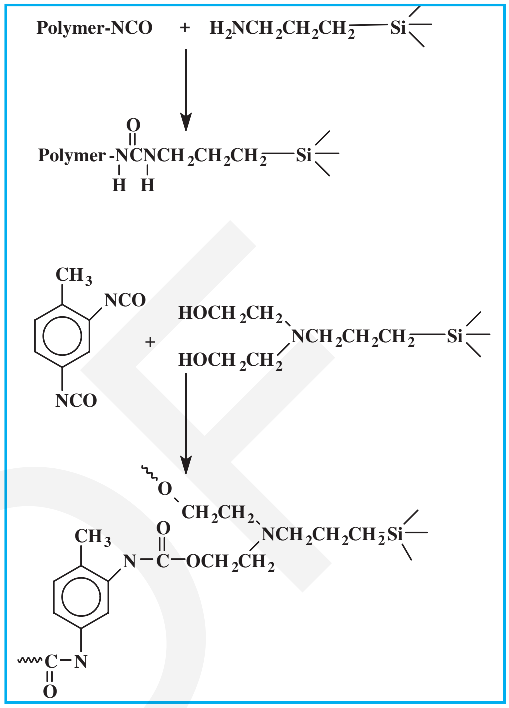
Unsaturated Polyester (Styrene) Coupling Reaction



Polyethylene Graft Coupling Reaction

Urethanes

Thermoset urethane can be effectively coupled with two types of silanes. The first type, including isocyanate functional silanes, may be used to treat the filler directly or integrally blended with the diisocyanate (TDI, MDI, etc.) prior to cure. Amine and alkanolamine functional silanes, on the other hand, are blended with the polyol rather than the diisocyanate. Isocyanate functional silanes couple with the polyol. Alkanolamine functional silanes react with the isocyanate to form urethane linkages, while amine silanes react with the isocyanates to yield urea linkages. A typical application for coupled urethane system is improving bond strength with sand in abrasion-resistant, sand-filled flooring resins.



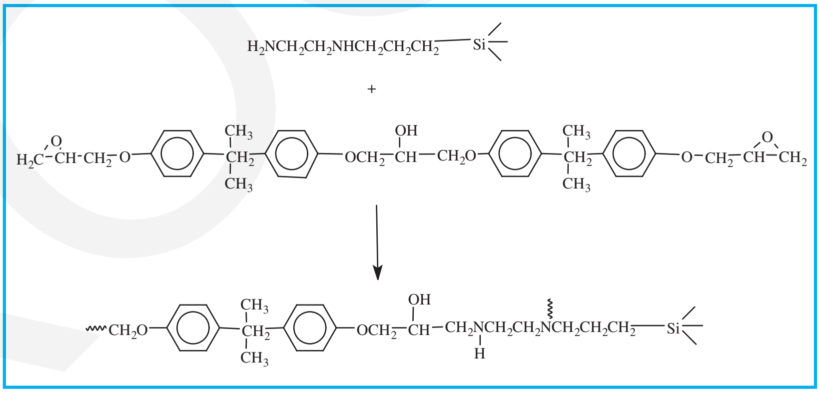
Polyurethane Coupling Reactions

Moisture-Cureable Urethanes

Aminosilanes have the general ability to convert isocyanate functional urethane prepolymers to systems that crosslink in the presence of water and a tin catalyst. The preferred aminosilanes are secondary containing methyl, ethyl or butyl substitutions on nitrogen.

Epoxies

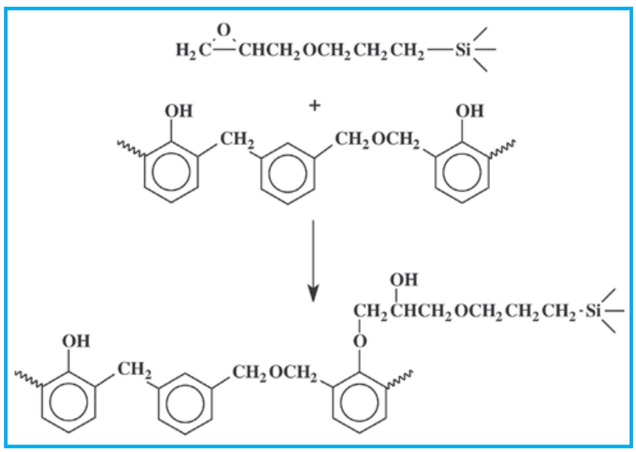
Epoxycyclohexyl and glycidoxy functional silanes are used to pretreat the filler or blended with the glycidylbisphenol-A ether. Amine functional silanes can likewise be used to pretreat the filler or blended with the hardener portion. Treatment of fillers in epoxy adhesives improves their dispersibility and increases the mechanical properties of the cured resin. A large application area is glass cloth-reinforced epoxy laminates and prepregs in aerospace and electrical printed circuit board applications.



Epoxy Coupling Reaction

Phenolics

Phenolic resins are divided into base catalyzed single-step resins called resols or better known acid catalyzed two-step systems called novolaks. Although foundry and molds are formulated with resols such as aminopropylmethyldialkoxysilanes, the commercial utilization of silanes in phenolic resins is largely limited to novolak/glass fabric laminates and molding compounds. The phenolic hydroxyl group of the resins readily react with the oxirane ring of epoxy silanes to form phenyl ether linkages. When phenolic resins are compounded with rubbers, as in the case with nitrile/phenolic or vinyl butyral/phenolic adhesives, or impact-resistant molding compounds, additional silanes, particularly mercapto-functional silanes, have been found to impart greater bond strength than silanes that couple to the phenolic portion.



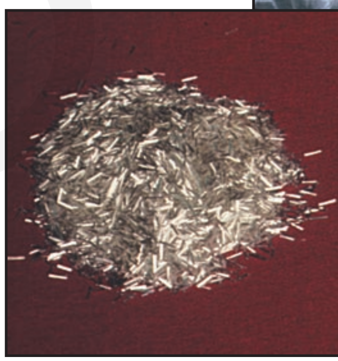
Phenolic Coupling Reaction

Thermoplastics

Thermoplastics provide a greater challenge in promoting adhesion through silane coupling agents than thermosets. The silanes must react with the polymer and not the monomeric precursors, which not only limits avenues for coupling, but also presents additional problems in rheology and thermal properties during composite formulation. Moreover mechanical requirements here are stringently determined. Polymers that contain regular sites for covalent reactivity either in the backbone or in a pendant group include polydienes, polyvinylchloride, polyphenylene sulfide, acrylic homopolymers, maleic anhydride, acrylic, vinyl acetate, diene-containing copolymers, and halogen or chlorosulfonyl-modified homopolymers. A surprising number of these are coupled by aminoalkylsilanes. Chlorinated polymers readily form quaternary compounds while the carboxylate and sulfonate groups form amides and sulfonamides under process conditions. At elevated temperatures, the amines add across many double bonds although mercaptoalkylsilanes are the preferred coupling agents. The most widely used coupling agents, the aminoalkylsilanes, are not necessarily the best. Epoxysilanes, for example, are successfully used with acrylic acid and maleic acid copolymers.

Scanning electron micrograph at a broken gear tooth from a non-coupled glass fiber/acetal composite. Note that cleavage occurred between fibers.

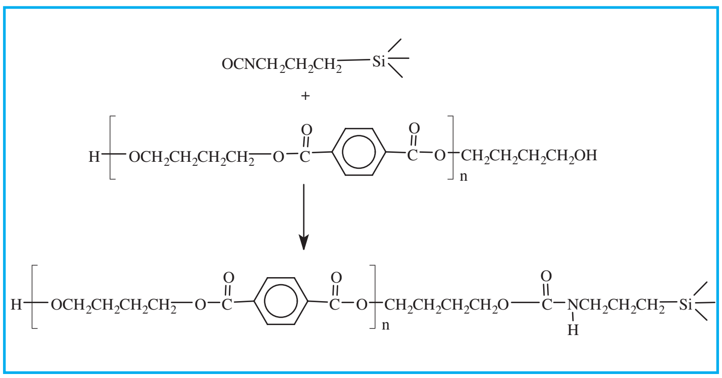
Scanning electron micrograph at a broken gear tooth from an aminosilane-coupled glass fiber/nylon 6/6 composite. Note how fibers have broken as well as matrix.



Chopped fiberglass strand sized with aminosilanes is a commonly used reinforcement for high temperature thermoplastics.

Thermoplastic Condensation Polymers

The group of polymers that most closely approaches theoretical limits of composite strength does not appear to contain regular opportunities for covalent bond formation to substrate. Most of the condensation polymers including polyamides, polyesters, polycarbonates, and polysulfones are in this group. Adhesion is promoted by introducing high energy groups and hydrogen bond potential in the interphase area or by taking advantage of the relatively low molecular weight of these polymers, which results in a significant opportunity for end-group reactions. Aminoalkylsilanes, chloroalkylsilanes, and isocyanatosilanes are the usual candidates for coupling these resins. This group has the greatest mechanical strength of the thermoplastics, allowing them to replace the cast metals in such typical uses as gears, connectors and bobbins.



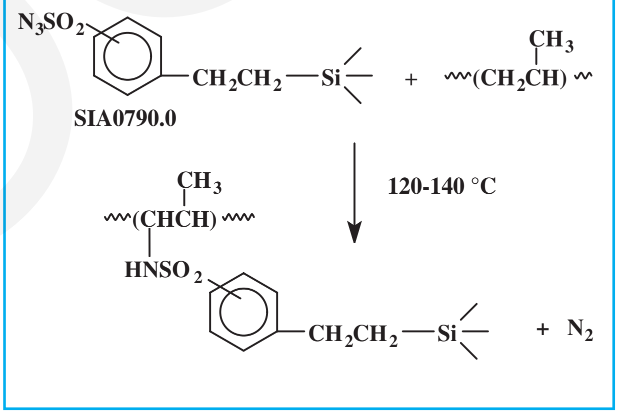
Thermoplastic Polyester Coupling Reaction

Polyolefins

The polyolefins and polyethers present no direct opportunity to covalent coupling. Until recently, the principal approach for composite formulation was to match the surface energy of the filler surface, by treating it with an alkylsubstituted silane, with that of the polymer. For optimum reinforcement, preferred resins should be of high molecular weight, linear, and have low melt viscosity. Approaches to improved composite strength have been through compatibility with long-chain alkylsilanes or aminosilanes. Far more effective is coupling with vinyl or methacryloxy groups, particularly if additional coupling sites are created in the resin by addition of peroxides. Dicumyl peroxide and bis(t-butylperoxy) compounds at levels of 0.15% to 0.25% have been introduced into polyethylene compounded with vinylsilane-treated glass fibers for structural composites or vinylsilane-treated clay for wire insulation. Increases of 50% in tensile and flexural properties have been observed in both cases when compared to the same silane systems without peroxides.

Another approach for coupling polypropylene and polyethylene is through silylsulfonylazides. Unlike azide bound to silicon, sulfonyl azides decompose above 150°C to form a molecule of nitrogen and a reactive nitrene that is capable of insertion into carbon-hydrogen bonds, forming sulfonamides, into carbon-carbon double bonds, forming triazoles, and into aromatic bonds, forming sulfonamides. Fillers are treated first with the silane and then the treated filler is fluxed rapidly with polymer melt.

Vinylsilanes are used in PE and EPDM insulated wire and cable

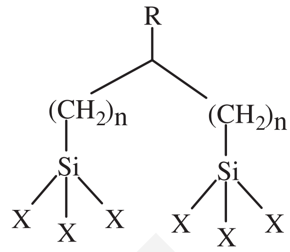


Polypropylene Coupling Reaction

Dipodal Silanes

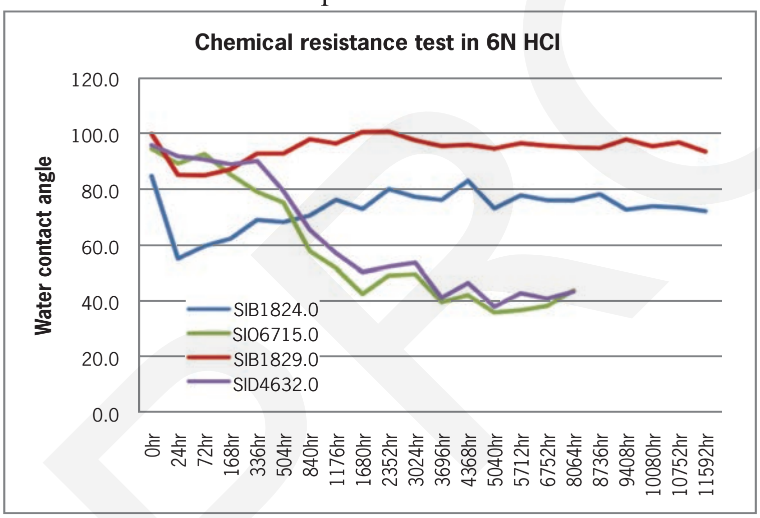
Functional dipodal silanes and combinations of non-functional dipodal silanes with functional silanes have significant impact on substrate bonding, hydrolytic stability and mechanical strength of many composites systems. They possess enabling activity in many coatings, particularly primer systems and aqueous immersion applications. The effect is thought to be a result of both the increased crosslink density of the interphase and a consequence of the fact that the resistance to hydrolysis of dipodal materials (with the ability to form six bonds to a substrate) is estimated at close to 100,000 times greater than conventional coupling agents (with the ability to form only three bonds to a substrate).

Both because dipodal silanes may not have functional groups identical to conventional coupling agents or because of economic considerations, conventional coupling agents are frequently used in combination with a non-functional dipodal silanes. In a typical application a dipodal material such as bis(triethoxysilyl)ethane (SIB1817.0) is combined at a 1:5 to 1:10 ratio with a traditional coupling agent. It is then processed in the same way as the traditional silane coupling agent.



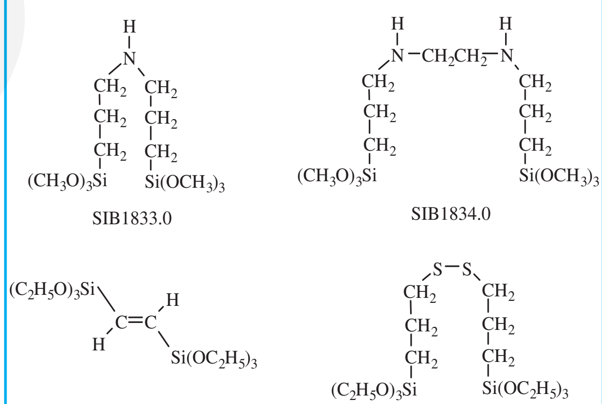
Dipodal tetrasulfide silanes are used in "green" tires

Dipodal vs Conventional Silanes
in acidic aqueous environments



Glass surfaces treated with: bridged dipodal silane SIB1824.0 1,8-bis (triethoxysilyl)octane; conventional silane SIO6715.0 n-octyltriethoxysilane; pendant dipodal silane SIB1829.0 1,2-bis(trimethoxysilyl)decane; conventional silane, SID4632.0 n-decyltriethoxysilane.

Functional Dipodals



SIB1833.0 SIB1834.0 SB1820..0 SIB1824.6

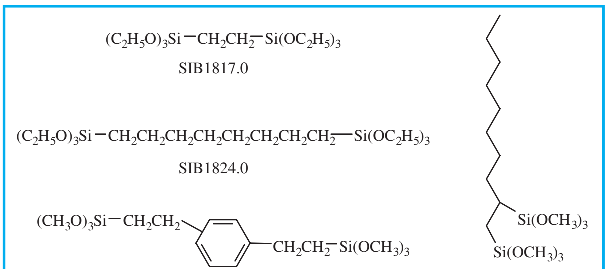
Effect of dipodal -SiCH2CH2Si- on the bond strength of a crosslinkable ethylene-vinyl acetate primer formulation

Primer on metal 10% in *i*-PrOH	Wet adhesion to metals (N/cm) Titanium	Cold-rolled steel
No silane	Nil	Nil
Methacryloxypropylsilane	0.25	7.0
Methacryloxypropylsilane + 10% dipodal	10.75	28.0 (cohesive failure)

90° peel strength after 2 h in 80°C water.

P. Pape et al, in Silanes and Other Coupling Agents, ed. K. Mittal, 1992, VSP, p105

Non-Functional Dipodals



SIB1817.0 SIB1824.0 SIB1831.0 SIB1829.0

Non-Functional Dipodal Silane Selection Guide

aliphatic

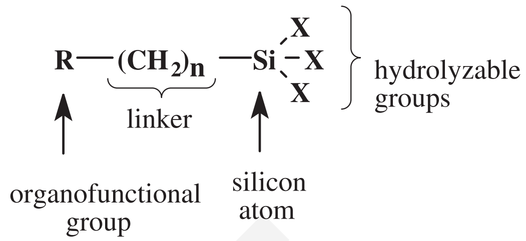
Spacer atoms	4 Hydrolyzeable Groups Product Code/Name	5 Hydrolyzeable Groups Product Code/Name	6 Hydrolyzeable Groups Product Code/Name
1	SIB1635.0 bis(methyldimethoxysilyl)methane		SIB1821.0 bis(triethoxysilyl)methane
2	SIB1615.0 bis(methyldiethoxysilyl)ethane	SIT8185.8 1-(triethoxysilyl)-2-(diethoxymethylsilyl)ethane	SIB1817.0 bis(triethoxysilyl)ethane
2	SIB1632.0 bis(methyldimethoxysilyl)ethane		SIB1830.0 bis(trimethoxysilyl)ethane
2			SIB1829.0 1,2-bis(trimethoxysilyl)decane
6			SIB1832.0 1,6-bis(trimethoxysilyl)hexane
6			SIB1829.7 1,6-bis(trimethoxysilyl)-2,5-dimethylhexane
8			SIB1824.0 1,8-bis(triethoxysilyl)octane
8			SIB1832.7 1,8-bis(trimethoxysilyl)octane

aromatic/heteroatom

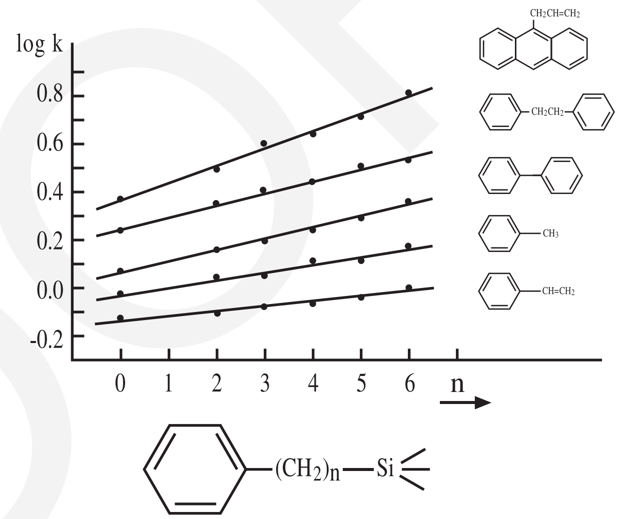
	4 Hydrolyzeable Groups Product Code/Name	5 Hydrolyzeable Groups Product Code/Name	6 Hydrolyzeable Groups Product Code/Name
aromatic			SIB1831.0 bis(trimethoxysilylethyl)benzene
aromatic			SIB1816.6 bis(triethoxysilyl)benzene
aromatic			SIB1832.2 bis(trimethoxysilylmethyl)benzene
ethylene oxide			SIB1824.84 bis(triethoxysilylpropyl)poly(ethyleneoxide)
siloxane			SIB1820.2 bis(triethoxysilylethyl)tetramethyldisiloxane

Linker Length

An important factor in controlling the effectiveness and properties of a coupled system is the linker between the organic functionality and the silicon atom. The linker length imposes a number of physical property and reactivity limitations. The desirability of maintaining the reactive centers close to the substrate are most important in sensor applications, in heterogeneous catalysis, fluorescent materials and composite systems in which the interfacing components are closely matched in modulus and coefficient of thermal expansion. On the other hand, inorganic surfaces can impose enormous steric constraints on the accessibility of organic functional groups in close proximity. If the linker length is long the functional group has greater mobility and can extend further from the inorganic substrate. This has important consequences if the functional group is expected to react with a single component in a multi-component organic or aqueous phases found in homogeneous and phase transfer catalysis, biological diagnostics or liquid chromatography. Extended linker length is also important in oriented applications such as self-assembled monolayers (SAMs). The typical linker length is three carbon atoms, a consequence of the fact that the propyl group is synthetically accessible and has good thermal stability.

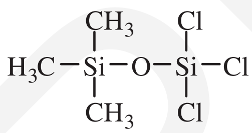


Effect of linker length on the separation of aromatic hydrocarbons

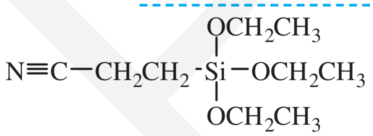


T. Den et al, in "Silanes, Surfaces, Interfaces" D. Leyden ed., 1986 p403.

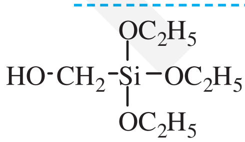
Silanes with short linker length



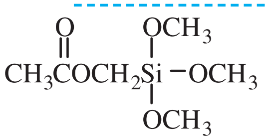
SIT8572.6



SIC2445.0

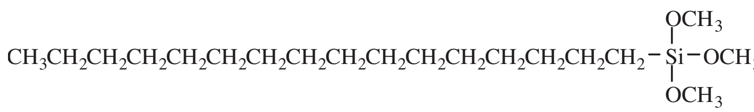


SIH6175.0

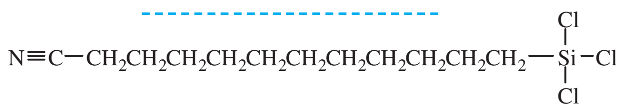


SIA0055.0

Silanes with extended linker length



SIH5925.0



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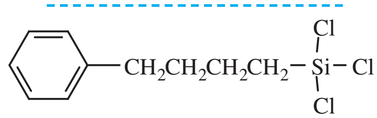

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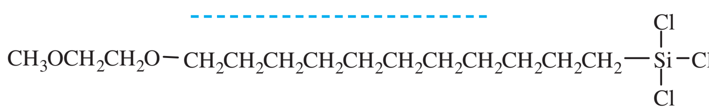


SIM6491.5

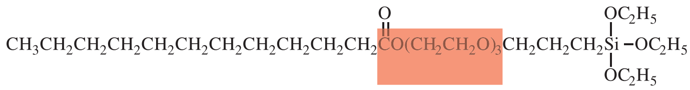
Combining Polarity and Non-Polarity in Silane Surface Treatments

It may be desirable for a surface treatment to possess both polar groups and non-polar groups. The polarity may either embedded below a hydrocarbon tail (i.e. proximal to the surface) or tipped at the end of the hydrocarbon (i.e. proximal to the contacting phase).

Tipped

$CH_3OCH_2CH_2OCH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2CH_2SiCl_3$

Embedded



Silane surface treatments with either tipped or embedded polarity provide an avenue to overcome traditional limitations imposed by surface energetics. They allow formation of surfaces that respond to solvent, electrical potential and thermal transitions by dramatically varying wettability. Silane treated substrates associated with a variety of multiphasic applications, including particle dispersion, reversed-phase HPLC and diagnostic assays can also take advantage of surfaces which combine polarity with non-polarity.

Comparative contact angle data of various silanes with polar substitution having degrees of hydrogen bonding and in which the polar groups are either embedded or are tipped along with hydrophobic and hydrophilic controls demonstrate interesting trends. Tipped polar silanes show higher contact angles with water than the embedded polar silanes, regardless of opportunities for hydrogen-bonding. The number of PEG units has relatively small impact on contact angle of the tipped silanes although an increase in number of PEG units does correlate to decreased water contact angle. PEG units embedded in silanes have a stronger effect on contact angle than PEG units in the tipped analogs. Hexadecane contact angle seems to be controlled by the number of carbon atoms in the carbon chain, although a step-change increase in contact angle is observed with C_{18}-PEG silanes.

Polarity is generally associated with hydrophilicity. Non-polarity is generally associated with hydrophobicity. In the case of surface treatments, it may be that the term hydrophobic ("water-hating" or "water fearing") suggests a too simplistic explanation. It appears not so much that hydrocarbons hate water, but that water hates hydrocarbons. Hydrocarbons appear indifferent to water. In the case of alkylsilanes tipped with polar groups, water molecular interaction proceeds until interaction with the hydrocarbon. In the cases of alkylsilanes in which polar groups are embedded near the surface, the hydrocarbon poses only a small barrier to the access of water to the polar groups.

Particle Dispersion Utilizing Silanes with Embedded Polarity

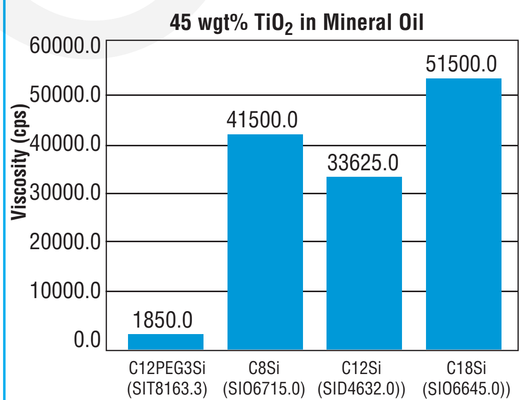
The incorporation of polar functionality into hydrocarbon substituted silanes can have dramatic effects on the dispersion of particles. Depending on the media, the appropriate mixed polarity surface treatment can improve dispersion, reduce viscosity or increase loading.

Contact Angles of Water and Hexadecane on Silane Layers with Tipped and Embedded Polar Groups

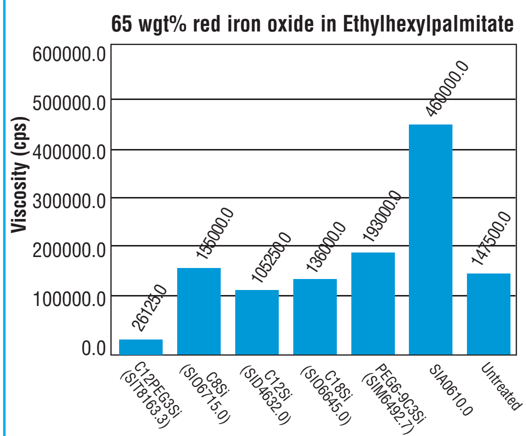
Silane	Contact angle (degrees) Water	Hexadecane
Hydrophobic control		
Dodecyltriethoxysilane (SID4632.0)	100	21
Hydrophilic tipped silanes		
(Methoxytriethyleneoxy)-trimethoxysilylundecanoate (SIM6493.7)	74	7
Methoxyethoxyundecyltrichlorosilane (SIM6491.5)	73	5
Hydrophilic embedded silanes		
Triethoxysilylpropoxy(triethyleneoxy)-octadecanoate	68	28
Triethoxysilylpropoxy(triethyleneoxy)-dodecanoate (SIT8186.3)	62	6
Triethoxysilylpropoxy(hexaethyleneoxy)-octadecanoate	42	28
Triethoxysilylpropoxy(hexaethyleneoxy)-dodecanoate	35	3
Hydrophilic control		
Methoxy(polyethyleneoxy)$_{6\text{-}9}$-propyltrimethoxysilane (SIM6492.7)	16	17

B. Arkles et al in "Silanes & Other Coupling Agents Vol 5, K. Mittal Ed. p.51 VSP (Brill) 2009.

Silane Surface Treated Particles – Effect on Rheology



Dispersion viscosity of different silane treated titanium dioxide pigment at 65% loading in mineral oil. DodecanoylPEG3silane (SIT8186.3) with embedded polarity provides lower viscosity than octyl-, dodecyl- and octadecylsilanes.



Dispersion viscosity of different silane treated iron oxide pigments at 65% loading in 2-ethylhexylpalmitate. DodecanoylPEG3silane (SIT8186.3) with embedded polarity provides lower viscosity than alkyl, polyethyleneoxide, and aminopropyl substituted silanes.

Partition, Orientation and Self-Assembly in Bonded Phases

Chromatography

Octadecyl, cyanopropyl and branched tricocyl silanes provide bonded phases for liquid chromatography. Reverse-phase thin-layer chromatography can be accomplished by treating plates with dodecyltrichlorosilane.

Liquid Crystal Displays

The interphase can also impose orientation of the bulk phase. In liquid crystal displays, clarity and permanence of image are enhanced if the display can be oriented parallel or perpendicular to the substrate. The use of surfaces treated with octadecyl(3-(trimethoxysilyl)propyl) ammonium chloride (perpendicular) or methylaminopropyl-trimethoxysilane (parallel) has eliminated micromachining operations The oriented crystalline domains often observed in reinforced nylons have also been attributed to orientation effects of the silane in the interphase.

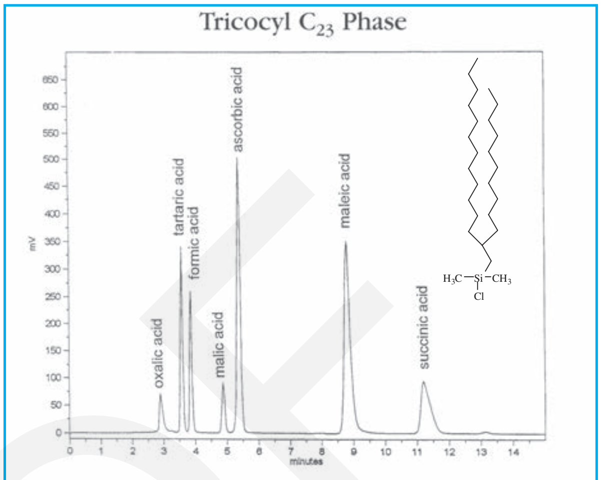
Self-Assembled Monolayers (SAMs)

A Self-Assembled Monolayer (SAM) is a one molecule thick layer of material that bonds to a surface in an ordered way as a result of physical or chemical forces during a deposition process. Silanes can form SAMs by solution or vapor phase deposition processes. Most commonly, chlorosilanes or alkoxysilanes are used and once deposition occurs a chemical (oxane) bond forms with the surface rendering a permanent modification of the substrate. Applications for SAMs include micro-contact printing, soft lithography, dip-pen nanolithography, anti-stiction coatings and orientation layers involved in nanofabrication of MEMs, fluidic microassemblies, semiconductor sensors and memory devices.

Common long chain alkyl silanes used in the formation of SAMs are simple hydrocarbon, fluoroalkyl and end-group substituted silanes. Silanes with one hydrolyzeable group maintain interphase structure after deposition by forming a single oxane bond with the substrate. Silanes with three hydrolyzeable groups form siloxane (silsesquioxane) polymers after deposition, bonding both with each other as well as the substrate. For non-oxide metal substrates, silyl hydrides may be used, reacting with the substrate by a dehydrogenative coupling.

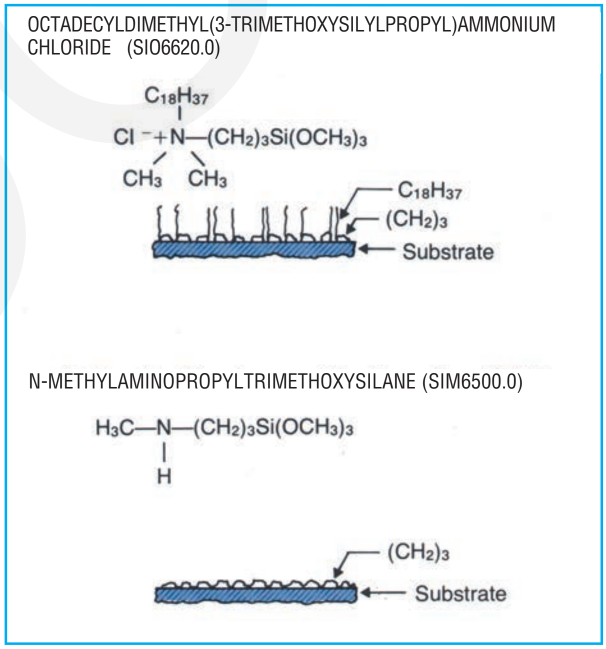
The perpendicular orientation of silanes with C_{10} or greater length can be utilized in micro-contact printing and other soft lithography methods. Here the silane may effect a simple differential adsorption, or if functionalized have a direct sensor effect.

Normal Phase HPLC of Carboxylic Acids with a C_{23}-Silane Bonded Phase



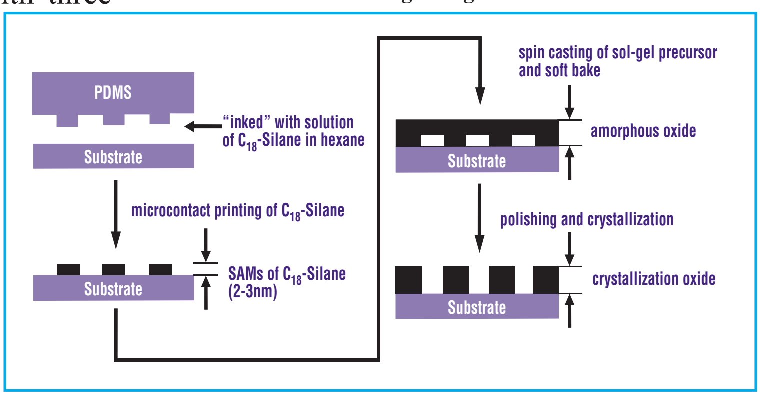
Column-C23, 60-5, 250x4.66mm; Mobile Phase-0.1% H_3PO_4, 1mL/min; Temperature 30°C; Detector-210 nm

Orientation effects of silanes for passive LCDs



F. Kahn., Appl. Phys. Lett. 22, 386, 1973

Micro-Contact Printing Using SAMs



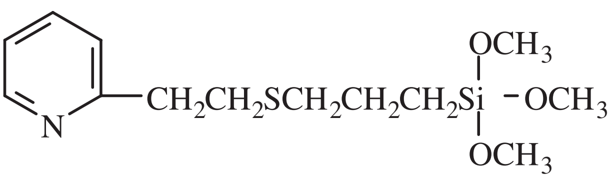
Modification of Metal Substrates

The optimum performance of silanes is associated with siliceous substrates. While the use of silanes has been extended to metal substrates, both the effectiveness and strategies for bonding to these less-reactive substrates vary. Four approaches of bonding to metals have been used with differing degrees of success. In all cases, selecting a dipodal or polymeric silane is preferable to a conventional trialkoxy silane.

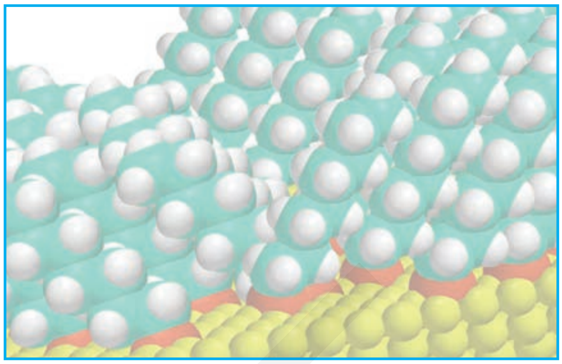
Metals that form hydrolytically stable surface oxides, e.g. aluminum, tin, titanium. These oxidized surfaces tend to have sufficient hydroxyl functionality to allow coupling under the same conditions applied to the siliceous substrates discussed earlier.

Metals that form hydrolytically or mechanically unstable surface oxides, e.g. iron, copper, zinc. These oxidized surfaces tend to dissolve in water leading to progressive corrosion of the substrate or form a passivating oxide layer without mechanical strength. The successful strategies for coupling to these substrates typically involves two or more silanes. One silane is a chelating agent such as a diamine, polyamine or polycarboxylic acid. A second silane is selected which has a reactivity with the organic component and reacts with the first silane by co-condensation. If a functional dipodal or polymeric silane is not selected, 10-20% of a non-functional dipodal silane typically improves bond strength.

Metals that do not readily form oxides, e.g. nickel, gold and other precious metals. Bonding to these substrates requires coordinative bonding, typically a phosphine, sulfur (mercapto), or amine functional silane. A second silane is selected which has a reactivity with the organic component. If a functional dipodal or polymeric silane is not selected, 10-20% of a non-functional dipodal silane typically improves bond strength.

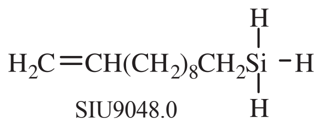


SIP6926.2



Octysilane adsorbed on titanium — figure courtesy of M. Banaszak-Holl

Metals that form stable hydrides, e.g. titanium, zirconium, nickel. In a significant departure from traditional silane coupling agent chemistry, the ability of certain metals to form so-called amorphous alloys with hydrogen is exploited in an analogous chemistry in which hydride functional silanes adsorb and then coordinate with the surface of the metal.[1] Most silanes of this class possess only simple hydrocarbon substitution such as octylsilane. However they do offer organic compatibility and serve to markedly change wet-out of the substrate. Both hydride functional silanes and treated metal substrates will liberate hydrogen in the presence of base or with certain precious metals such as platinum and associated precautions must be taken.



SIU9048.0

Coupling Agents for Metals*

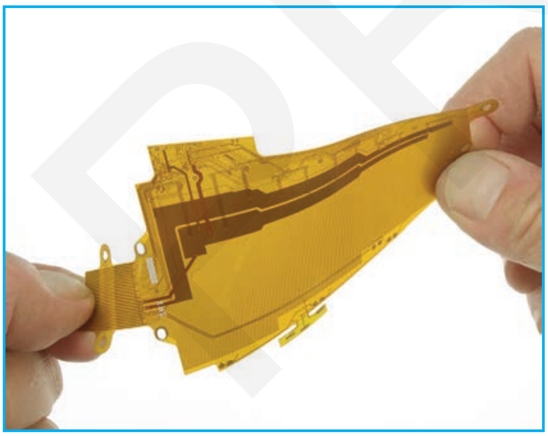
Metal	Class	Screening	Candidates
Copper	Amine	SSP-060	SIT8398.0
Gold	Sulfur Phosphorus	SIT7908.0 SID4558.0	SIP6926.2 SIB1091.0
Iron	Amine Sulfur	SIB1834.0 SIB1824.6	WSA-7011 SIM6476.0
Tin	Amine	SIB1835.5	
Titanium	Epoxy Hydride	SIG5840.0 SIU9048.0	SIE6668.0
Zinc	Amine Carboxylate	SSP-060 SIT8402.0	SIT8398.0 SIT8192.6

*These coupling agents are almost always used in conjunction with a second silane with organic reactivity or a dipodal silane.

1. B. Arkles et al J. Adhesion Science Technol, 2012, 26, 41.

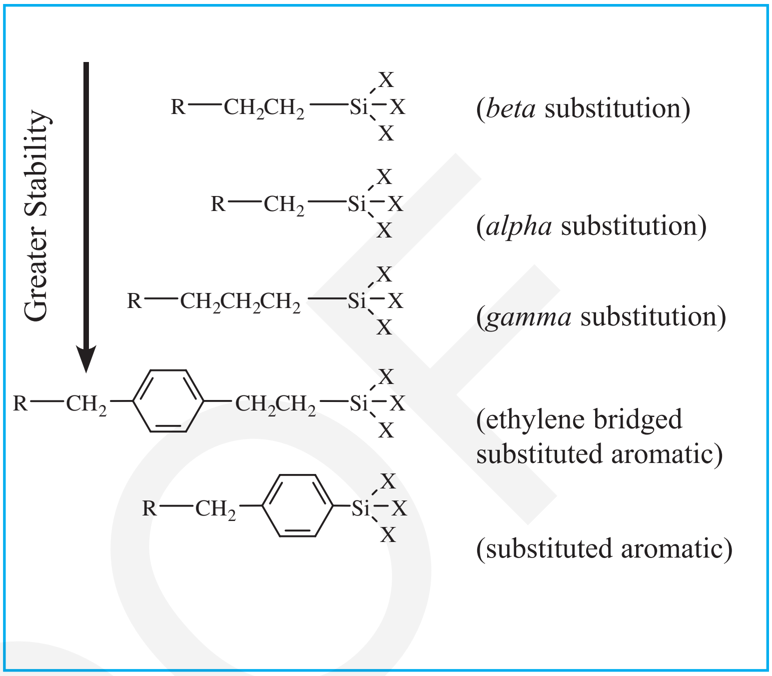
Thermal Stability of Silane Coupling Agents

The general order of thermal stability for silane coupling agents is depicted.Most commercial silane coupling agents have organic functionality separated from the silicon atom by three carbon atoms and are referred to as gamma-substituted silanes. The gamma-substituted silanes have sufficient thermal stability to withstand short-term process conditions of 350°C and long-term continuous exposure of 160°C. In some applications gamma-substituted silanes have insufficient thermal stability or other system requirements that can eliminate them from consideration. In this context, some comparative guidelines are provided for the thermal stability of silanes. Thermogravimetric Analysis (TGA) data for hydrolysates may be used for bench-marking. The specific substitution also plays a significant role in thermal stability. Electron withdrawing substitution reduces thermal stability, while electropositive groups enhance thermal stability.



Flexible multi-layer circuit boards for cell-phones utilize polyimide films coupled with chloromethylaromatic silanes.

Relative Thermal Stability of Silanes



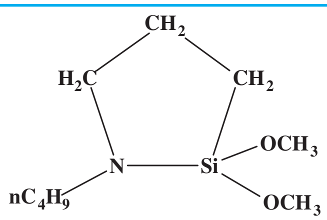
Thermal Stability of Silanes

SIA0025.0	$CH_3C(=O)OCH_2CH_2Si(OC_2H_5)_3$	220°
SIC2271.0	$ClCH_2CH_2CH_2Si(OCH_3)_3$	360°
SIM6487.4	$H_2C{=}C(CH_3)C(=O)OCH_2CH_2CH_2Si(OCH_3)_3$	395°
SIA0591.0	$H_2NCH_2CH_2N(H)CH_2CH_2CH_2Si(OCH_3)_3$	390°
SIA0588.0	$H_2NCH_2CH_2NHCH_2{-}C_6H_4{-}CH_2CH_2Si(OCH_3)_3$	435°
SIC2295.5	$ClCH_2{-}C_6H_4{-}CH_2CH_2Si(OCH_3)_3$	495°
SIA0599.1	$H_2N{-}C_6H_4{-}Si(OC_2H_5)_3$	485°
SIT8042.0	$CH_3{-}C_6H_4{-}Si(OCH_3)_3$	530°

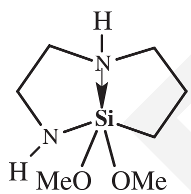
25% weight loss of dried hydrolysates as determined by TGA

Cyclic Azasilanes

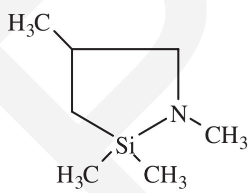
Volatile cyclic azasilanes are of particular interest in the surface modification of hydroxyl-containing surfaces, particularly inorganic surfaces such as nanoparticles and other nano-featured substrates. In these applications the formation of high functional density monolayers is critical. The cyclic azasilanes react with hydroxyl groups of a wide range of substrates at low temperatures by a ring-opening reaction that does not require water as a catalyst. Significantly, no byproducts of reaction form. The reactions of cyclic azasilanes are rapid at room temperature, even in the vapor phase. They also react rapidly at room temperature with isolated non-hydrogen bonded hydroxyls which do not undergo reaction with alkoxysilanes under similar conditions. The four most common cyclic azasilanes structures are depicted.



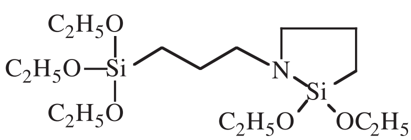
SIB1932.4



SID3543.0

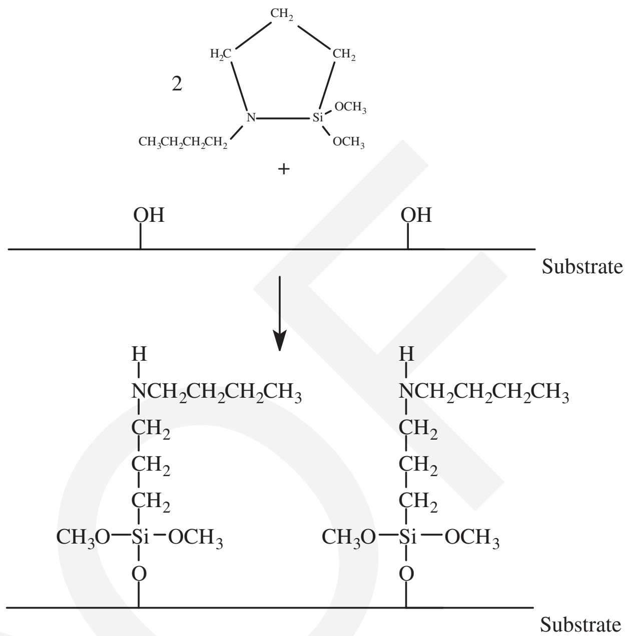


SIM6501.4



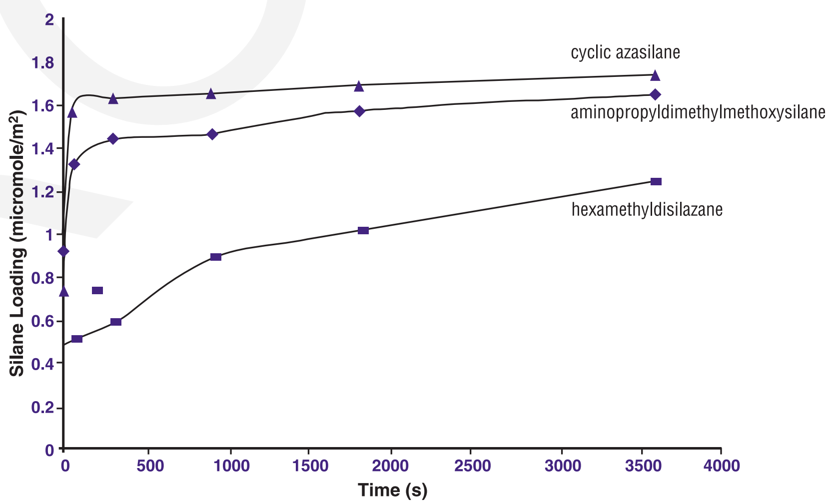
SIT8187.2

Anhydrous deposition with Cyclic Azasilanes



B. Arkles et al in Silanes and other Coupling Agents, Vol. 3. K Mittal ed VSP, 2004, p179.

Extent of reaction of organosilanes with fumed silica



M. Vedamuthu et al, J. Undergrad., Chem. Res., 1, 5, 2002

Aqueous Systems & Water-borne Silanes

Before most surface modification processes, alkoxysilanes are hydrolyzed forming silanol-containing species. The silanol-containing species are highly reactive intermediates which are responsible for bond formation with the substrate. In principal, if silanol species were stable, they would be preferred for surface treatments. Silanols condense with other silanols or with alkoxysilanes to form siloxanes. This can be observed when preparing aqueous treatment solutions. Initially, since most alkoxysilanes have poor solubility in water, two phases are observed. As the hydrolysis proceeds, a single clear phase containing reactive silanols forms. With aging, the silanols condense forming siloxanes and the solution becomes cloudy. Eventually, as molecular weight of the siloxanes increases, precipitation occurs.[1]

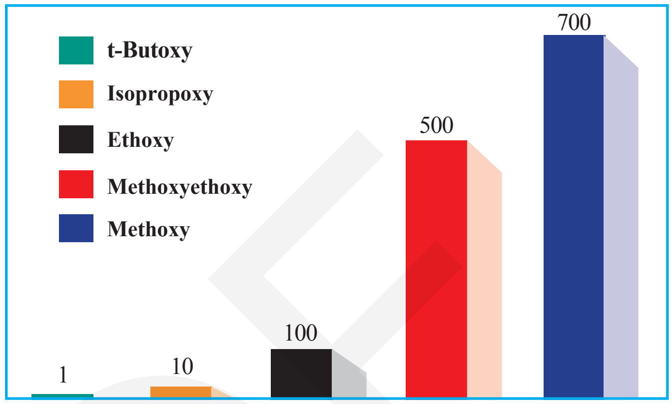
Hydrolysis and condensation of alkoxysilanes is dependent on both pH and catalysts. The general objective in preparing aqueous solutions is to devise a system in which the rate of hydrolysis is substantially greater than the rate of condensation beyond the solubility limit of the siloxane oligomers. Other considerations are the work-time requirements for solutions and issues related to byproduct reactivity, toxicity or flammability.

Stable aqueous solutions of silanes are more readily prepared if byproduct or additional alcohol is present in the solution since they contribute to an equilibrium condition favoring monomeric species.

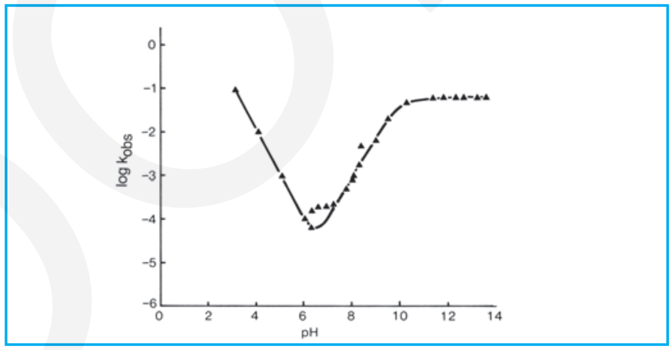
Water-borne coupling agent solutions are usually free of VOCs and flammable alcohol byproducts. Most water-borne silanes can be described as hydroxyl-rich silsesquioxane copolymers. Apart from coupling, silane monomers are included to control water-solubility and extent of polymerization. Water-borne silanes act as primers for metals, additives for acrylic latex sealants and as coupling agents for siliceous surfaces.

1. B. Arkles et al, "Factors contributing to the stability of alkoxysilanes in aqueous solutions", J. Adhesion Science Technology, 1992, 6(1), 193.

Relative Hydrolysis Rates of Hydrolyzable Groups

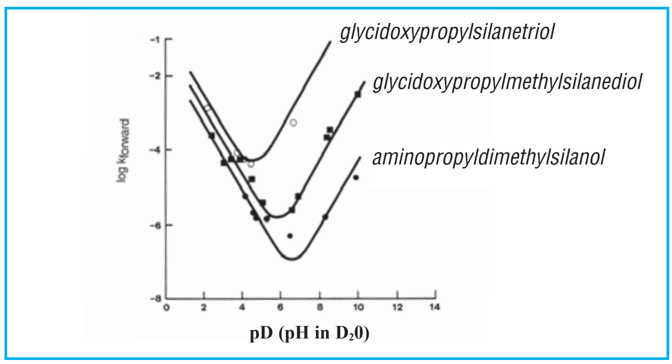


Hydrolysis Profile of Phenylbis(2-methoxyethoxy)silanol

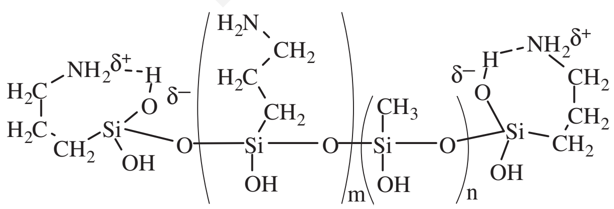


F. Osterholtz et al in Silanes and Other Coupling Agents ed K. Mittal, VSP, 1992, p119

Profile for Condensation of Silanols to Disiloxanes



E. Pohl et al in Silanes Surfaces and Interfaces ed., D. Leyden, Gordon and Breach, 1985, p481.



Water-borne Silsesquioxane Oligomers

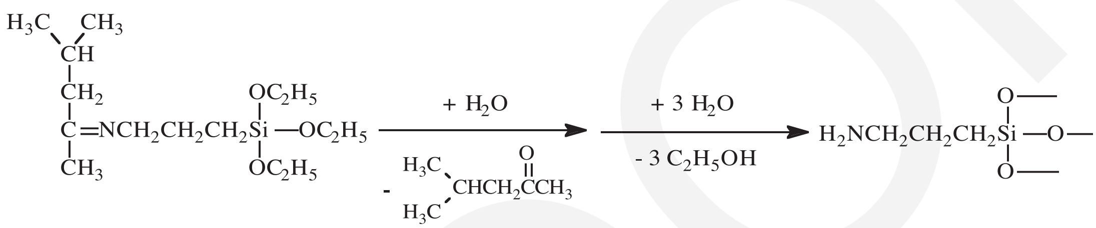
Code	Functional Group	Mole %	Molecular Weight	Weight % in solution
WSA-7011	Aminopropyl	65-75	250-500	25-28
WSA-9911	Aminopropyl	100	270-550	22-25
WSA-7021	Aminoethylaminopropyl	65-75	370-650	25-28
WSAV-6511	Aminopropyl, Vinyl	60-65	250-500	25-28

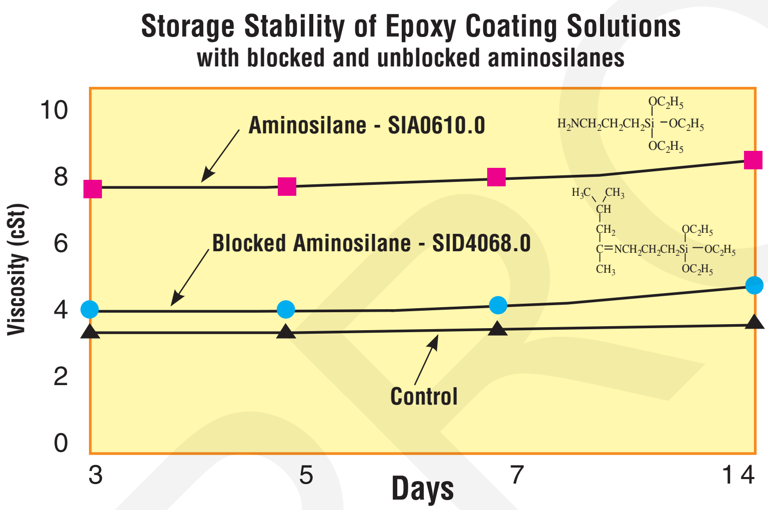
Masked Silanes - Latent Functionality

Maximum bond strength in some adhesion and bonding systems requires that the organic functionality of a silane coupling agent becomes available during a discrete time period of substrate - matrix contact. Examples are epoxy adhesives in which reaction of the silane with the resin increases viscosity of an adhesive to the extent that substrate wet-out is inhibited and pretreated fillers for composites which can react prematurely with moisture before melt compounding or vulcanization. A general approach is to mask the organic functionality of the silane which converts it to a storage-stable form and then to trigger the demasking with moisture, or heat concomitant with bonding or composite formation.

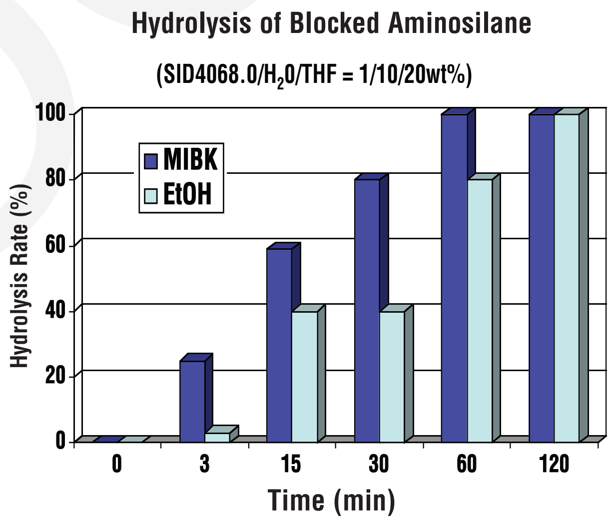
Masked Silanes - Moisture Triggered

Single-component liquid-cure epoxy adhesives and coatings employ dimethylbutylidene blocked amino silanes. These materials show excellent storage stability in resin systems, but are activated by moisture provided by water adsorbed on substrate surfaces or from humidity. Deblocking begins in minutes and is generally complete within two hours in sections with a diffusional thickness of less than 1mm.

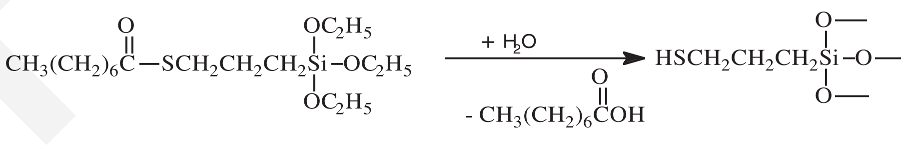




Epoxy Resin Solution: 50 parts bisphenol A epoxide, 5 parts SID4068.0 or SIA0610.0, 50 parts toluene.

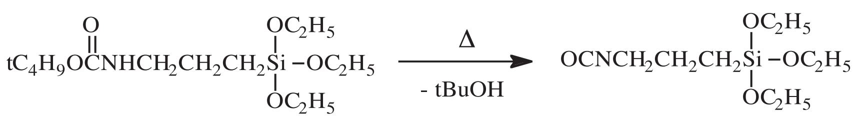


An alternative is to use the moisture adsorbed onto fillers to liberate alcohol which, in turn, demasks the organic functionality.



Masked Silanes - Heat Triggered

Isocyanate functionality is frequently delivered to resin systems during elevated temperature bonding or melt processing steps. Demasking temperatures are typically 160-200°C.



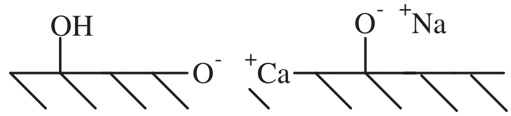
Difficult Substrates

Silane coupling agents are generally recommended for applications in which an inorganic surface has hydroxyl groups and the hydroxyl groups can be converted to stable oxane bonds by reaction with the silane. Substrates such as calcium carbonate, copper and ferrous alloys, and high phosphate and sodium glasses are not recommended substrates for silane coupling agents. In cases where a more appropriate technology is not available a number of strategies have been devised which exploit the organic functionality, film-forming and crosslinking properties of silane coupling agents as the primary mechanism for substrate bonding in place of bonding through the silicon atom. These approaches frequently involve two or more coupling agents.

Calcium carbonate fillers and marble substrates do not form stable bonds with silane coupling agents. Applications of mixed silane systems containing a dipodal silane or tetraethoxysilane in combination with an organofunctional silane frequently increases adhesion. The adhesive mechanism is thought to be due to the low molecular weight and low surface energy of the silanes which allows them initially to spread to thin films and penetrate porous structures followed by the crosslinking which results in the formation of a silica-rich encapsulating network. The silica-rich encapsulating network is then susceptible to coupling chemistry comparable to siliceous substrates. Marble and calciferous substrates can also benefit from the inclusion of anhydride-functional silanes which, under reaction conditions, form dicarboxylates that can form salts with calcium ions.

Metals and many metal oxides can strongly adsorb silanes if a chelating functionality such as diamine or dicarboxylate is present. A second organofunctional silane with reactivity appropriate to the organic component must be present. Precious metals such as gold and rhodium form weak coordination bonds with phosphine and mercaptan functional silanes.

High phosphate and sodium content glasses are frequently the most frustrating substrates. The primary inorganic constituent is silica and would be expected to react readily with silane coupling agents. However alkali metals and phosphates not only do not form hydrolytically stable bonds with silicon, but, even worse, catalyze the rupture and redistribution of silicon-oxygen bonds. The first step in coupling with these substrates is the removal of ions from the surface by extraction with deionized water. Hydrophobic dipodal or multipodal silanes are usually used in combination with organofunctional silanes. In some cases polymeric silanes with multiple sites for interaction with the substrate are used. Some of these, such as the polyethylenimine functional silanes can couple to high sodium glasses in an aqueous environment.



Substrates with low concentrations of non-hydrogen bonded hydroxyl groups, high concentrations of calcium, alkali metals or phosphates pose challenges for silane coupling agents.

Removing Surface Impurities

Eliminating non-bonding metal ions such as sodium, potassium and calcium from the surface of substrates can be critical for stable bonds. Substrate selection can be essential. Colloidal silicas derived from tetraethoxysilane or ammonia sols perform far better than those derived from sodium sols. Bulk glass tends to concentrate impurities on the surface during fabrication. Although sodium concentrations derived from bulk analysis may seem acceptable, the surface concentration is frequently orders of magnitude higher. Surface impurities may be reduced by immersion in 5% hydrochloric acid for 4 hours, followed by a deionized water rinse, and then immersion in deionized water overnight followed by drying.

Oxides with high isoelectric points can adsorb carbon dioxide, forming carbonates. These can usually be removed by a high temperature vacuum bake.

Increasing Hydroxyl Concentration

Hydroxyl functionalization of bulk silica and glass may be increased by immersion in a 1:1 mixture of 50% aqueous sulfuric acid : 30% hydrogen peroxide for 30 minutes followed by rinses in D.I. water and methanol and then air drying. Alternately, if sodium ion contamination is not critical, boiling with 5% aqueous sodium peroxodisulfate followed by acetone rinse is recommended[1].

1. K. Shirai et al, J. Biomed. Mater. Res. *53*, 204, 2000.

Catalyzing Reactions in Water-Free Environments

Hydroxyl groups without hydrogen bonding react slowly with methoxy silanes at room temperature. Ethoxy silanes are essentially non-reactive. The methods for enhancing reactivity include transesterification catalysts and agents which increase the acidity of hydroxyl groups on the substrate by hydrogen bonding. Transesterification catalysts include tin compounds such as dibutyldiacetoxytin and titanates such as titanium isopropoxide. Incorporation of transesterification catalysts at 2-3 weight % of the silane effectively promotes reaction and deposition in many instances. Alternatively, amines can be premixed with solvents at 0.01-0.5 weight % based on substrate prior or concurrent to silane addition. Volatile primary amines such as butylamine can be used, but are not as effective as tertiary amines such as benzyldimethylamine or diamines such as ethylenediamine. The more effective amines, however, are more difficult to remove after reaction[1].

1. S. Kanan et al, Langmuir, *18*, 6623, 2002.

Hydroxylation by Water Plasma & Steam Oxidation

Various metals and metal oxides including silicon and silicon dioxide can achieve high surface concentrations of hydroxyl groups after exposure to H_2O/O_2 in high energy environments including steam at 1050° and water plasma[1].

1. N. Alcanter et al, in "Fundamental & Applied Aspects of Chemically Modified Surfaces" ed. J. Blitz et al, 1999, Roy. Soc. Chem., p212.

Applying Silanes

Fig. 1 Reactor for slurry treatment of powders. Separate filtration and drying steps are required.

Deposition from aqueous alcohol solutions is the most facile method for preparing silylated surfaces. A 95% ethanol-5% water solution is adjusted to pH 4.5-5.5 with acetic acid. Silane is added with stirring to yield a 2% final concentration. Five minutes should be allowed for hydrolysis and silanol formation. Large objects, e.g. glass plates, are dipped into the solution, agitated gently, and removed after 1-2 minutes. They are rinsed free of excess materials by dipping briefly in ethanol. Particles, e.g. fillers and supports, are silylated by stirring them in solution for 2-3 minutes and then decanting the solution. The particles are usually rinsed twice briefly with ethanol. Cure of the silane layer is for 5-10 mins at 110°C or 24 hours at room temperature (<60% relative humidity).

Deposition from aqueous solution is employed for most commercial fiberglass systems. The alkoxysilane is dissolved at 0.5-2.0% concentration in water. For less soluble silanes, 0.1% of a non-ionic surfactant is added prior to the silane and an emulsion rather than a solution is prepared. The solution is adjusted to pH 5.5 with acetic acid. The solution is either sprayed onto the substrate or employed as a dip bath. Cure is at 110-120°C for 20-30 minutes. Stability of aqueous silane solutions varies from 2-12 hours for the simple alkyl silanes. Poor solubility parameters limit the use of long chain alkyl and aromatic silanes by this method. Distilled water is not necessary, but water containing fluoride ions must be avoided.

Bulk deposition onto powders, e.g. filler treatment, is usually accomplished by a spray-on method. It assumes that the total amount of silane necessary is known and that sufficient adsorbed moisture is present on the filler to cause hydrolysis of the silane. The silane is prepared as a 25% solution in alcohol. The powder is placed in a high intensity solid mixer, e.g. twin cone mixer with intensifier. The methods are most effective. If the filler is dried in trays, care must be taken to avoid wicking or skinning of the top layer of treated material by adjusting heat and air flow.

Fig. 2 Vacuum tumble dryers can be used for slurry treatment of powders.

Integral blend methods are used in composite formulations. In this method the silane is used as a simple additive. Composites can be prepared by the addition of alkoxysilanes to dry-blends of polymer and filler prior to compounding. Generally 0.2 to 1.0 weight percent of silane (of the total mix) is dispersed by spraying the silane in an alcohol carrier onto a preblend. The addition of the silane to non-dispersed filler is not desirable in this technique since it can lead to agglomeration. The mix is dry-blended briefly and then melt compounded. Vacuum devolatization of byproducts of silane reaction during melt compounding is necessary to achieve optimum properties. Properties are sometimes enhanced by adding 0.5-1.0% of tetrabutyl titanate or benzyldimethylamine to the silane prior to dispersal.

Fig. 3 Twin-cone blenders with intensive mixing bars are used for bulk deposition of silanes onto powders.

Anhydrous liquid phase deposition of chlorosilanes, methoxysilanes, aminosilanes and cyclic azasilanes is preferred for small particles and nano-featured substrates. Toluene, tetrahydrofuran or hydrocarbon solutions are prepared containing 5% silane. The mixture is refluxed for 12-24 hours with the substrate to be treated. It is washed with the solvent. The solvent is then removed by air or explosion-proof oven drying. No further cure is necessary. This reaction involves a direct nucleophilic displacement of the silane chlorines by the surface silanol. If monolayer deposition is desired, substrates should be predried at 150°C for 4 hours. Bulk deposition results if adsorbed water is present on the substrate. This method is cumbersome for large scale preparations and rigorous controls must be established to ensure reproducible results. More reproducible coverage is obtained with monochlorosilanes.

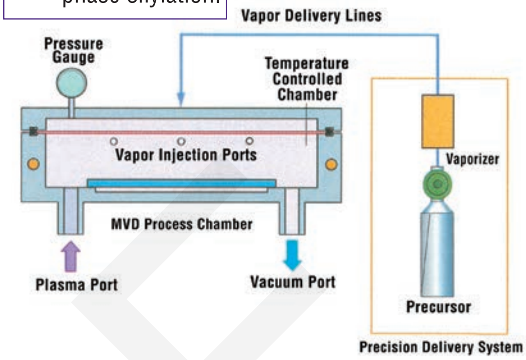
Chlorosilanes can also be deposited from alcohol solution. Anhydrous alcohols, particularly ethanol or isopropanol are preferred. The chlorosilane is added to the alcohol to yield a 2-5% solution. The chlorosilane reacts with the alcohol producing an alkoxysilane and HCl. Progress of the reaction is observed by halt of HCl evolution. Mild warming of the solution (30-40°C) promotes completion of the reaction. Part of the HCl reacts with the alcohol to produce small quantities of alkyl halide and water. The water causes formation of silanols from alkoxysilanes. The silanols condense on the substrate. Treated substrates are cured for 5-10 mins. at 110°C or allowed to stand 24 hours at room temperature.

Applying Silanes

Vapor Phase Deposition

Silanes can be applied to substrates under dry aprotic conditions by chemical vapor deposition methods. These methods favor monolayer deposition. Although under proper conditions almost all silanes can be applied to substrates in the vapor phase, those with vapor pressures >5 torr at 100°C have achieved the greatest number of commercial applications. In closed chamber designs, substrates are supported above or adjacent to a silane reservoir and the reservoir is heated to sufficient temperature to achieve 5mm vapor pressure. Alternatively, vacuum can be applied until silane evaporation is observed. In still another variation the silane can be prepared as a solution in toluene, and the toluene brought to reflux allowing sufficient silane to enter the vapor phase through partial pressure contribution. In general, substrate temperature should be maintained above 50° and below 120° to promote reaction. Cyclic azasilanes deposit the quickest- usually less than 5 minutes. Amine functional silanes usually deposit rapidly (within 30 minutes) without a catalyst. The reaction of other silanes requires extended reaction times, usually 4-24 hours. The reaction can be promoted by addition of catalytic amounts of amines.

Figure 4. Apparatus for vapor phase silylation.



Spin-On

Spin-On applications can be made under hydrolytic conditions which favor maximum functionalization and polylayer deposition or dry conditions which favor monolayer deposition. For hydrolytic deposition 2-5% solutions are prepared (see deposition from aqueous alcohol). Spin speed is low, typically 500 rpm. Following spin-deposition a hold period of 3-15 minutes is required before rinse solvent. Dry deposition employs solvent solutions such as methoxypropanol or ethyleneglycol monoacetate (EGMA). Aprotic systems utilize toluene or THF. Silane solutions are applied at low speed under a nitrogen purge. If strict monolayer deposition is preferred, the substrate should be heated to 50°. In some protocols, limited polylayer formation is induced by spinning under an atmospheric ambient with 55% relative humidity.

Figure 5. Spin-coater for deposition on wafers.

Spray Application

Formulations for spray applications vary widely depending on end-use. They involve alcohol solutions and continuously hydrolyzed aqueous solutions employed in architectural and masonry applications. The continuous hydrolysis is effected by feeding mixtures of silane containing an acid catalyst such as acetic acid into a water stream by means of a venturi (aspirator). Stable aqueous solutions (see water-borne silanes), mixtures of silanes with limited stability (4-8 hours) and emulsions are utilized in textile and fiberglass applications. Complex mixtures with polyvinyl acetates or polyesters enter into the latter applications as sizing formulations.

Figure 6. Spray application of silanes on large structures.

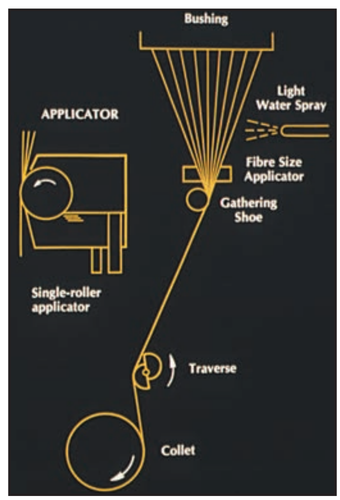


Figure 7. Spray & contact roller application of silanes on fiberglass.

Hydrophobic Silane Selection Guide

Hydrophobic silanes employed in surface moodification form the following major categories:

Methyl-Silanes very hydrophobic, hydrolysates stable to 425°C, acceptable performance to 600°C reported, volatile

3 Hydrolyzable Groups

Hydrolyzable Groups	Product Code	Product Name
chloro	SIM6520.0	methyltrichlorosilane
methoxy	SIM6560.0	methyltrimethoxysilane
ethoxy	SIM6555.0	methyltriethoxysilane
propoxy	SIM6579.0	methyltri-n-propoxysilane
methoxyalkoxy	SIM6585.0	methyltris(methoxyethoxy)silane
acetoxy	SIM6519.0	methyltriacetoxysilane
dimethylamine	SIT8712.0	tris(dimethylamino)methylsilane
other amine	SIT8710.0	tris(cyclohexylamino)methylsilane
silazane (NH)		
oxime	SIM6590.0	methyltris(methylethylketoximino)silane

Methyl-SiloxanylSilanes

3 or more Hydrolyzable Groups

Hydrolyzable Groups	Product Code	Product Name
2 silicon atom compounds		
chloro	SIT8572.6	trimethylsiloxytrichlorosilane
ethoxy	SIT7095.0	tetraethoxy-1,3-dimethyldisiloxane
acetoxy		
3 silicon atom compounds		
chloro		
methoxy		
ethoxy		
chloro		
oligomeric polysiloxanes		
chloro		
methoxy	SIM6560.2	methyltrimethoxysilane, oligomeric hydrolysate
ethoxy		
amine/silazane		
silanol		
selected specialties		
	SID4236.0	dimethyltetramethoxydisiloxane

Fumed silica treated with hexamethyldisilazane floats on water.

2 Hydrolyzable Groups

Product Code	Product Name
SID4120.0	dimethyldichlorosilane
SID4123.0	dimethyldimethoxysilane
SID4121.0	dimethyldiethoxysilane
SID4076.0	dimethyldiacetoxysilane
SIB1072.0	bis(dimethylamino)dimethylsilane
SIB1068.0	bis(diethylamino)dimethylsilane
SIH6102.0	hexamethylcyclotrisilazane

1 Hydrolyzable Group

Product Code	Product Name
SIT8510.0	trimethylchlorosilane
SIT8566.0	trimethylmethoxysilane
SIT8515.0	trimethylethoxysilane
SIT8568.0	trimethyl-n-propoxysilane
SIM6492.8	methoxypropoxytrimethylsilane
SIA0110.0	acetoxytrimethylsilane
SID3605.0	dimethylaminotrimethylsilane
SID3398.0	diethylaminotrimethylsilane
SIH6110.0	hexamethyldisilazane

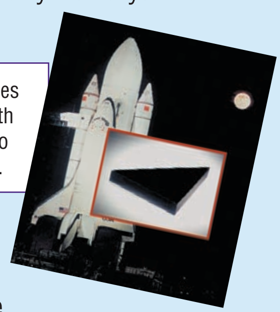
2 Hydrolyzable Groups

Product Code	Product Name
SID3372.0	dichlorotetramethyldisiloxane
SIT7534.0	tetramethyldiethoxydisiloxane
SID3360.0	dichlorohexamethyltrisiloxane
SID3394.0	1,5-diethoxyhexamethyltrisiloxane
SIB1837.0	bis(trimethylsiloxy)dichlorosilane
DMS-K05	chlorine terminated polydimethylsiloxane
DMS-XM11	methoxy terminated polydimethylsiloxane
DMS-XE11	ethoxy terminated polydimethylsiloxane
DMS-N05	dimethylamine terminated polydimethylsiloxane
DMS-S12	silanol terminated polydimethylsiloxane

1 Hydrolyzable Group

Product Code	Product Name
SIP6717.0	pentamethylacetoxydisiloxane
SIB1843.0	bis(trimethylsiloxy)methylmethoxysilane
SID4125.0	dimethylethoxysilane

Space Shuttle tiles are treated with dimethylethoxysilane to reduce water absorption.



Hydrophobic Silane Selection Guide

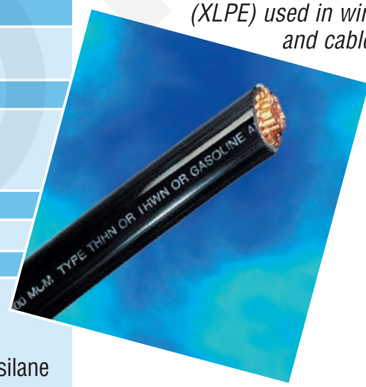
Linear Alkyl-Silanes

3 Hydrolyzable Groups

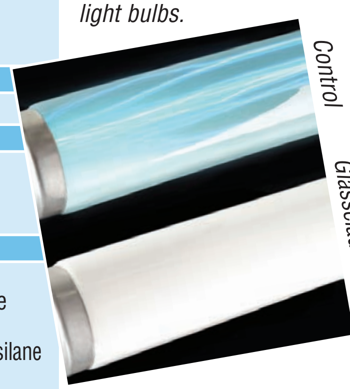
	Hydrolyzable Groups	Product Code	Product Name
C_2	hydrophobic, treatment for microporous mineral powders used as fillers for plastics		
	chloro	SIE4901.0	ethyltrichlorosilane
	methoxy	SIE4901.4	ethyltrimethoxysilane
	ethoxy	SIE4901.2	ethyltriethoxysilane
	acetoxy	SIE4899.0	ethyltriacetoxysilane
C_3	hydrophobic, treatment for microporous mineral powders used as fillers for plastics		
	chloro	SIP6915.0	propyltrichlorosilane
	methoxy	SIP6918.0	propyltrimethoxysilane
	ethoxy	SIP6917.0	propyltriethoxysilane
	amine/silazane		
C_4	moderate hydrophobicity, penetrates microporous structures, minimal organic compatibility		
	chloro	SIB1982.0	n-butyltrichlorosilane
	methoxy	SIB1988.0	n-butyltrimethoxysilane
	ethoxy	SIB1986.0	n-butyltriethoxysilane
	amine/silazane		
C_5	moderate hydrophobicity with minimal organic compatibility		
	chloro	SIP6720.0	pentyltrichlorosilane
	ethoxy	SIP6720.2	pentyltriethoxysilane
C_6	moderate hydrophobicity with moderate organic compatibility		
	chloro	SIH6167.0	hexyltrichlorosilane
	methoxy	SIH6168.5	hexyltrimethoxysilane
	ethoxy	SIH6167.5	hexyltriethoxysilane
C_7	moderate hydrophobicity with moderate organic compatibility		
	chloro	SIH5846.0	heptyltrichlorosilane
C_8	hydrophobic with moderate organic compatibility - generally most economical		
	chloro	SIO6713.0	octyltrichlorosilane
	methoxy	SIO6715.5	octyltrimethoxysilane
	ethoxy	SIO6715.0	octyltriethoxysilane
	amine		
	silazane (NH)		
C_{10}	hydrophobic, concentrates on surface of microporous structures		
	chloro	SID2663.0	decyltrichlorosilane
	methoxy	SID2670.0	decyltrimethoxysilane
	ethoxy	SID2665.0	decyltriethoxysilane
C_{11}	hydrophobic, concentrates on surface of microporous structures, forms SAMs		
	chloro	SIU9050.0	undecyltrichlorosilane
C_{12}	hydrophobic, concentrates on surface of microporous structures, forms SAMs		
	chloro	SID4630.0	dodecyltrichlorosilane
	methoxy	SID4635.0	dodecyltrimethoxysilane
	ethoxy	SID4632.0	dodecyltriethoxysilane
C_{14}	hydrophobic, concentrates on surface of microporous structures, forms SAMs		
	chloro	SIT7093.0	tetradecyltrichlorosilane
C_{16}	forms hydrophobic and oleophilic coatings, liquid a room temperature, forms SAMs		
	chloro	SIH5920.0	hexadecyltrichlorosilane
	methoxy	SIH5925.0	hexadecyltrimethoxysilane
	ethoxy	SIH5922.0	hexadecyltriethoxysilane
C_{18}	forms hydrophobic and oleophilic coatings allowing full miscibility with parafinic materials, forms SAMs		
	chloro	SIO6640.0	octadecyltrichlorosilane
	methoxy	SIO6645.0	octadecyltrimethoxysilane
	ethoxy	SIO6642.0	octadecyltriethoxysilane
	amine	SIO6648.0	octadecyltris(dimethylamino)silane
	proprietary	SIS6952.0/PPI-GC18	Siliclad®/Glassclad® 18
C_{20}	forms hydrophobic and oleophilic coatings, solid at room temperature		
	chloro	SIE4661.0	eicosyltrichlorosilane
C_{20-24}	forms hydrophobic and oleophilic coatings, solid at room temperature		
	chloro	SID4621.0	docosyltrichlorosilane blend
	ethoxy	SID4622.09	docosyltriethoxysilane blend
C_{26}-C_{34}	forms hydrophobic and oleophilic coatings, solid at room temperature		
	chloro	SIT8048.0	triacontyltrichlorosilane blend

2 Hydrolyzable Groups		1 Hydrolyzable Group	
Product Code	**Product Name**	**Product Code**	**Product Name**
SIE4896.0	ethylmethyldichlorosilane	SIE4892.0	ethyldimethylchlorosilane
SIP6912.0	propylmethyldichlorosilane	SIP6910.0	propyldimethylchlorosilane
SIP6914.0	propylmethyldimethoxysilane	SIP6911.0	propyldimethylmethoxysilane
		SID4591.0	dipropyltetramethyldisilazane
SIB1972.0	butylmethyldichlorosilane	SIB1934.0	n-butyldimethylchlorosilane
		SIB1937.0	n-butyldimethyl(dimethylamino)silane
SIP6719.9	pentylmethyldichlorosilane		
SIH6165.6	hexylmethyldichlorosilane		
SIH5845.0	heptylmethyldichlorosilane		
SIO6712.0	octylmethyldichlorosilane	SIO6711.0	octyldimethylchlorosilane
		SIO6711.1	octyldimethylmethoxysilane
SIO6712.2	octylmethyldiethoxysilane		
		SIO6711.3	octyldimethyl(dimethylamino)silane
		SID4404.0	dioctyltetramethyldisilazane
SID2662.0	decylmethyldichlorosilane	SID2660.0	decyldimethylchlorosilane
SID4628.0	dodecylmethyldichlorosilane	SID4627.0	dodecyldimethylchlorosilane
SID4629.0	dodecylmethyldiethoxysilane		
SIO6625.0	octadecylmethyldichlorosilane	SIO6615.0	octadecyldimethylchlorosilane
SIO6629.0	octadecylmethyldimethoxysilane	SIO6618.0	octadecyldimethylmethoxysilane
SIO6627.0	octadecylmethyldiethoxysilane		
		SIO6617.0	octadecyldimethyl(dimethylamino)silane
SID4620.0	docosylmethyldichlorosilane blend		
		SIT8045.0	triacontyldimethylchlorosilane blend

Long chain alkylsilanes are processing additives for crosslinked polyethylene (XLPE) used in wire and cable.



Surface conductivity of glass substrates is reduced by application of hydrophobic coatings. Surface arc-tracking is eliminated on fluorescent light bulbs.



Hydrophobic Silane Selection Guide

Branched and Cyclic Alkyl-Silanes

3 Hydrolyzable Groups

	Hydrolyzable Groups	Product Code	Product Name
C_3			
	chloro		
C_4			
	chloro	SII6453.0	isobutyltrichlorosilane
	methoxy	SII6453.7	isobutyltrimethoxysilane
	ethoxy	SII6453.5	isobutyltriethoxysilane
	chloro	SIB1985.0	t-butyltrichlorosilane
C_5			
	chloro	SIC2555.0	cyclopentyltrichlorosilane
	methoxy	SIC2557.0	cyclopentyltrimethoxysilane
C_6			
	chloro	SID4069.0	(3,3-dimethylbutyl)trichlorosilane
	ethoxy	SID4068.4	(3,3-dimethybutyl)triethoxysilane
	chloro	SIT7906.6	thexyltrichlorosilane
	chloro	SIC2480.0	cyclohexyltrichlorosilane
	methoxy	SIC2482.0	cyclohexyltrimethoxysilane
C_7 norbornene			
	chloro	SIB0997.0	bicycloheptyltrichlorosilane
	chloro	SIC2470.0	(cyclohexylmethyl)trichlorosilane
C_8			
	chloro	SII6457.0	isooctyltrichlorosilane
	methoxy	SII6458.0	isooctyltrimethoxysilane
	ethoxy	SII6453.5	isooctyltriethoxysilane
	chloro	SIC2490.0	cyclooctyltrichlorosilane
C_{10}			
C_{12}			
		SIA0325.0	adamantylethyltrichlorosilane
C_{16}			
		SIT8162.4	7-(trichlorosilylmethyl)pentadecane
C_{18} silahydrocarbon			
	chloro	SID4401.5	(di-n-octylmethylsilyl)ethyltrichlorosilane
C_{24}			
	chloro		
C_{28}			
	chloro	SIT8162.0	13-(trichlorosilylmethyl)heptacosane

Isobutyltriethoxysilane solutions in ethanol are applied by spray to protect architecture.

2 Hydrolyzable Groups		1 Hydrolyzable Group	
Product Code	**Product Name**	**Product Code**	**Product Name**
SII6463.0	isopropylmethyldichlorosilane	SII6462.0	isopropyldimethylchlorosilane
		SII6452.5	isobutyldimethylchlorosilane
SII6452.8	isobutylmethyldimethoxysilane		
SIB1972.2	t-butylmethyldichlorosilane	SIB1935.0	t-butyldimethylchlorosilane
		SID4065.0	(3,3-dimethylbutyl)dimethylchlorosilane
		SIT7906.0	thexyldimethylchlorosilane
SIC2468.0	cyclohexylmethyldichlorosilane	SIC2465.0	cyclohexyldimethylchlorosilane
SIC2469.0	cyclohexylmethyldimethoxysilane		
		SIB0994.0	bicycloheptyldimethylchlorosilane
		SII6456.6	isooctyldimethylchlorosilane
		SID4074.0	(dimethylchlorosilyl)methylpinane
		SID4401.0	(di-n-octylmethylsilyl)ethyldimethylchlorosilane
		SIC2266.5	11-(chlorodimethylsilylmethyl)tricosane
		SIC2266.0	13-(chlorodimethylsilylmethyl)heptacosane

Hydrophobic Silane Selection Guide

Phenyl- and Phenylalkyl-Silanes

3 Hydrolyzable Groups

	Hydrolyzable Groups	Product Code	Product Name
spacer atoms = 0	Moderate hydrophobicity, hydrolysates stable to 325° C; UV, radiation resistant		
	chloro	SIP6810.0	phenyltrichlorosilane
	methoxy	SIP6822.0	phenyltrimethoxysilane
	ethoxy	SIP6821.0	phenyltriethoxysilane
	acetoxy	SIP6790.0	phenyltriacetoxysilane
	oxime/amine	SIP6826.5	phenyltris(methylethylketoximino)silane
spacer atoms = 1			
	chloro	SIB0970.0	benzyltrichlorosilane
	ethoxy	SIB0971.0	benzyltriethoxysilane
	chloro	SIP6813.0	1-phenyl-1-trichlorosilylbutane
spacer atoms = 2	More hydrophobic, acid resistant than phenyl		
	chloro	SIP6722.0	phenethyltrichlorosilane
	methoxy	SIP6722.6	phenethyltrimethoxysilane
	amine/silazane		
spacer atoms = 3			
	chloro	SIP6744.6	(3-phenylpropyl)trichlorosilane
spacer atoms = 4			
	chloro	SIP6724.9	4-phenylbutyltrichlorosilane
	methoxy	SIP6724.92	4-phenylbutyltrimethoxysilane
	chloro	SIP6723.3	phenoxypropyltrichlorosilane
spacer atoms > 4			
	chloro	SIP6736.4	phenoxyundecyltrichlorosilane
	chloro	SIP6723.4	phenylhexyltrichlorosilane
	chloro		

Substituted Phenyl- and Phenylalkyl-Silanes

	Hydrolyzable Groups	Product Code	Product Name
spacer atoms = 0	More hydrophobic than phenyl, peroxide crosslinkable		
	chloro	SIT8040.0	p-tolyltrichlorosilane
	methoxy	SIT8042.0	p-tolyltrimethoxysilane
spacer atoms = 2	Greater compatibility with styrenics, acrylics		
	methyl/chloro		
	ethyl/chloro		
	ethyl/methoxy	SIE4897.5	ethylphenethyltrimethoxysilane
	t-butyl/chloro	SIB1973.0	p-(t-butyl)phenethyltrichlorosilane
spacer atoms = 3			
	chloro	SIM6492.5	3-(p-methoxyphenyl)propyltrichlorosilane

Napthyl-Silanes

Forms high refractive index coatings

	Hydrolyzable Groups	Product Code	Product Name
	methoxy	SIN6597.0	1-napthyltrimethoxysilane
	chloro	SIN6596.0	(1-napthylmethyl)trichlorosilane

Specialty Aromatic- Silanes

	Hydrolyzable Groups	Product Code	Product Name
spacer atoms = 0			
	chloro		
spacer atoms = 4			
	chloro		

2 Hydrolyzable Groups		1 Hydrolyzable Group	
Product Code	Product Name	Product Code	Product Name
SIP6738.0	phenylmethyldichlorosilane	SIP6728.0	phenyldimethylchlorosilane
SIP6740.0	phenylmethyldimethoxysilane		
SIP6739.0	phenylmethyldiethoxysilane	SIP6728.4	phenyldimethylethoxysilane
SIP6736.8	phenylmethylbis(dimethylamino)silane		
SIP6738.5	1-phenyl-1-methyldichlorosilylbutane	SIB0962.0	benzyldimethylchlorosilane
SIP6721.5	phenethylmethyldichlorosilane	SP6721.0	phenethyldimethylchlorosilane
SIM6512.5	(2-methyl-2-phenethyl) methydlichlorosilane	SIP6721.2	phenethyldimethyl(dimethylamino)silane
SIP6744.0	(3-phenylpropyl)methyldichlorosilane	SIP6743.0	(3-phenylpropyl)dimethylchlorosilane
SIP6724.8	4-phenylbutylmethyldichlorosilane	SIP6724.7	4-phenylbutyldimethylchlorosilane
SIP6723.25	phenoxypropylmethyldichlorosilane	SIP6723.2	phenoxypropyldimethylchlorosilane
		SIP6736.3	(6-phenylhexyl)dimethylchlorosilane
		SIP6729.5	(12-phenyldodecyl)dimethylchlorosilane
SIT8035.0	p-tolylmethydichlorosilane	SIT8030.0	p-tolyldimethylchlorosilane
SIT8035.6	p-tolylmethyldimethoxysilane		
SIM6511.0	(p-methylphenethyl)methyldichlorosilane		
		SIE4897.2	m,p-ethylphenethyldimethylchlorosilane
		SIB1972.5	p-(t-butyl)phenethyldimethylchlorosilane
SIM6492.4	3-(p-methoxyphenyl)propylmethyldichlorosilane		
		SIP6723.0	m-phenoxyphenyldimethylchlorosilane
		SIN6598.0	p-nonylphenoxypropyldimethylchlorosilane

Hydrophobic Silane Selection Guide

Fluorinated Alkyl-Silanes - linear

3 Hydrolyzable Groups

	Hydrolyzable Groups	Product Code	Product Name
C_3	Moderately polar hydrophobic coating		
	chloro	SIT8371.0	(3,3,3-trifluoropropyl)trichlorosilane
	methoxy	SIT8372.0	(3,3,3-trifluoropropyl)trimethoxysilane
	amine/silazane		
C_6	Hydrophobic films		
	chloro	SIN6597.6	nonafluorohexyltrichlorosilane
	methoxy	SIN6597.7	nonafluorohexyltrimethoxysilane
	ethoxy	SIN6597.65	nonafluorohexyltriethoxysilane
	amino/silazane	SIN6597.4	nonafluorohexyltris(dimethylamino)silane
C_8	Hydrophobic, oleophobic films		
	chloro	SIT8174.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)trichlorosilane
	methoxy	SIT8176.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)trimethoxysilane
	ethoxy	SIT8175.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)triethoxysilane
C_{10}	Forms oleophobic films with extremely low surface energy		
	chloro	SIH5841.0	(heptadecafluoro-1,1,2,2-tetrahydrodecyl)trichlorosilane
	methoxy	SIH5841.5	(heptadecafluoro-1,1,2,2-tetrahydrodecyl)trimethoxysilane
	ethoxy	SIH5841.2	(heptadecafluoro-1,1,2,2-tetrahydrodecyl)triethoxysilane
C_{12}			
	chloro	SIH5840.25	heneicocyl-1,1,2,2-tetrahydrodecyltrichlorosilane

Fluorinated Alkyl-Silanes - branched

1 x 3 fluorinated carbons	chloro	SIH5842.0	heptafluoroisopropoxypropyltrichlorosilane
	methoxy	SIH5842.2	heptafluoroisopropoxypropyltrimethoxysilane
2 x 4 fluorinated carbons	chloro	SIB1706.0	bis(nonafluorohexyldimethylsiloxy)methyl-silylethyldimethylchlorosilane
2 x 6 fluorinated carbons	chloro	SIT8176.3	tridecafluoro-2-(tridecafluorohexyl)decyltrichlorosilane

DiAlkyl Silanes

2 Hydrolyzable Groups

Highest Carbon #	Next Carbon #	Hydrolyzable Groups	Product Code	Product Name
C_2	C_2			
		chloro	SID3402.0	diethyldichlorosilane
		ethoxy	SID3404.0	diethyldiethoxysilane
C_3	C_3			
		chloro	SID3537.0	diisopropyldichlorosilane
		methoxy	SID3538,0	diisopropyldimethoxysilane
C_4	C_4			
		chloro	SID3203.0	di-n-butyldichlorosilane
		methoxy	SID3214.0	di-n-butyldimethoxysilane
		methoxy	SID3530.0	diisobutyldimethoxysilane
		ethoxy	SID3528.0	diisobutyldiethoxysilane
C_4	C_3			
		methoxy	SII6452.6	isobutylisopropyldimethoxysilane
C_5	C_5			
		chloro	SID3390.0	dicyclopentyldichlorosilane
		methoxy	SID3391.0	dicyclopentyldimethoxysilane
C_6	C_6			
		chloro	SID3510.0	di-n-hexyldichlorosilane
		chloro	SID3382.0	dicyclohexyldichlorosilane
C_8	C_8			
		chloro	SID4400.0	di-n-octyldichlorosilane
		methoxy	SID4400.4	di-n-octyldimethoxysilane

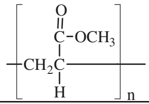
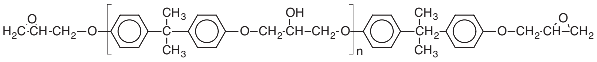
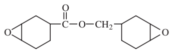
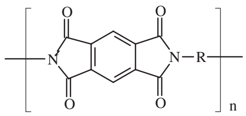
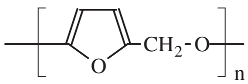
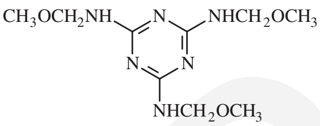
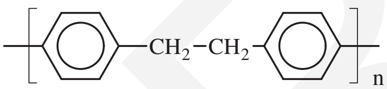
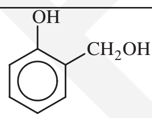
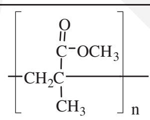
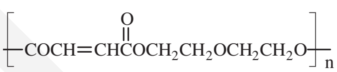
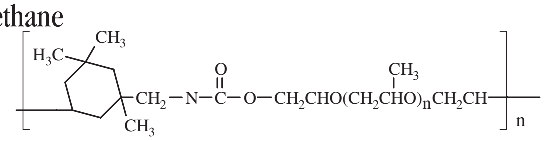
2 Hydrolyzable Groups		1 Hydrolyzable Group	
Product Code	**Product Name**	**Product Code**	**Product Name**
SIT8369.0 SIT8370.0	(3,3,3-trifluoropropyl)methyldichlorosilane (3,3,3-trifluoropropyl)methyldimethoxysilane	SIT8364.0 SIB1828.4	(3,3,3-trifluoropropyl)dimethylchlorosilane bis(trifluoropropyl)tetramethyldisilazane
SIN6597.5	nonafluorohexylmethyldichlorosilane	SIN6597.3 SIN6597.4	nonafluorohexyldimethylchlorosilane
SIT8172.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)methyldichlorosilane	SIT8170.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)dimethylchlorosilane
SH5840.6	(heptadecafluoro-1,1,2,2-tetrahydrodecyl)methyldichlorosilane	SIH5840.4	(heptadecafluoro-1,1,2,2-tetrahydrodecyl)dimethylchlorosilane

Pigments *treated with hydrophobic silanes resist agglomeration in highly polar vehicle and film-forming compositions such as those used in nail polish.*

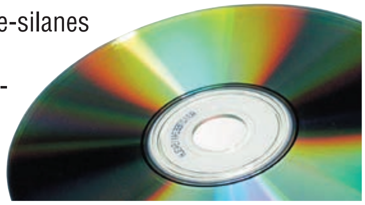
Acrylate-silanes in dental restorative composites.

Silane Coupling Agents for Thermosets

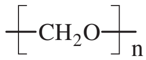
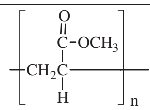
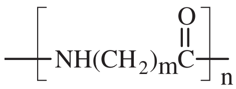
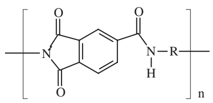
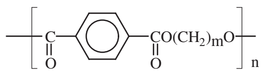
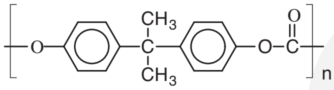
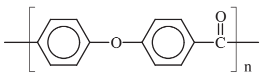
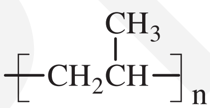
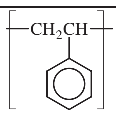
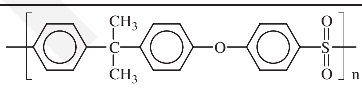
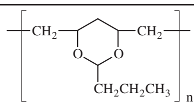
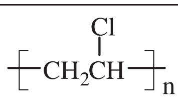
Selection Chart

Resin	Structure	Coupling Agent Class	Suggestions for Primary Screening	
Acrylate, UV cure		Acrylate	SIA0200.0	SIM6487.4
		Vinyl/Olefin	SIS6990.0	
Diallylphthalate		Amine	SIA0591.0	SIA0610.0
		Vinyl/Olefin	SIS6964.0	
		Dipodal	SIB1824.5	
Epoxy		Amine	SIA0591.0	SIT8398.0
		Anhydride	SIT8192.6	
		Epoxy	SIG5840.0	
		Dipodal	SIB1834.0	
Epoxy, UV Cure		Amine	SIA0591.0	SIT8398.0
		Epoxy	SIE4668.0	SIE4670.0
Polyimide		Amine	SIA0599.2	SIA0591.0
		Halogen	SIC2295.5	SIC2296.2
		Dipodal	SIB1833.0	
Furan		Amine	SIA0611.0	SIA0599.0
		Epoxy	SIG5840.0	
Melamine		Amine	SIA0611.0	SIA0599.0
		Hydroxyl	SIB1140.0	
		Dipodal	SIB1833.0	SIT8717.0
Parylene		Halogen	SIC2295.5	
		Vinyl/Olefinic	SIS6990.0	SIM6487.4
		Dipodal	SIB1832.0	VMM-010
Phenol-formaldehyde		Amine	SIA0611.0	SIT8187.5
		Epoxy	SIE4670.0	SIG5840.0
Methylmethacrylate, cast		Acrylate	SIM6487.4	SIA0200.0
		Amine	SIB1828.0	
Polyester, unsaturated		Acrylate	SIM6487.4	
		Vinyl/Olefin	SIS6994.0	SIV9112.0
Urea-formaldehyde		Amine	SIA0610.0	SIU9055.0
		Hydroxyl	SIB1140.0	
Urethane		Amine	SIA0610.0	SIM6500.0
		Isocyanate	SII6455.0	
		Sulfur	SIM6476.0	

Diamine-silanes couple polycarbonate in CDs



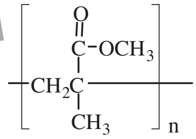
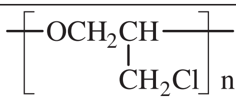
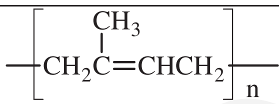
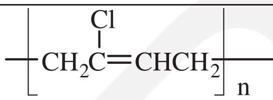
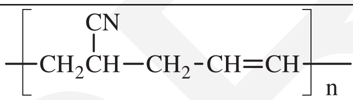
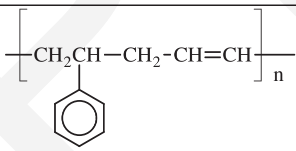
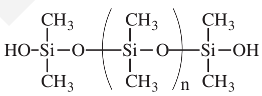
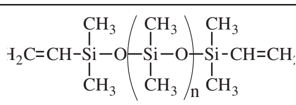
Silane Coupling Agents for Thermoplastics
Selection Chart

		Coupling Agent Class	Suggestions for Primary Screening	
Polyacetal		Vinyl/Olefin	SIS6994.0	
Polyacrylate		Amine	SIU9058.0	SIA0610.0
Polyamide		Amine Dipodal Water-borne	SIA0610.0 SIB1834.1 WSA-7011	SIA0614.0 SSP-060
Polyamide-imide		Amine Halogen	SIA0610.0 SIC2295.5	
Polybutylene terephthalate		Amine Isocyanate	SIA0610.0 SII6455.0	
Polycarbonate		Amine	SIA0591.0	SIA0610.0
Polyether ketone		Amine Dipodal	SIA0591.0 SIT8717.0	
Polyethylene		Amine Vinyl/Olefin	SIA0591.0 SSP-055	SIT8398.0 SIV9112.0
Polyphenylene sulfide		Amine Halogen Sulfur	SIA0605.0 SIC2295.5 SIM6476.0	
Polypropylene		Acrylate Azide Vinyl/Olefin	SIM6487.4 SIA0780.0 VEE-005	 SSP-055
Polystyrene		Acrylate Dipodal	SIM6487.4 SIB1831.0	
Polysulfone		Amine	SIA0591.0	SIU9055.0
Polyvinyl butyral		Amine	SIA0611.0	SIU9058.0
Polyvinyl chloride		Amine Sulfur	SIA0605.0 SIM6474.0	 SIB1825.0

Water-borne aminosilanes increase bonding of acrylic latex sealants

Silane Coupling Agents for Sealants & Elastomers

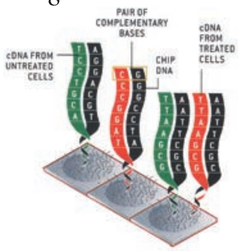
Selection Chart

		Coupling Agent Class	Suggestions for Primary Screening	
Acrylic latex		Acrylate Vinyl/Olefin Water-borne	SIM6487.4 SIV9210.0 WSA-7021	 SIV9218.0 WSA-6511
Butyl	$-[CH_2CH=CHCH_2]_n-$	Acrylate Sulfur Vinyl/Olefin	SIM6487.4 SIB1825.0 SSP-055	 SIM6476.0 VEE-005
Epichlorohydrin		Amine Sulfur	SIA0605.0 SIM6474.0	
Fluorocarbon	$-(CF_2CF_2)_m(CH_2CF_2)_n-$	Amine Dipodal	SIB1834.1 SIT8717.0	
Isoprene		Sulfur Vinyl/Olefin	SIM6474.0 SSP-055	SIM6476.0 VEE-005
Neoprene		Sulfur Vinyl/Olefin	SIM6474.0 SSP-055	SIM6476.0 VEE-005
Nitrile		Epoxy Sulfur	SIG5840.0 SIB1825.0	
Polysulfide	$-[CH_2CH_2S]_n-$	Epoxy Sulfur	SIG5840.0 SIB1825.0	 SIM6476.0
SBR		Amine Sulfur	SIA0605.0 SIB1825.0	 SIM6486.0
Silicone (hydroxyl terminated)		Amine Vinyl/Olefin Dipodal	SIA0605.0 SIV9098.0 SIB1824.0	SIA0589.0 VMM-010
Silicone (vinyl terminated)		Acrylate Vinyl/Olefin	SIM6487.4 SIA0540.0	 VMM-010

aldehyde-, amino-, and hydroxyl- silanes couple DNA in array technology

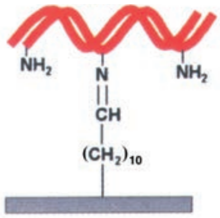
Silane Coupling Agents for Biomaterials
Selection Chart

	Site/Type	Coupling Class	Co-reactant	Suggestions for Screening	
Oligonucleotides		*hydroxyl*		*SIB1140.0*	
		diamine	*cobalt ethylenediamine*	*SIA0591.0*	
		semicarbazide		*SIS6944.0*	



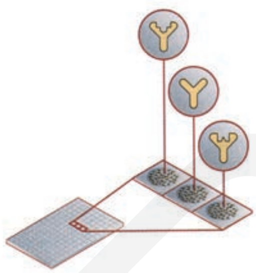
G. McGall et al, J. Am. Chem. Soc., *119*, 5081, 1997. **F. Chow**, in "Silylated Surfaces" D. Leyden ed., Gordon & Breach, 1978, p.301. **M. Podyminogin** et al, Nucleic Acid Res., 2001, 29, 5090.

	Site/Type	Coupling Class	Co-reactant	Suggestions for Screening	
DNA	*terminal favored*	*vinyl/olefin*		*SIO6708.0*	*SIU9049.0*
	pendant amine	*aldehyde*		*SIT8194.0*	
	pendant amine	*diamine*		*SIA0594.0*	*SID3543.0*
	pendant amine	*epoxy*		*SIE4675.0*	*SIG5838.0*



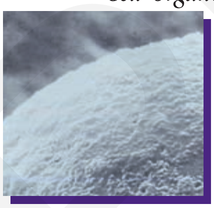
A. Bensimon, Science, *265*, 2096, 1994. **J. Grobe** et al, J. Chem. Soc. Chem. Commun, 2323, 1995. **C. Kneuer** et al, Int'l J. Pharmaceutics, *196(2)*, 257, 2000.

	Site/Type	Coupling Class	Co-reactant	Suggestions for Screening	
Protein	*lysine*	*aldehyde*		*SIT8194.0*	
	lysine	*amine*	*glutaraldehyde*	*SIA0611.0*	*SIA0595.0*
	lysine	*amine*	*thiophosgene*	*SIA0611.0*	
	cysteine	*sulfur*	*dithionite*	*SIM6476.0*	
	tyrosine	*nitrobenzamide*	*$NaNO_2$/HCl*	*SIT8191.0*	*SIA0599.0*
	heparinated	*amine/quat*		*SSP-060*	*SIT8415.0*
	immunoglobin	*pyridyl-thio*		*SIP6926.4*	
	antibody	*cyano*		*SIC2456.0*	



J. Grobe et al, J. Chem. Soc. Chem. Commun, 2323, 1995. **H. Weetall**, US Pat. 3,652,761. **G. Royer**, CHEMTECH, *4*, 699, 1974. **S. Bhatia** et al, Anal. Biochem., *178*, 408, 1989. **J. Venter** et al, Proc. Nat. Acad. Soc., *69(5)*, 1141, 1972. **R. Merker** et al, Proc. Artificial Heart Prog. Conf., June 9-13, 1969 HEWNIH, p29. **S. Falipou**, Fundamental & Applied Aspects of Chemically Modified Surfaces, p389, 1999.

	Site/Type	Coupling Class	Co-reactant	Suggestions for Screening	
Cell-Organelle					
	chloroplast	*alkyl*		*SIO6645.0*	
	mitochondria	*alkyl*		*SIO6645.0*	



mitochondria on silica bead

B. Arkles et al, in "Silylated Surfaces" D. Leyden ed., Gordon & Breach, 1978, p363. **B. Arkles** et al, J. Biol. Chem., *250*, 8856, 1975.

	Site/Type	Coupling Class	Co-reactant	Suggestions for Screening	
Whole Cell					
	erythrocytes	*short alkyl*		*SIE4901.4*	

erythrocytes on glass wall

B. Arkles et al, in "Silylated Surfaces" D. Leyden ed., Gordon & Breach, 1978, p363.

	Site/Type	Coupling Class	Co-reactant	Suggestions for Screening	
Whole Cell (causing lysis)	*procaryotic*	*alkyl-quat*		*SIO6620.0*	
				SID3392.0	

W. White et al in "Silanes, Surfaces & Interfaces" ed. D. Leyden, Gordon & Breach, 1986, p. 107.

	Site/Type	Coupling Class	Co-reactant	Suggestions for Screening	
Tissue	*histological samples*			*SIA0611.0*	*SIA0610.0*

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BOND DISSOCIATION ENERGIES IN ORGANOSILICON COMPOUNDS

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Introduction

All practicing chemists need to know bond strengths. How else can they have any idea of the magnitude of the forces holding the atoms together in a molecule? Traditionally we express the strengths of these forces as energies, and additionally we focus strongly on *dissociation* energies because it is natural to ask "how much energy does it take to break a bond?" This has to be made clear at the outset because the term 'bond energy' without the qualifier 'dissociation' has the different meaning of an average. Not only is the meaning different, but the values are often quite different, and this is particularly true in silicon chemistry.

The purpose of this brief account is to provide a summary of current values and to use these values to illustrate aspects of structure and bonding in organosilicon compounds and illuminate some of the synthetically most well known processes of organosilicon chemistry. It is not meant as an exhaustive review. For those who wish to delve more deeply, some useful references are offered at the end of the article.

Measurement

There are many methods of measuring bond dissociation energies. One of the most appealing, because it is the most direct, is somehow to dial in and record the exact amount of energy needed to break the bond and watch the molecule fall apart into two fragments. In principle this can be done nowadays by the technique of laser-induced photodissociation. But the circumstances need to be favorable (the molecule must absorb in the right energy region!) and only a few selected values have been obtained in this way (and none yet in organosilicon compounds). By and large the more successful methods are less direct. The bulk of them fall into the categories of kinetics, spectroscopy and ion threshold measurements. The scope of this article is too limited to offer experimental details of these methods. Over the period of my own involvement in this field (some 30 years) there has been steady refinement starting from a situation where some values were uncertain to as much as ± 10 kcal mol^{-1} (and a lot not known at all) to one where many are now known to ± 1 kcal mol^{-1} and some to better than ± 0.5 kcal mol^{-1}. In 1966, for example, the average bond energy, D(Si-H) = 77 kcal mol^{-1} was quoted for $D(H_3Si\text{-}H)$ which is now known to have a value of 91.8 ± 0.5 kcal mol^{-1}.

It needs to be remembered, however, that the bulk of bond dissociation energy values come, not from measurement at all, but indirectly, by use of thermochemical cycles, *viz*, where D(R-X) is the desired bond dissociation energy, $\Delta H_f^O(R)$ and $\Delta H_f^O(X)$ are the radical product enthalpies of formation and $\Delta H_f^O(RX)$ is the molecular enthalpy of formation. Thus, the reliability of a particular dissociation energy depends on three ancillary ΔH_f^O values. The current database of enthalpies of formation of organosilicon compounds and radicals is not particularly large and, most serious of all, the traditional method of measurement, calorimetry, has almost become extinct in the world's chemistry laboratories. In light of this it is not surprising that *ab initio* theoretical chemistry has taken over the task of calculating, but it carries the risk that, if theory outpaces experiment too far, we build our quantitative edifice on increasingly inadequate foundations.

Values

The currently best data for all Si-X bonds have undergone increases of *ca* + 2kcal mol^{-1} (and occasionally more) since my 1981 review. This is now quite well documented and arose because erroneous assumptions were made about the magnitude of activation energies for reactions of silyl radicals with HI and HBr (which have now been experimentally measured). Listed here are the data, based on experiment, for representative molecules containing Si-H, Si=C, Si-Si, Si-Hal, Si-O, and Si-N bonds. Values from theory are generally in reasonable, if not precise, agreement, but are not given here.

(i) Si-H bonds

The data of table 1 show that Si-H bonds, for which dissociation energies are known, lie in the range of 84 – 104 kcal mol^{-1}. They are generally slightly weaker than the analogous C-H bonds in organic compounds (exceptions are Ar_nH_{3-n}Si-H bonds). Me-, Cl- and F- substituents are bond strengthening, while R_3Si- and Ph- are bond weakening. These effects can be understood in terms of electronegativity (the bond strengtheners) and the rather limited willingness of Si-centered radicals to delocalize with π-bonded systems (Ph substituent). Whereas Me substituents were originally thought to have no effect on Si-H bonds, they appear now to exert a small but significant strengthening. The same is true for all other Si-X bonds to a greater or lesser extent (see tables 2-4).

(ii) Si-C bonds

The data of table 2 gives values for Si-C bonds showing them to be as strong as, and in some cases, stronger than, the analogous C-C bonds. It is interesting to note that Me substitution strengthens when at silicon but weakens when at carbon.

(iii) Si-Si bonds

The data of table 3 shows that the Si-Si bonds are subject to the same influences as Si-H bonds. It was noted earlier that the silyl substituent weakening effect extends to elemental silicon itself where the average Si-Si bond energy is 54 kcal mol^{-1}. Si-Si bonds are definitely weaker than analogous C-C bonds.

(iv) Si-Hal bonds

The data of table 4 shows the extraordinarily high strengths of the Si-halogen bonds. The Si-F bond in SiF_4 is the strongest single bond known. The Si-hal and, indeed, the Si-O and Si-N bonds (see tables 5 and 6) are all much stronger than their carbon counterparts. This has been attributed to p_π- back bonding, but other explanations are possible.

(v) Si-O and SiO-X bonds

The data of table 5 reveal the high strengths of Si-O bonds, but also the significant strengthening effect of an Me_3Si group as a substituent on oxygen. Thus, the O-H bond in Me_3SiOH has a strength close to that in H_2O (119 kcal mol^{-1}). Also the Si-O bond in $(Me_3Si)_2O$ is much stronger than that in Me_3SiOMe.

(vi) Si-N and SiN-X bonds

The data of table 6 show the same features as that of table 5, *viz* strong Si-N bonds and striking Me_3Si substituent strengthening effects. The N-H bond in $(Me_3Si)_2NH$ is actually stronger than in NH_3.

(vii) π-bond energies

These are the values required for the notional process, where the product species is the supposed 1,2-diradical with non-interacting (orthogonal) singly occupied orbitals. The values come from heats of hydrogenation (estimated) and σ-bond dissociation energies. The

$$M{=}M \longrightarrow \dot{M}{-}\dot{M}$$

reference values for purely organic species show that, approximately, the Si=Si and Si=C π-bonds have 40% and 60% of the strengths of the C=C bond, whereas the Si=O π-bond has 80% of that for C=O.

Applications

A number of the commercially significant processes (prototypes) of organosilicon chemistry are examined here from the point of view of their reaction enthalpies as approximately estimated from bond dissociation energies. While ΔH^o alone is not a sufficient criterion by which to determine the potential viability of a process, the majority of processes do have negative values (i.e. are exothermic).

(i) Hydrosilylation

$$R_3SiH + C_2H_4 \longrightarrow R_3SiCH_2CH_3$$

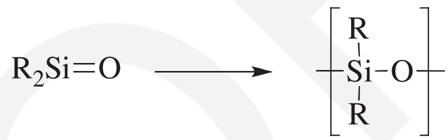
$$\Delta H° = D(\text{Si-H}) + D_\pi(\text{C=C}) + D(\text{Si-C}) - D(\text{C-H})$$

$$= 94 + 65 + 92 - 100$$

$$\underline{\Delta H° = -33 \text{ kcal mol}^{-1}}$$

It is the turning of the C=C π-bond into σ-bonds (the essence of a polymerization process) which makes this viable.

(ii) Polysiloxane creation from silanone monomer



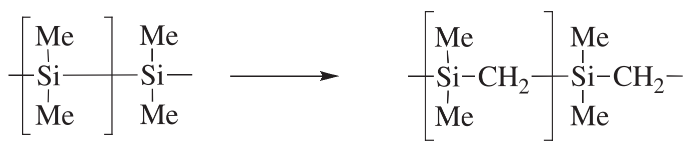
$$\Delta H° = D_\pi(\text{Si=O}) - D(\text{Si-O})$$

$$= 61 - 136$$

$$\underline{\Delta H° = -75 \text{ kcal mol}^{-1}}$$

The driving force here is the significant advantage of the Si-O σ-bond over its π-bond. Interestingly, if we consider the more realistic model reaction starting from $Me_2Si(OH)_2$ with the elimination of H_2O, a crude estimate comes up with $\Delta H^o = 0$, because we are just rearranging the Si-O and O-H bonds in the process. Undoubtedly ΔH^o is negative for this latter process because of the significantly stronger Si-O bonds in alternating –Si-O-Si-O- polysiloxane chains (recall the stronger Si-O bond in $(Me_3Si)_2O$

(iii) Polycarbosilane from polysilane



$$\Delta H° = D(\text{Si-Si}) + D(\text{C=H}) + D(\text{Si-C}) - D(\text{Si-H})$$

$$= 79 + 100 + 93 - 95$$

$$\underline{\Delta H° = -9 \text{ kcal mol}^{-1}}$$

The driving enthalpy here is rather small but again there is probably a strengthening of Si-C bonds in alternating –Si-C-Si-C- chains (just as for Si-O bonds in polysiloxanes) which would make the reaction more exothermic.

Because they are so important, I include additionally two more processea whose overall enthalpies are more easily related to *average* bond energies (although with some dissociation energies involved as well). The required values are shown in table 8 and are all estimated from known compounds, including solids!

(iv) The direct process

$$\text{Si(cryst)} + 2\,\text{MeCl(g)} \longrightarrow \text{Me}_2\text{SiCl}_2\text{(g)}$$

$$\triangle H^\circ = 2\overline{D}(\text{Si-Si}) + 2D(\text{C-Cl}) - 2\overline{D}(\text{Si-C}) - 2\overline{D}(\text{Si-Cl})$$

$$= 2 \times 54 + 2 \times 83 - 2 \times 86 - 2 \times 95$$

$$\underline{\triangle H^\circ = -68 \text{ kcal mol}^{-1}}$$

This brings out clearly the strong driving forces of this reaction, *viz*, the significant gains in bond energy of Si-C over Si-Si and of Si-Cl over C-Cl.

(v) The dream process

$$\text{SiO}_2\text{ (cryst)} + 2\,\text{CH}_4\text{(g)} \longrightarrow \left[-\overset{\text{Me}}{\underset{\text{Me}}{\text{Si}}}-\text{O}- \right] + \text{H}_2\text{O}$$

$$\triangle H^\circ = 2\overline{D}(\text{Si-O}) + 2D(\text{C-H}) - 2\overline{D}(\text{Si-C}) - 2\overline{D}(\text{O-H})$$

$$= 2 \times 111 + 2 \times 104 - 2 \times 76 - 2 \times 111$$

$$\underline{\triangle H^\circ = +56 \text{ kcal mol}^{-1}}$$

This is clearly an endothermic process and could only be brought about with a significant energy input. The problem lies in the requirement to break the relatively strong C-H bonds compared to the Si-C bonds made. Interestingly the other requirement, *viz*, to break two (out of four) of the Si-O bonds, is compensated for by the strengths of the O-H bonds formed in the by-product water molecule. Although variants on this reaction have been reported with retention of all four Si-O bonds, the prospect of replacing two of them by Si-C bonds in any kind of direct reaction looks remote from the thermochemical viewpoint.

Summary

This brief review provides current values of key dissociation energies of the commonly encountered bonds in organosilicon compounds. They are used to illustrate, by rapid estimate, the thermochemical viability of several of the well-known commercial processes. It is hoped that the availability of these numbers, and this rapid estimate approach, will encourage organosilicon chemists in their search for new and viable organosilicon processes of the future.

Some Good References

1. Walsh, R. "Bond dissociation energy values in silicon-containing compounds and some of their implication", *Accounts of Chemical Research,* **1981**, *14,* 246-252.
2. Walsh, R. "Thermochemistry", chapter 5 in *The Chemistry of Organic Silicon Compounds,* eds. S. Patai; Z. Rappoport, John Wiley and Sons Ltd., **1999**, pp 371-391.
3. Becerra, R.; Walsh, R. "Thermochemistry", Chapter 4 in *The Chemistry of Organic Silicon Compounds,* Rappoport, Z.; Apeloig, Y. Eds. John Wiley and Sons Ltd. **1998**, pp153-180.
4. Benson, S. W. *Thermochemical Kinetics*, John Wiley and Sons, 2nd Ed. **1976**.
5. Berkowitz, J.; Ellison, C. B.; Gutman, D. "Three methods to measure RH bond energies", *Journal of Physical Chemistry*, **1994**, *98*, 2744-2765.

Table 1 Some Si-H bond dissociation energies (kcal mol^{-1})

Bond	*D*(Si-H)
H_3Si-H	91.8
Me_3Si-H	94.6
Ph_3Si-H	88.7
$(Me_3Si)_3Si$-H	84.7
Cl_3Si-H	94.4
F_3Si-H	103.3
H_3SiSiH_2-H	89.4
$PhSiH_2$-H	91.3

Table 2 Some Si-C bond dissociation energies (kcal mol^{-1})

Bond	*D*(Si-C)
H_3Si-Me	89.6
MeH_2Si-Me	91.1
Me_2HSi-Me	92.5
Me_3Si-Me	94.2
Me_3Si-Et	92.3

Table 3 Some Si-Si bond dissociation energies (kcal mol^{-1})

Bond	*D*(Si-C)
H_3Si-SiH_3	76.7
H_3Si-Si_2H_5	74.8
H_5Si_2-Si_2H_5	73.1
Me_3Si-$SiMe_3$	79.3

Table 4 Some Si-Si bond dissociation energies (kcal mol^{-1})

Bond	*D*(Si-X)	Bond	*D*(Si-X)	Bond	*D*(Si-X)
H_3Si-F	152	Me_3Si-F	158	F_3Si-F	167
H_3Si-Cl	109	Me_3Si-Cl	117	Cl_3Si-Cl	110
H_3Si-Br	90	Me_3Si-Br	102	Br_3Si-Br	90
H_3Si-I	71	Me_3Si-I	82	I_3Si-I	68

Table 5 Some Si-O and SiO-X bond dissociation energies (kcal mol^{-1})

Bond	*D*(Si-O)	Bond	*D*(SiO-X)
Me_3Si-OH	133	Me_3SiO-H	118
Me_3Si-OMe	123	Me_3SiO-Me	96
Me_3Si-OEt	122	Me_3SiOEt	98
Me_3Si-$OSiMe_3$	136		

Table 6 Some Si-O and SiO-X bond dissociation energies (kcal mol^{-1})

Bond	*D*(Si-N)	Bond	*D*(SiN-X)
Me_3Si-NHMe	100	$(Me_3Si)_2N$-H	111
Me_3Si-NMe_2	98	$(Me_3Si)_2N$-Me	87
Me_3Si-$N(SiMe_3)_2$	109		

Table 7 Some π-bond energies (kcal mol^{-1})

Bond	*D*π(Si-O)	Bond	*D*π(SiO-X)
H_3Si=CH_2	37	H_2C=CH_2	65
H_2Si=SiH_2	27		
H_2Si=O	61	H_2C=O	75

Table 8 Some average bond energies (kcal mol^{-1})

Bond	$\overline{D}$(Si-X)
Si-Si	54
Si-C	76
Si-Cl	95
Si-O	111

^{29}Si NMR: SOME PRACTICAL ASPECTS

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Introduction

Silicon is in many respects one of the more important elements in both nature and chemistry. On one hand silicates constitute the main material of the earth's crust, and on the other hand organosilicon compounds are often used in element organic chemistry or as building blocks in material science. This is reflected also in literature concerning silicon NMR. For example, one of the fastest growing sections in the last years comprises the application to material sciences and here especially the solid-state silicon NMR. Of the naturally occurring isotopes ^{28}Si (92.21%), ^{29}Si (4.70%), and ^{30}Si (3.09%), ^{29}Si is the isotope with spin of ½ and has a magnetic moment. This puts it in the same league together with the other elements of group 14 of the Periodic Table of the elements such as carbon, germanium, tin and lead. All of these elements, with the exception of germanium, have at least one isotope with a nuclear spin of ½ (Table 1).

Table 1 shows that ^{29}Si NMR has a higher share in the isotopic mixture, but the absolute value of the magnetic moment is slightly lower than that of ^{13}C. This leads to a lower resonance frequency. A complication arises from the fact that spin and magnetic moment are antiparallel leading to a negative sign of the gyromagnetic ratio. Concerning these facts silicon NMR had a slow start. After the first report by Lauterbur et al. in 1962[2] there have been only a few papers per year. However, since the beginning of the 1980s this has changed dramatically. Our own data collection of ^{29}Si chemical shifts now contains about 13,000 data sets for more than 6,500 compounds.[3] a quick literature search yields around 25, 000 compounds with a measured ^{29}Si chemical shift. Because of these huge amounts of material available in silicon NMR, all discussions or reviews must be limited to special and selected research fields.

General Aspects

Use of Standards

The only magnetic isotope of silicon is ^{29}Si, which has a nuclear spin of ½, a magnetic moment of -0.9609 and, therefore, a receptivity of $3.69x10^{-4}$ compared to that of ^{1}H. It can be characterized as a magnetically diluted isotope of medium sensitivity.[4] Similar to ^{1}H or ^{13}C NMR the referencing is mostly done relative to tetramethylsilane (Me_4Si, TMS), which has the advantages of having a low boiling point, a relatively short relaxation time and being essentially chemically inert. Therefore, if necessary, it can be added directly to the sample. However, its resonance is in a shift range where the resonances of many other

Table 1 | Group 14 Elements, parameters of selected isotopes

Isotope	Natural Abundance	Nuclear Spin	Magnetic Moment $\mu^{d)}$	Sensitivity		Recept. rel. to ^{13}C
				rel.[a)]	abs.[b)]	
^{13}C	1.108	½	0.7022	$1.59x10^{-2}$	$1.76x10^{-4}$	1
^{29}Si	4.7	½	-0.5548	$7.84x10^{-3}$	$3.69x10^{-4}$	2.1
^{73}Ge	7.76	$^{9}/_{2}$[c)]	-0.8768	$1.4x10^{-3}$	$1.08x10^{-4}$	0.61
^{119}Sn[d)]	8.58	½	-1.0409	$5.18x10^{-3}$	$4.44x10^{-3}$	25.2
^{207}Pb	22.6	½	0.5843	$9.16x10^{-3}$	$2.07x10^{-3}$	11.8

a) At constant field and equal number of nuclei; b) product of relative sensitivity and natural abundance; c) quadrupole moment, $-0.18x10^{-28}$m; d) isotope used in most tin NMR experiments, for other relevant nuclei see reference 1 and the cited reviews.

organosilicon compounds occur and so misinterpretations are possible. Two general strategies are usable to avoid this problem. The first is the use of secondary standards. Some secondary reference standards as known from the literature are collected in Table 2. Unfortunately, due to their higher reactivity, in contrast to TMS, they are useful only for a limited number of applications.

More common, except for precision measurement, is to use no standard compound at all in the sample (tube interchange technique). In such a case the referencing is done relative to a sample containing TMS in the same solvent as it was used in the unknown sample.

Negative values of the silicon chemical shift are to low frequency and high field compared to TMS. Special care must be given by using silicon chemical shift data from earlier reviews and original papers. Some of these employ the magnetic field definition of chemical shifts instead of the currently accepted frequency based one, resulting in a reversed sign for chemical shift data.

Problems in ^{29}Si NMR, pulse techniques

There is a number of aspects for running into difficulties in measuring silicon NMR. The first of it concerns the fact that silicon containing materials such as glass and ceramics constitute a major part of the construction material of the probe head and probe tube resulting in a broad background signal at approximately -110 ppm. There are three general methods to avoid this potential problem:

1. In the case of narrow signals, the smallest sweep width possible should be used.
2. Population transfer pulse programs such as DEPT or INEPT can be used if the silicon atoms are coupling with protons or fluorine.
3. If broad lines are measured, one might be able to subtract it from a blank spectrum obtained under otherwise identical conditions.

One other characteristic feature regarding spectra of organosilicon compounds is usually observed under broad band decoupling of protons. Resonances of silicon atoms containing organic substituents split into many lines by spin-spin couplings with the protons. This is mostly prevented by decoupling experiments. However, the Nuclear Overhauser Effect (NOE) can then lead to zero signals, if the (^{29}Si,1H) dipole-dipole contribution T1DD to the longitudinal relaxation paths of the silicon is close to 1.52. The relaxation times depend on the correlation times of a molecule, therefore, the signal intensity of a ^{29}Si spectrum with NOE varies with the temperature. Again, there are three ways to turn around the situation:

1. Adding a shift-free relaxation reagent, for example, the well-known $Cr(acac)_3$ in a concentration of ca. 10^{-2} molar.
2. Use of inverse gated decoupling. Here proton decoupling is only active during acquisition with long waiting times (3 to 5 times the relaxation time T_1) between scans. The advantage of not polluting the sample is offset by ineffective use of spectrometer time, which can be alleviated somewhat by using shorter pulses (40°) and shorter recovery times (20s).
3. Use of population transfer pulse programs such as INEPT or DEPT.[5]

Table 2 | Current and historic reference compounds for silicon NMR

Name	Formula	Common Abbreviation	Chemical Shift[a),b)]
Tetramethylsilane	Me_4Si	TMS	0.0
Tetrakis(trimethylsilyl)methane	$(Me_3Si)_4C$		3.6
Hexamethylsiloxane	$(Me_3Si)_2O$	M_2	6.53
Octamethylcyclotetrasiloxane	$(Me_2SiO)_4$	D_4	-19.86
Tetramethoxysilane	$(MeO)_4Si$	TMOS	-78.54
Tetraethoxysilane	$(EtO)_4Si$		TEOS
Tetrafluorosilane	F_4Si		-113.5
Tetrakis(trimethylsiloxy)silane	$(Me_3SiO)_4Si$	M_4Q	8.62 / -104.08
Silicon Oil	$(Me_2SiO)_x$		-22.0

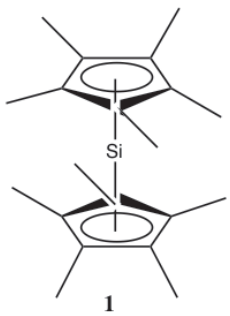
a) Relative to tetramethylsilane (TMS). b) the use of silicone-containing greases for your equipment can lead to “impurity” resonances around -22 ppm.

A third disadvantage in measuring silicon NMR spectra is related especially with "pure" inorganic compounds containing only ^{29}Si as the useful isotopic nucleus. In such cases single pulse experiments are applicable only. Due to the slow relaxation time with such compounds, a 30° pulse is used with repetition rates of about 20 seconds.

Solid state ^{29}Si NMR differs from that of solutions inasmuch as the spatial interactions are not averaged out by particle motion, resulting in broad lines and all the problems that are related to that fact. Literature on ^{29}Si solid state NMR is to be found.[6]

Chemical Shifts

The majority of ^{29}Si NMR shifts are found in a range between +50 and -200 ppm. However, as far as is known, the current upfield and downfield "world records" are formed by divalent silicon compounds. The largest upfield shift is measured for the decamethylsilicocene **1** with -392 ppm.[7] The highest downfield shift is given for **2** with 567 ppm.[8]



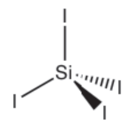
1

-392 ppm

2

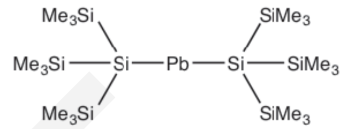
+567 ppm

The border lines for silicon(IV) compounds are given by the tetraiodosilane **3** with a chemical shift of -350 ppm and the central silicon atom of dihypersilylplumbandiyl **4** with +197 ppm.[9,10]



3

-350 ppm



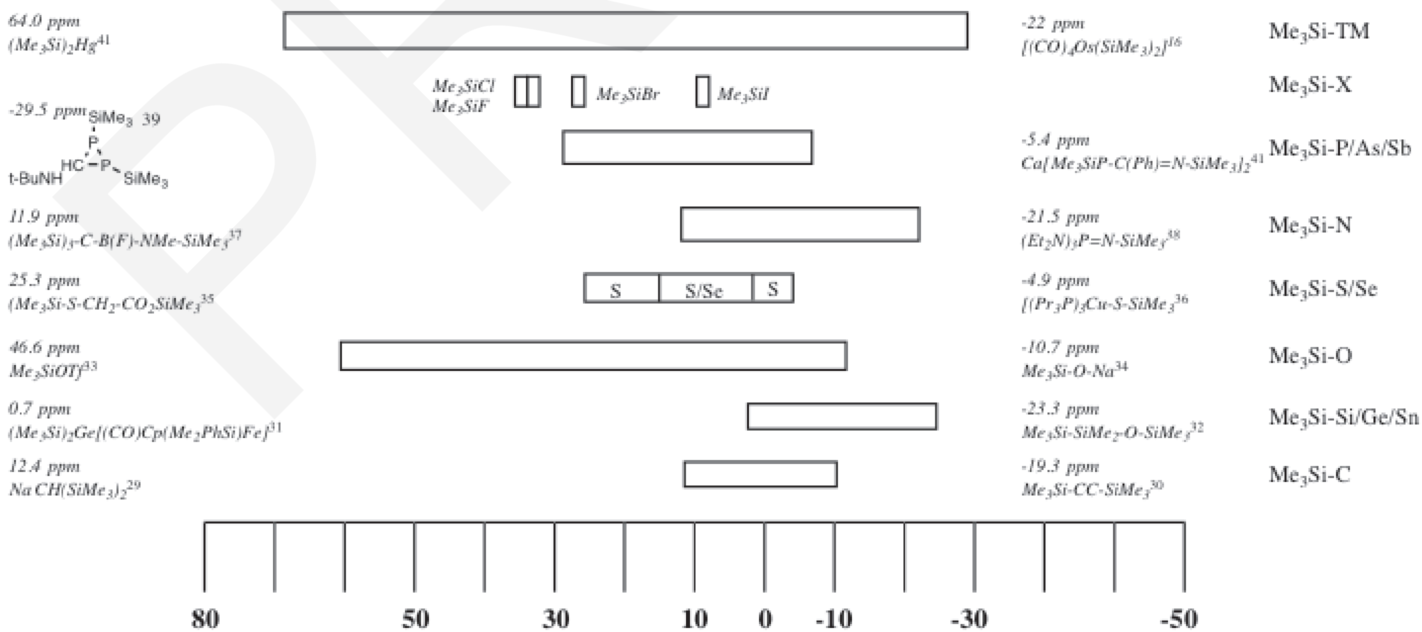
4

+197 ppm

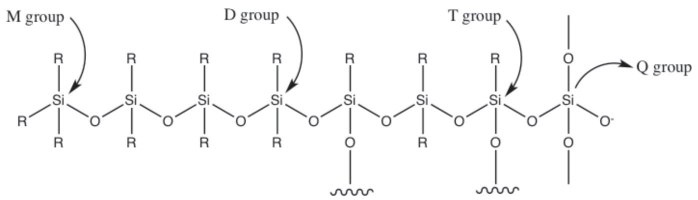
The name hypersilyl is used mainly as abbreviation for the tris(trimethylsilyl)silyl substituent, as supersilyl is used as abbreviation for the tri-tert-butylsilyl group.

Derivatives containing the trimethylsilyl group (Me_3Si) abbreviated also as TMS, form the largest group of compounds with a known ^{29}Si Shift. One reason to introduce one of these groups into a molecule is to obtain a certain substitution pattern in organic chemistry.[11] Another reason is, for example, the fact to make substances now containing Me_3SiO- or Me_3SiN- groups instead of labile protons in HO- or NH-groups easier to handle. For instance, the volatility or the solubility in organic solvents is much better for the derivatized compound. The TMS group is also useful for the characterization of such compounds by NMR methods.[20] The shift of TMS groups ranges from -34.4 ppm for Me_3Si-K^+ up to 83.6 ppm for $[Me_3Si]^+[B(C_6F_5)_3]^-$.[21,22] An overview about typical shift ranges of trimethylsilyl-substituted compounds is given in Scheme 1.

Scheme 1 | Typical shift ranges for trimethylsilyl-substituted derivatives. Selected borderline examples for each class are given.



One of the first uses of ^{29}Si NMR was its application in the analysis of siloxane polymers. Although it is still possible to recognize and isolate individual molecules, the main view is to dissect the molecules into building units (Scheme 2).



End- (M) Middle- (D) Trifunctional (T) Tetrafunctional (Q)
Groups Branching Groups

M		D		T		(Q)
R = Me_3	7 – 9 ppm	Me_2	-17 to –22	Me	-55 to –65	-105 to -115
Me_2Cl	~5	Cl_2	~ -73	HO	~ -100	
$MeCl_2$	~ -20	Me/H	~ -35	H	~ -85	
Cl_3	~ -48	Me/O	~ -55	Ph	~ -78	
Ph_3	~ -10	Ph/OH	~ -70			
		Ph_2	-42±3			

The main difference between the building units is the number of oxygen atoms connected to a silicon atom. Except for the **M** group, the exchange of an R substituent for oxygen leads to an upfield shift. The chemical shifts of the building units are sensitive to neighbor effects in the chain structure revealing the microstructure of polymers. The chemical shifts of all building groups are modified be ring strain if cyclic siloxanes are investigated by ^{29}Si NMR.

Silazanes possess structural similarities to siloxanes and can be rationalized by the analogous principles, however, the range of chemical shifts is smaller. The total region extends from -62 to +18 ppm.[12] the same is true for carbosilanes. Resonances for silicon atoms bonded to 4 carbon atoms are found between -4 and +20 ppm.[12] A report concerning silthianes has appeared.[13] Oligomeric and polymeric silanes are discussed in detail in the literature and some of the appropriate references can be consulted there.[14] The ranges of chemical shifts of building components for oligosilanes are collected in Table 3. The skeleton of these compounds is similar to those of alkanes. A number of studies on substituted di- and trisilanes are also discussed in the article mentioned above.[14]

The chemistry of silicon-containing double bonds was a rapid growing field during the last 20-25 years. For silicon-silicon double bonds the ^{29}Si chemical shifts are reported from ca. 50 ppm up to ca. 160 ppm, for example 49.4 ppm for $[Mes((Me_3Si)_2N)Si]_2$;[25] 156.2 ppm for $(t\text{-}BuMe_2Si)_2Si{=}Si(Si\textit{i}\text{-}Pr_2Me)_2$;[26] and for silicon carbon double bonds a range of ca. 130 ppm is given, for example 13.1 ppm for $[2,4,6\text{-}i\text{-}Pr_3C_6H_2]_2Si{=}C{=}C(Ph)t\text{-}Bu$;[27] 144.2 ppm for $Me_2Si{=}C(SiMe_3)Sit\text{-}Bu_2Me$.[28] The chemical shifts of silicon having a double bond to a transition metal strongly depends on the substituents on the transition metal and the metal itself. Chemical shifts are observed in a range of ca. 10 ppm, for example -9.4 ppm for $[t\text{-}BuO)_2Si{=}Fe(CO)_4]{\bullet}THF$[23] and nearly 141.9 ppm for $[(Me_2NC_{10}H_6)(H)Si{=}Mn(CO)_2(MeCp)]$.[24]

The data of a number of other transition metal complexes are collected in some reviews.[12,14-16] Due to the large variety for the bonding situations of the silicon a great spread of chemical shifts ranging from 289 ppm up to -150 ppm is observed.[17,18]

For other compounds, especially for higher coordinated silicon derivatives, general collections of silicon chemical shifts may be consulted.[3,12,19]

Table 3 | Selected chemical shifts of polysilane units in ppm

R	End Group $R_3Si\text{-}Si$	Middle Group $R_2Si(Si)_2$	Trifunctional Group $RSi(Si)_3$	Tetrafunctional Group $Si(Si)_4$
Me	-4 ± 5	-28 to -50	-65 to -95	-109 to -165[b)]
Ph	-19 ± 3	-40 to -50	-75 to -85	
Ph/H	-30	-65 ± 5		
Me/H	-35 ± 2	-70 ± 5		
Me_2/Cl[a)]	28 ± 2			
t-Bu	20 to 30			

a) $BrMe_2Si$, 21ppm; IMe_2Si, 2 ppm. b) Exception $Si(SiCl_3)_3(SiCl_2SiCl_3)$, -79.5 ppm

Coupling Constants

All magnetic nuclei in a molecule interact and the splitting caused by this interaction gives rise to typical coupling patterns. Two cases can be distinguished:

1. Coupling with 100 % isotopes such as ^{1}H, ^{19}F, or ^{31}P gives the well-known splitting patterns in the ^{29}Si spectra. Couplings with quadrupolar nuclei such as the isotopes of chlorine are usually not observed.
2. Coupling with other rare spins such as ^{29}Si, $^{119/117}$Sn, or ^{13}C leads to smaller satellite lines left and right to the main line according to their abundance in the usual ^{29}Si spectra.

The ranges of some silicon-element coupling constants are found in Table 4. The sign of coupling constants over one bond is mostly negative because of he negative magnetogyric ratio of the ^{29}Si. Exceptions are found if the silicon is connected to an element with tightly bonded s-electrons, for example ^{19}F or ^{31}P.

Table 4 | Ranges of selected silicon element coupling constants

Si-X Coupling (X)	^{1}J(Si-X)$^{a)}$	^{2}J(Si-X)$^{a)}$	^{3}J(Si-X)$^{a)}$
^{1}H	420 – 75	10 – 3 (SiMe) 13 – 1 (SiXH)	8 - 1
^{19}F	488 – 108	91 – 17	16 - 2
^{31}P	256 – 16	44 - <1	
^{13}C	113 – 37	18 - 4	
^{29}Si	186 – 23	24 - <1	
^{119}Sn	750 – 120	100 – 35	60 - 12

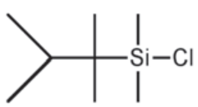
a) Reported in Hz and largest to smallest

Reviews, Databases of ^{29}Si NMR data

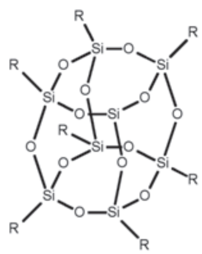
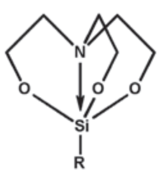
A large number of review articles deal with selected and special fields of ^{29}SI NMR, but only a limited number of general collections of ^{29}Si NMR chemical shifts or coupling s=constants exist. An electronic version of a ^{29}Si database is available from the authors of this article.[3] further information is available via the world wide web (http://www.silicium-nmr.de) or directly from the authors.

Table 5 | Selected ^{29}Si NMR chemical shifts[5]

Formula	Empirical Formula	Chemical Shift [ppm]$^{a)}$	Gelest Product Code
Et_4Si	$C_8H_{20}Si$	7.1	SIT7115.0
Me_4Si	$C_4H_{12}Si$	0	SIT7555.0
Me_3SiCl	C_3H_9ClSi	30	SIT8510.0 SIT8510.1
Me_3SiBr	C_3H_9BrSi	26	SIT8430.0
Me_3SiI	C_3H_9ISi	8.7	SIT8564.0
Me_3SiF	C_3H_9FSi	31.0	SIT8525.0
$Me_3SiOSO_2CF_3$	$C_4H_9F_3O_4SSi$	44	SIT8620.0
Me_3SiCCH	$C_5H_{10}Si$	-17.5	SIE4904.0
$Me_3SiCCSiMe_3$	$C_8H_{18}Si_2$	-19.4	SIB1850.0
Me_2SiCl_2	$C_2H_6Cl_2Si$	32	SID4120.0

Formula	Empirical Formula	Chemical Shift [ppm][a]	Gelest Product Code
$MeSiCl_3$	CH_3Cl_3Si	12	SIM6520.0 SIM6520.1
Ph_4Si	$C_{24}H_{20}Si$	-14	SIT7755.0
Ph_3SiCl	$C_{18}H_{15}ClSi$	1.5	SIT8645.0
Ph_3SiF	$C_{18}H_{15}FSi$	4.35	SIT8655.0
Ph_2SiCl_2	$C_{12}H_{10}Cl_2Si$	6.2	SID4510.0 SID4510.1
Ph_2SiF_2	$C_{12}H_{10}Cl_2Si$	-3.0	SID4530.0
$PhSiCl_3$	$C_{12}H_{10}F_2Si$	-0.8	SIP6810.0
Cl_4Si	Cl_4Si	-18	SIT7085.0
Br_4Si	Br_4Si	-92	SIT7050.0
I_4Si	I_4Si	-350	SIT7123.0
F_4Si	F_4Si	-112	SIT7120.0
H_2SiCl_2	H_2SiCl_2	-11.3	SID3368.0 SID3368.2
$HSiCl_3$	$HSiCl_3$	-9.4	SIT8155.0
$(H_2C{=}CHCH_2)_4Si$	$C_{12}H_{20}Si$	-2	SIT7020.0
$H_2C{=}CHCH_2SiMe_2Cl$	$C_5H_{11}ClSi$	27.2	SIA0460.0
$H_2C{=}CHCH_2SiMeCl_2$	$C_4H_8Cl_2Si$	26.8	SIA0470.0
$H_2C{=}CHCH_2SiCl_3$	$C_{12}H_{20}Cl_3Si$	8	SIA0520.0
$H_2C{=}CHSiCl_3$	$C_2H_3Cl_3Si$	-3	SIV9110.0
$PhCH_2SiCl_3$	$C_7H_7Cl_3Si$	7.2	SIB0970.0
$MeSi(CH_2Cl)Cl_2$	$C_2H_5Cl_3Si$	21.6	SIC2290.0
$Me_2Si(CH_2Cl)_2$	$C_4H_{10}Cl_2Si$	-3.5	SIB1051.0
 $Me_2CHC(Me)_2SiMe_2Cl$	$C_8H_{19}ClSi$	35.8	SIT7906.0
$t\text{-}BuMe_2SiCl$	$C_6H_{15}ClSi$	33	SIB1935.0

Formula	Empirical Formula	Chemical Shift [ppm][a)]	Gelest Product Code
PhMeSiHCl	C_7H_9ClSi	1.3	SIP6738.0
Me_2HClSi	C_2H_7ClSi	-11.1	SID4070.0
$PhSiH_3$	C_6H_8ClSi	-60	SIP6750.0
Ph_2SiH_2	$C_{12}H_{12}Si$	-34	SID4559.0
Ph_3SiH	$C_{12}H_{12}Si$	-17 to -22	SIT8665.0
Me_2SiH_2	$C_{18}H_{16}Si$	-37 to -48	SIM6515.0
$MeSiH_3$	CH_6Si	-65	SID4230.0
Me_3SiH	$C_3H_{10}Si$	-17	SIT8570.0
Et_3SiH	$C_6H_{16}Si$	0.2	SIT8330.0
$(EtO)_3SiH$	$C_6H_{16}O_3Si$	-60 to -65	SIT8185.0
$(EtO)_4Si$; TEOS	$C_6H_8O_4Si$	-82	SIT7110.0 SIT7110.1
$(PhO)_4Si$	$C_6H_8O_4Si$	-101.1	--
$(MeO)_4Si$; TMOS	$C_4H_{12}O_4Si$	-79.5	SIT7510.0 SIT7510.2
$(MeO)_3SiCl$	$C_3H_9ClO_3Si$	-66.6	--
$(MeO)_2SiCl_2$	$C_2H_6Cl_2O_2Si$	-52.6	--
$MeOSiCl_3$	CH_3Cl_3OSi	-36.1	--
$EtOSiCl_3$	$C_2H_5Cl_3OSi$	-38.3	--
$Ph_2Si(OH)_2$	$C_{12}H_{12}O_2Si$	-33.9	SID4560.0
Ph_3SiOH	$C_{18}H_{16}OSi$	-12 to -24	SIT8695.0
Et_3SiOH	$C_6H_{16}OSi$	19.3	SIT8332.0
Me_3SiONa	C_3H_9NaOSi	-4 to -11	SIS6988.0
$Me_3SiOSiMe_3$	$C_6H_{18}OSi$	6	SIH6115.0
$Me_3SiOOSiMe_3$	$C_6H_{18}O_2Si$	27.3	SIB1868.0
$Me_3SiSSiMe_3$	$C_6H_{18}SSi$	13	SIH6116.0
$Me_3SiOSiMe_2OSiMe_3$; MDM	$C_8H_{24}O_2Si_3$	6.5(Me_3Si) -22 (Me_2Si)	SIO6703.0

Formula	Empirical Formula	Chemical Shift [ppm][a]	Gelest Product Code
$Me_3SiO(SiMe_2O)_3SiMe_3$; MD_3M	$C_{12}H_{24}O_4Si_5$	6.8(Me_3Si) -21.9 (2xMe_2Si) -22.6 (1xMe_2Si)	SID4626.0
$(Me_3SiO)_4Si$; M_4Q	$C_{12}H_{36}O_4Si_5$	8 (Me_3Si) -105 (Si)	SIT7298.0
$(Me_3SiO)_3SiMe$; M_3T	$C_{10}H_{30}O_3Si$	7(Me_3Si) -65 (Si)	SIM6592.0
$(Me_2SiO)_3$; D_3	$C_6H_{18}O_3Si_3$	-9	SIH6105.0 SIH6105.1
$(PhMeSiO)_3$	$C_{21}H_{24}O_3Si_3$	-20.8	SIT8705.0
$(Ph_2SiO)_3$	$C_{36}H_{30}O_3Si_3$	-33.8	--
$(Me_2SiO)_4$; D_4	$C_8H_{24}O_4Si_4$	-20	SIO600.0
$(MeHSiO)_4$; D_4’	$C_4H_{16}O_4Si_4$	-32.5	SIT7530.0
$(Ph_2SiO)_4$	$C_{48}H_{40}O_4Si_4$	-46	SIO6705.0
$(Me_2SiO)_x$; silicone oil	Molecular Weight 160-430,000	-22	DMS-Txx
T8 silsesquioxane  R = vinyl R = Me_2HSiO R = H	$C_{16}H_{24}O_{12}Si_8$ $C_{16}H_{56}O_{20}Si_{16}$ $H_8O_{12}Si_8$	-79.4 0.5(Me_2HSi) -84.5	SIO6706.0 SIO6696.5 SIH6168.0
$Me_2HSiOSiHMe_2$	$C_4H_{14}OSi_2$	-5	SIT7546.0
$Me_2ClSiOSiClMe_2$	$C_4H_{12}Cl_2OSi_2$	9.6	SID3372.0
$Me_2ClSiOSiMe_2OSiMe_2Cl$	$C_6H_{18}Cl_2O_2Si_3$	-18.3(Me_3Si) 2.3 (SiCl)	SID3360.0
$Cl_3SiOSiCl_3$	Cl_6OSi	-46	SIH5910.0
$(MeO)_3SiSi(OMe)_3$	$C_6H_{18}O_6Si_2$	-52.5	SIH6101.0
 R = vinyl R = Me	$C_8H_{15}NO_3Si$ $C_7H_{15}NO_3Si$	-80 -63	SIV9097.0 SIM6518.0
$(Me_2N)_4Si$	$C_8H_{24}N_4Si$	-28.1	SIT7276.0

Formula	Empirical Formula	Chemical Shift [ppm][a]	Gelest Product Code
$(Me_2N)_3SiMe$	$C_7H_{21}N_3Si$	-17	SIT8712.0
$(Et_2N)_2SiMe_2$	$C_6H_{18}N_2Si$	-1.8	SIB1095.0
Me_2NSiMe_3	$C_5H_{15}NSi$	-6	SID3605.0
$(Me_3Si)_2NH$; HMDS or HMDZ	$C_6H_{19}NSi$	2.2	SIH6110.0
$(Me_3SiNSiMe_3$	$C_9H_{27}NSi_3$	2.4	SIN6595.0
$(Me_2SiNH)_3$	$C_6H_{21}N_3Si_3$	-4	SIT6102.0
$(Me_2SiNH)_4$	$C_8H_{28}N_4Si_4$	-8.2	SIO6698.0
$(Me_3SiO)_3B$	$C_9H_{27}BO_3Si_3$	12.3	SIT8718.0
$(Me_3SiO)P{=}O$	$C_9H_{27}O_4PSi_3$	20	SIT8723.0
$(Me_3Si)_3P$	$C_9H_{27}PSi_3$	0.2	SIT8723.4
$Me_3SiSiMe_3$	$C_6H_{18}Si_2$	-19.5	SIH6109.0
$PhMe_2SiSiMe_2Ph$	$C_{16}H_{22}Si_2$	-21.8	SID4584.0
$Ph_2MeSiSiMePh_2$	$C_{26}H_{26}Si_2$	-22	SID4238.0
$Ph_3SiSiPh_3$	$C_{36}H_{30}Si_2$	-26.5	SIH6155.0
$ClMe_2SiSiMe_2Cl$	$C_4H_{12}Cl_2Si_2$	17	SID3370.0
$Cl_2MeSiSiClMe_2$	$C_4H_{12}Cl_2Si_2$	15.4 (SiCl) 25 ($SiCl_2$)	--
$Cl_2MeSiSiCl_2Me$	$C_2H_6C_{14}Si_2$	18	--
$Cl_3SiSICl_3$	Cl_6Si_2	-6.2	SIH5905.0
$(Me_2Si)_6$	$C_{12}H_{36}Si_6$	-41.6	SID4623.0
$(Me_3Si)_3SiMe$	$C_{10}H_{30}Si_4$	-12.5(Me_3Si) -87.9 (SiMe)	--
$(Me_3Si)_4Si$	$C_{12}H_{36}Si_5$	-9.8(Me_3Si) -135.5 (Si)	SIT7308.0
$n\text{-}Bu_3SnSiMe_3$	$C_{15}H_{36}SiSn$	-8	SNT8585

a) Chemical shifts without decimal point are due to different values with deviations of ±2 ppm.

References

1. Brevard, C.; Granger, P. "*Handbook of High Resolution Multinuclear NMR*", John Wiley & Sons, Chichester, **1982**.
2. Lauterbur, P. C. "*Determination Phys. Meth.*", **1962**, *2*, 511.
3. Hermann, U.; Marsmann, H. Uhlig, F. *^{29}Si NMR Database System* (PC based, see also http://www.silicium-nmr.de)
4. Harris, R. K.; Mann, B. E.; "*NMR and the Periodic Table*", Academic Press, New York, **1978.**
5. Blinka, T. A.; Helmer, B. J.; West, R. *Adv. Organomet. Chem.* **1984**, *23*, 193.
6. a) Engelhardt, G.; Michel, D. "High Resolution Solid State NMR or Silicates and Zeolites", John Wiley & Sons, Chichester, **1987**. b) Babonneau, F.; Gualandris, V.; Maquet, J.; Massiot, D.; Janicke, M. T.; Chmelka, B. F. *J. Sol-Gel Science and Technology* **2000**, *19*, 113. C) Matijasic, A.; Lewis, A. R.; Marichal, C.; Delmonte, L.; Chezeau, J.-M.; Patarin, J. *Phys. Chemistry Chemical Physics* **2000**, *2*, 2807.
7. Jutzi, P.; Holtmann, U.; Kanne, D.; Kruger, C.; Blam, R.; Gleiter, R. Hyala-Kryspin, I. *Chem. Ber.* **1989**, *122*, 1629.
8. Kira, M.; Ishida, S.; Iwamoto, T.; Kabuto, C.; *J. Am. Chem. Soc.* **1999**, *121*, 9722.
9. a) Marsmann, H. C.; Horn, H. G. *Chem.-Ztg.* **1972**, *96*, 456. b) Niemann, U.; Marsmann, . C. *Naturforsch.* **1975**, *30b*, 202.
10. Klinkhammer, K. W.; Schwarz, W. *Angew. Chem.* **1995**, *107*, 1448.
11. Colvin, E. "*Silicon in Organic Synthesis*" Butterworths, London, **1981**.
12. Marsmann, H. C. in "*NMR Basic Principles and Progress*" Vol. *17*, Springer Verlag, Heidelberg, **1981**.
13. a) Horn, H.-G. *J. Prakt. Chem.* **1992**, *334*, 201. B) Roewer, G.; Herzog, U. *Main Group Metal Chemistry*" **1999**, *22*, 579. c) Herzog, U.; Bohme, U.; Rheinwald, G. *J. Organomet. Chem.* **2000**, *612*, 133.
14. Williams, E. A. in "*The Chemistry of Organic Silicon Compounds*" Patai, S.; Rapport, Z. Eds. John Wiley & Sons, Chichester, Vol. 1 1997, 511.
15. Likiss, P. D. *Chem. Soc. Rev.* **1992**, 271.
16. Krentz, R.; Pommeroy, R. K. *Inorg. Chem.* **1985**, *24*, 2976.
17. Arnold, J.; Tilley, T. D.; Rheingold, A. L.; Geib, S. J.; *Inorg. Chem.* **1987**, *26*, 2106.
18. Kawano, Y.; Tobita, H.; Ogino, H.; *J. Organomet. Chem.* **1992**, *428*, 125.
19. Williams, E. A.; Cargioli, J. D. in "*Annual Reports in NMR Spectroscopy*" **1979**, Vol. *9*, Academic Press, New York, 221.
20. Schraml, J. *Prog. Nucl. Magn. Res. Spect.***1990**, *22*, 289.
21. Olah, G. A.; Hunadi, R. J. *J. Am. Chem. Soc.* **1990**, *102*, 6989.
22. Lickiss, P. D. in "*The Chemistry of Organic Silicon Compounds*" Patai, S.; Rappoport, Z. Eds. John Wiley & Sons, Chichester, Vol. 2, **1998**.
23. Lickiss, P. D. *Chem. Soc. Rev.* **1992**.
24. Corriu, R. J. P.; Chauhan, B. P. S.; Lanneau, G. F. *Organometallics*, **1995**, *14*, 1646.
25. West, R. *Angew. Chem.* **1987**, *99*, 1231.
26. Kira, M.; Ohya, S.; Iwamoto, T.; Ichinhe, M.; Kabuto, C. *Organometallics,* **2000**, *19*, 1817.
27. Trommer, M.; Miracle, G. E.; Eichler, B. E.; Powell, D. R.; West, R. *Organometallics,* **1997**, *16*, 5737.
28. a) Wiberg, N.; Wagner, G.; Muller, G. *Angew. Chem.* **1985**, *97*, 220. b) Baines, K. M.; Brook, A. G.; Ford, R. R.; Lickiss, P. D.; Saxena, A. *Organometallics*, **1989**, *8*, 693.
29. Boesveld, M.; Hitchcock, B.; Lappert, M. F.; Liu, D. S.; Tian, S. *Organometallics* **2000**, *19*, 4030.
30. Wrackmeyer, B. *J. Organomet. Chem.* **1979**, *166*, 353.
31. Sharma, S.; Pannell, K. H. *Organometallics* **2000**, *19*, 1225.
32. Harloff, J.; Popowski, E.; Fuhrmann, H. *J. Organomet. Chem.* **1999**, *592,* 136.
33. Marsmann, H. C.; Horn, H. G. *Naturforsch.* **1972**, *27b*, 1448.
34. Marsmann, H. C. unpublished results.
35. a) Schraml, J. *Coll. Czech. Chem. Commun.* **1977**, *42*, 1165. b) Herzog, U. *J. Prakt. Chem.* **2000**, *342*, 379.
36. Tran, D. T. T.; Corrigan, F. *Organometallics* **2000**, *19*, 5202.
37. Haase, M.; Klingebiel, U.; Boese, R.; Polk, M. *Chem. Ber.* **1986**, *119,* 1117.
38. Marsmann, H. C.; Boese, H.; Flindt, E. P. *Z. Anorg. Allg. Chem.* **1977**, *430*, 155.
39. Wiberg, N.; Worner, A.; Karagiosoff, K.; Klapotke, T.-M. unpublished results.
40. Westerhausen, M.; Digester, M.; Schwarz, W. *Inorg. Chem.* **1997**, *36*, 521.
41. Cradock, S.; Ebsworth, E. A. V. Hosmane, N. S.; McKay, K. M. *Angew. Chem.* **1975**, *87*, 207.

INFRARED ANALYSIS OF ORGANOSILICON COMPOUNDS: SPECTRA-STRUCTURE CORRELATIONS

Complied by Philip J. Launer, Updated by Barry Arkles

The infrared spectrum reveals vibrations of atoms in molecules. The beauty of the spectrum is the close and accessible relationship between infrared bands and molecular structure. Certain groups of atoms have characteristic vibration frequencies which persist in different compounds. These groups (i.e. Si-OCH_3, C=O, Si-CH=CH_2, BF_4^-) are the very kind of functional groups chemists are interested in. This is why infrared spectroscopy is an indispensable tool for organosilicon research.

The positions of infrared bands characteristic of some organosilicon groups are shown in the following table. Ideally, these correlations should be used for liquids or solutions. Infrared band positions for a crystalline solid often show shifts and splitting when compared with band positions of the sample in the liquid state. However, non-crystalline solids (amorphous polymers, glasses) tend to have infrared spectra that are similar to their solution spectra.

These spectra-structure correlations are the result of work by many investigators. Major contributions have been made by A. Lee Smith and his colleagues at Dow Corning Corporation. In addition to previously-published data, we have included some correlations based on our experience in the analysis of organosilicon compounds.

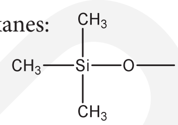
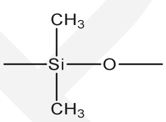
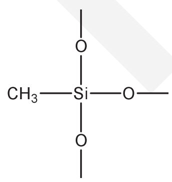
There is increasing interest in carbon-containing silicon compounds as precursors of high-performance ceramics. Accordingly, the table gives data on the infrared bands of some silicon-containing ceramics.

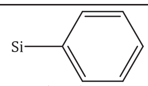
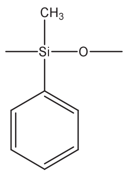
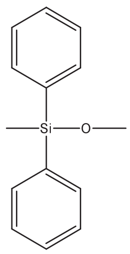
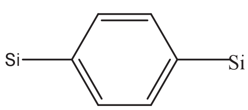
This table presents *empirical* correlations between spectra and structure. The table does not show the types of vibrations (stretching, bending, rocking etc.) that give rise to the infrared bands. Empirical correlations can guide the chemist who is using infrared to follow the course of the reaction, to analyze a commercial product, or to identify an unknown. The correlations become even more useful if the chemist learns the vibrational origins of the bands. The chemist then will be in a better position to anticipate interferences by other groups. Knowledge of the vibrational origins also will help the chemist to understand shifts in a group frequency caused by strain in a bond, coupling of vibrations, or change in the electronegativity of neighboring atoms.

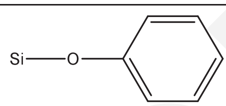
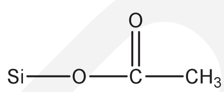
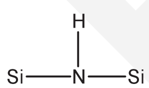
The references list three excellent reviews of spectra-structure correlations for organosilicon compounds. Each review contains some discussion of the molecular vibrations associated with the infrared bands. The reviews also offer a quick way to locate the original literature for many of the correlations.

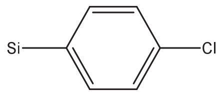
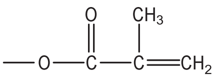
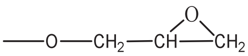
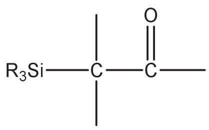
References

1. D. R. Anderson in "Analysis of Silicones," A. Lee Smith, editor, Wiley-Interscience, New York, 1974, Chapter 10.
2. L .J. Bellamy, "The Infra-red Spectra of Complex Molecules," 3rd ed., Chapman and Hall, London, 1975, Chapter 20.
3. A. Lee Smith, *Spectrochim. Acta* **1960**, *16*, 87.

Group	Frequency in cm^{-1}	Comments
Si—CH_3	1275-1245, 865-750	
In polysiloxanes: 	(M) 1250, 840, 755	The Si—CH_3 group is easily recognized by a strong, sharp band at about 1260 cm^{-1} together with one or more strong bands in the range 865-750 cm^{-1}. Some $(CH_3)_3$Si— compounds show a 1250 cm^{-1} band split into two components with the weaker component often appearing as a shoulder on the higher frequency side of the band. Blocks of dimethyl D units show a relatively weak band at 860 cm^{-1}. In many copolymers containing dimethyl D units (random or alternative, not block), the 860 cm^{-1} band shifts to 845 cm^{-1} and becomes stronger.
	(D) 1260, 860 (weak), 800	
	(T) 1270, 780-760	
Si—CH_2CH_3	1250-1220, 1020-1000, 975-945	The 1250-1220 cm^{-1} Si—CH_2 band is much weaker than the analogues 1260 cm^{-1} Si—CH_3 band.
Si—$CH_2(CH_2)_xCH_3$	1220-1170	As the alkyl group becomes longer, the Si—CH_2— band moves to lower frequency; *n*-propyl, 1220-1200 cm^{-1}; *n*-butyl, 1200-1190 cm^{-1}; longer chains, 1190-1170 cm^{-1}

Group	Frequency in cm^{-1}	Comments
Si—CH═CH_2	1600, 1410, ca. 1010, ca. 960	If other alkenyl groups and aryl groups are absent, C—H bands at 3060 and 3020 cm^{-1} help to identify Si—CH═CH_2.
Si—CH_2—CH═CH_2	1640-1630, 1190-1140, 990, 930 (appears as shoulder in some compounds), 920-890	The isomeric group, Si—CH═CH-CH_3, shows a different pattern with a strong band at 970 cm^{-1} due to *trans* —CH═CH—.
Si—C≡CH	3300 (C-H), 2040 (C≡C)	These are strong, narrow bands. In Si—C≡C-Si compounds the 3300 cm^{-1} band is absent, and the C≡C band is so weak that it is difficult to identify.
 In polysiloxanes:  	1600-1590, 1430, 1130-1110, 1030, 1000, 760-710, 700-690 730, 700 Intensities approx. equal 740, 720, 700 Intensities increase as frequency of band decreases	The 1430 cm^{-1} band is so narrow that its intensity in a recorded spectrum is greatly influenced by the resolution of the spectrometer and the scanning speed. When two phenyl groups are attached to the silicone, the strong 1120 cm^{-1} band usually is split into a doublet. The 1030 and 1000 cm^{-1} bands, normally weak, become much stronger in cyclotrisiloxanes. Specific Si-phenyl compounds often can be identified by the pattern in the range 760-690 cm^{-1}, where there is a strong band in the region 700-710 cm^{-1} and one to three week, medium or strong bands in the region 760-710 cm^{-1}.
Si—O—Si	1130-1000	Siloxanes show one or more very strong infrared bands in the region of 1130-1000 cm^{-1}. Disiloxanes and small-ring cyclosiloxanes show a single Si—O—Si band. As the siloxane chains become longer or branched, the Si—O—Si absorption becomes broader and more complex, showing two or more overlapping bands. A band associated with Si-O rocking can be observed at 455 cm^{-1}
$R_3SiOSiR_3$ disiloxanes	1080-1040	Some unusual shifts in the disiloxane band: $Cl_3SiOSiCl_3$, 1115 cm^{-1} (inductive effect); $(CH_3)_2SiOSi(CH_3)_2CH_2CH_2$, 920 cm^{-1} (strained ring).
$[R_2SiO]_3$ cyclic trimers $[R_2SiO]_{4-5}$ cyclic tetramers and pentamers	1020-1010 1090-1075	Cyclic trimers, tetramers, and pentamers have a single Si—O—Si band. As the ring becomes larger (D_6, D_7, etc), the Si—O—Si band gradually widens and splits.
$[(CH_3)_2SiO]_x$ Poly(dimethylsiloxnae)	1090, 1020	Long chains of dimethyl D units show very strong, distinct bands of about equal intensity at 1090 and 1020 cm^{-1}.
$[RSiO_{1.5}]_{8, 10, \text{ or } 12}$	1130-1115	
$[RSiO_{1.5}]_x$	1160-1000	Polysiloxanes made up of T units $[RSiO_{1.5}]_x$, often show a broad, structureless absorption covering the entire region 1160-1000 cm^{-1}. In other preparations of all-T polymers, there are two distinct bands — one at about 1130 cm^{-1}, the other at about 1040 cm^{-1}
Si—CH_2—Si	1080-1040	The disilylmethylene band is strong and sharp. The sharpness helps distinguish it from Si—O—Si bands.
Si—CH_2CH_2—Si	1180-1120	This is a strong, sharp band. Caution: The band does not appear in this range when the disilylethylene group is part of a strained ring.
	1135	Compounds containing the *p*-substituted silphenylene group show a strong, sharp band at 1135 cm^{-1}.

Group	Frequency in cm^{-1}	Comments
Si—H	2280-2080, 950-800	The Si—H group is readily identified by a strong band in the range 2280-2080 cm^{-1}. There usually is no interference from other bands in this part of the spectrum. The exact position of the 2280-2080 band is very sensitive to the electronegativity of the groups attached to the silicon. (For details, see the references.)
Si—H in amorphous silicon	2150-2000	Si—H bands at three or more frequencies in the range 2150-2000 cm^{-1} have been found in amorphous silicon (a-Si). There still is some uncertainty about the correlations between these band positions and the nature of the other groups on the Si atom.
Si-F	1030-820	SiF_2 and SiF_3 compounds show two bands in this range.
Si—Cl	625-425	$SiCl_2$ and $SiCl_3$ compounds usually show two bands in this range.
Si—OH Si-OD	3690 (free OH), 3400-3200 (hydrogen-bonded OH), 950-810 2742	Isolated Si—OH groups on silica show a sharp band at 3750 cm^{-1} [R.S. McDonald, *J. Phys. Chem.* **62**, 1168 (1958)]. Free silanol groups in organo silicon compounds show a sharp band at about 3690 cm^{-1}. Aryl silanols show slightly lower frequencies than alkyl silanols. Two ways to tell the difference between Si—OH and C—OH: The free Si—OH band at 3390 cm^{-1} is at a significantly higher frequency than the free C—OH band. Si—OH compounds show absorption, often a single broad band, in the range 950-810 cm^{-1}. This band is observed after D_2O exchange with isolated Si-OH in silica.
Si—O—Metal	1000-900	Silanolates show a strong band in the range 1000-900 cm^{-1}. Si—O—Ti compounds show a strong band at ca. 925 cm^{-1}.
Si—OR Si—OCH_3 Si—OCH_2CH_3 Si—$OCH_2CH_2CH_3$ Si–$OCH(CH_3)_2$	1110-1000 2840 (sharp), 1190, 1100-1080 (strong) 1170-1160, 1100 and 1075 (strong doublet), 970-940 1155(weak), 1100 and 1085 (strong doublet), 1020 1385 and 1370 (sharp, well-defined doublet), 1175, 1140-1110, 1055-1030 (strongest band in the set), 890	Si—alkoxy compounds have one or more strong bands in the 1110-1000 cm^{-1} range. If siloxane is present in a sample, the 1110-1000 cm^{-1} band is apt to be masked by strong Si—O—Si absorption. In such cases, the alkoxy group often can be identified by using other bands.
	1240, 975	The phenoxy group attached to silicon has strong bands at about 1240 and 975 cm^{-1}.
	1770-1725, 1370, 1260-1195, 1050-1000, 970-925	Two of these bands are sensitive to the number of acetoxy groups attached to a silicon atom. The correlations are not perfect, but here are the tendencies: In the interval 1770-1725 cm^{-1}, as the number of acetoxy groups increases, the band shifts to higher frequency. In the interval 1260-1195 cm^{-1}, as the number of acetoxy groups increases, the band shifts to lower frequency.
Si—NH_2 	3500-3390 (NH_2, doublet in this interval), 1550-1540 3390 (NH, single band), 1200-1150, 950-920	Tris(trimethylsilyl)amine (also called nonamethyltrisilazane, "NMTS") has a strong Si—N—Si band at 915 cm^{-1}.
Si—N_3	2180-2120	Compounds containing the azide group attached to silicon have a strong N═N═N band in the interval 2180-2120 cm^{-1}. See W. R. Peterson, *Reviews on Silicon, Germanium, Tin and Lead Compounds* **1974**, *1*, 193.
Si—N═C═O	2280	Trimethylsilylisocyanate has a very strong —N═C═O band at 2280 cm^{-1}. This band position is close to the high frequency end of the range 2275-2250 cm^{-1} for N═C═O attached to carbon.
Si—$CH_2CH_2CF_3$	1210, 1130, 1070, 1025, 900	The 1210 cm^{-1} band is the strongest one of the set.
Si—CH_2Cl	1395, 1180	

Group	Frequency in cm^{-1}	Comments
	1580, 1485, 1380, 1090, 1015, 810	These are strong, narrow bands.
$(RO)_3Si—CH_2CH_2CH_2X$ *where X is* —Cl —C≡N —NH_2 —SH  	 1310, 910, 860 2245(C≡N), 1190-1175 3370 and 3290 (NH_2, weak doublet), 1595 (broad, weak) 2560 (S—H, weak) 1720 (C═O), 1640 (C═C) 3045 (C—H of three-membered ring, weak), 1250	Silanes having this general formula, where X is a reactive group, are used as coupling agents. For some of these silanes, the infrared spectrum is dominated by bands of the $(RO)_3Si$-part of the structure, and bands due to the reactive group are not obvious. In such cases, it often is a good idea to hydrolyze the trialkoxysilane to the resin, $[O_{1.5}SiCH_2CH_2CH_2X]_n$, and to record the infrared spectrum of the resin. This eliminates the many bands due to Si—OR and replaces them with one or two broad Si—O—Si bands. When 3-aminopropyl compounds are hydrolyzed in air, the —NH_2 group reacts with carbon dioxide and water, and one gets a resin containing —NH_3^+ $^-HCO_3$ [see S. R. Culler, H. Ishida, and J. K. Koenig, *Appl. Spect.* **1984**, *38*, 1]. This salt structure is characterized by the following bands: 3400-2000 (several broad bands), 1640 (shoulder), 1575 (strong), 1480 cm^{-1}(strong).
	1725-1660	In compounds having a carbonyl group β to silicon C═O frequency in 10-20 cm^{-1} *lower* than that of the carbon analog. This is attributed to the inductive effect of the R_3SiC— group. [see G. L. Larson, D. Hernandez, I. Montes de Lopez-Cepero and L. E. Torres, *J. Org. Chem.* **1985**, *50*, 5260 and references therein for examples of these kinds of molecules]
Si═C (silenes)	ca. 1000	$(CH_3)HSi═CH_2$, stable at 35°K in argon mixture, has a strong band at 989 cm^{-1} due to Si═C stretch (see C. A. Arrington et al., *J. Am. Chem. Soc.* **1984,** *106*, 525; and G. Raabe et al., *J. Am. Chem. Soc.* **1986**, *108*, 671. For a good summary of all the Si═C infrared results reported to date, see the review by A. G. Brook and K. M. Baines in *Advances in Organometallic Chemistry* **1986**, 25. Solid silenes of the type $[(CH_3)_3Si]_2Si═C[OSi(CH_3)_3]R$, where R is a bulky group, are stable at room temperature in the absence of air. These silenes show a strong band at 1135-1130 cm^{-1} probably due to the Si—O—C stretch in the Si—O—C═Si group (see A. G. Brook et al., *J. Am. Chem. Soc.* **1982**, *104*, 5667.
CERAMICS Silicon carbide Silicon nitride Silicon dioxide	 ca. 800 ca. 840 ca. 1100	Silicon carbide occurs in the bewildering number of crystal modifications. It also occurs as amorphous material (a-SiC). We do not have detailed spectra-structure correlations for these forms. We expect that the different forms will have small differences in the infrared spectra, but that all forms of SiC will show strong absorption at or near 800 cm^{-1}. Amorphous Si_3N_4 has a strong, broad absorption band at ca. 840 cm^{-1}. All forms of SiO_2 show a strong band at 1110-1080 cm^{-1}. In addition to this strong band, there are other bands that help to identify the kind of SiO_2: *α-Quartz* (a crystal form of SiO_2)—1170 (sharp band on the slope of the strong 1080 band), 800 and 780 (well-defined, sharp doublet), and 695 cm^{-1}. *Cristobalite* (another crystal form)—1200 (a narrow shoulder or “step”), 795, and 620 cm^{-1}. *Amorphous silica* (includes silica gel, silica glass, “fused quartz”, precipitated silica, and fumed silica)—ca. 1220 (a very broad shoulder) and 810-800 cm^{-1}. The 810-800 cm^{-1} absorption of amorphous silica is broader and weaker than the 800 cm^{-1} region bands of α-quartz and cristobalite.

Silicon Compounds

Gelest

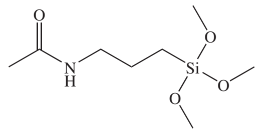
Enabling Your Technology

Commercial Status—produced on a regular basis for inventory
Developmental Status—available to support development and commercialization

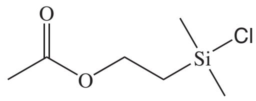
Specifications

For all chemicals listed the purity, unless otherwise noted, is 97% minimum, e.g. SIC2268.0 CHLOROMETHYLDIMETHOXYSILANE has a minimum purity of 97%. All other purity specifications listed are minimum purity; for example SIC2275.0 1-CHLOROETHYLTRIMETHYLSILANE, 96% has a minimum purity of 96%, and SIA0610.1 3-AMINOPROPYLTRIETHOXYSILANE, 99+% has a minimum purity >99%. Purity listed as tech indicates the assay for total active components, e.g.. SIC2070.0 2-(CARBOMETHOXY)ETHYLTRICHLOROSILANE tech-95 indicates that the material has 95% functional activity but contains other isomers or analogous compounds with similar activity (actual purity for the nominal compound is not specified).

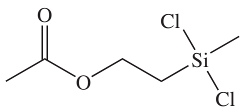
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



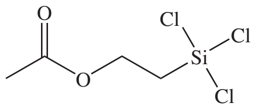
SIA0006.0
(3-ACETAMIDOPROPYL)TRIMETHOXYSILANE
221.33 | 162-5° / 2-3 | 1.0736 | 1.441
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[57757-66-1] HMIS: 3-2-1-X 10g ¥51,700



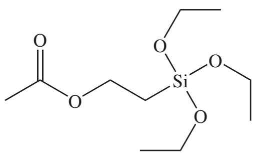
SIA0010.0
ACETOXYETHYLDIMETHYLCHLOROSILANE
$C_6H_{13}ClO_2Si$ | 180.71 | 108-9° / 50 | 1.031^{25} | 1.4301^{25}
Flashpoint: 63°C (145°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18306-45-1] HMIS: 3-2-1-X 25g ¥25,700



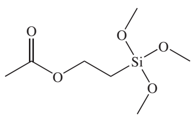
SIA0015.0
ACETOXYETHYLMETHYLDICHLOROSILANE
$C_5H_{10}Cl_2O_2Si$ | 201.12 | 117° / 62 | 1.177^{25} | 1.4390^{25}
Flashpoint: 65°C (149°F)
See also SIC2267.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18163-34-3] TSCA EC 242-045-0 HMIS: 3-2-1-X 25g ¥23,600



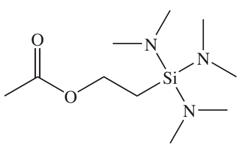
SIA0020.0
ACETOXYETHYLTRICHLOROSILANE
$C_4H_7Cl_3O_2Si$ | 221.54 | 143° / 70 | 1.272^{25} | 1.4427^{25}
Flashpoint: 82°C (180°F)
See also SIA0025.0, SIC2270.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18204-80-3] TSCA EC 242-092-7 HMIS: 3-2-1-X 25g ¥20,400 100g ¥58,600



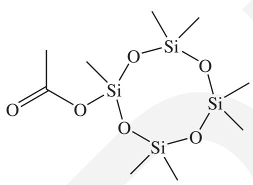
SIA0025.0
ACETOXYETHYLTRIETHOXYSILANE
$C_{10}H_{22}O_5Si$ | 250.37 | 60° / 0.2 | 0.983 | 1.410
>280° forms acetoxytriethoxysilane with extrusion of ethylene.[1]
1. Ezbiansky, K. A. et al. *Chemical Processing of Dielectrics, Insulators & Electronic Ceramics,* MRS Proc. 2000; Vol. 606, p.251.
See also SIC2271.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[22538-45-0] HMIS: 2-2-1-X 25g ¥19,900



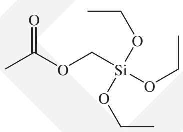
SIA0030.0
ACETOXYETHYLTRIMETHOXYSILANE, 95%
$C_7H_{16}O_5Si$ | 208.29 | 108-9° / 27 | 1.061 | 1.411
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[72878-29-6] TSCA HMIS: 3-3-1-X 25g ¥17,200 100g ¥48,300



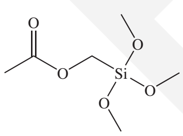
SIA0035.0
ACETOXYETHYLTRIS(DIMETHYLAMINO)SILANE
$C_{10}H_{25}N_3O_2Si$ | 247.42 | 105° / 5 | 0.9486 | 1.4468
Employed in ALD, CVD of SiO_2
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1356113-09-1] HMIS: 3-3-1-X 10g ¥45,900



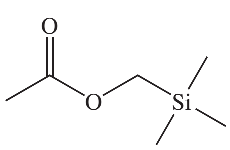
SIA0038.0
ACETOXYHEPTAMETHYLCYCLOTETRASILOXANE
$C_9H_{24}O_6Si_4$ | 340.63 | 80° / 4 | 1.035 | 1.4040
Employed in PECVD of SiO_2 dielectrics
See also SIH5842.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[14697-86-0] HMIS: 3-2-1-X 25g ¥31,600



SIA0050.0
ACETOXYMETHYLTRIETHOXYSILANE
$C_9H_{20}O_5Si$ | 236.34 | 106° / 15 | 1.0420^{25} | 1.4092
Hydrolyzes to form stable silanol solutions in neutral water
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5630-83-1] TSCA-L HMIS: 2-2-1-X 25g ¥20,400 100g ¥58,600

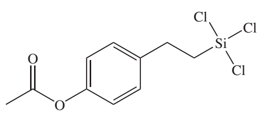


SIA0055.0
ACETOXYMETHYLTRIMETHOXYSILANE, 95%
$C_6H_{14}O_5Si$ | 194.26 | 190-1° | 1.085 | 1.4031
Flashpoint: 56°C (133°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[65625-39-0] TSCA-L HMIS: 3-2-1-X 10g ¥16,400 50g ¥55,400

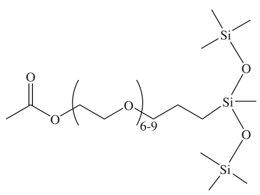


SIA0060.0
ACETOXYMETHYLTRIMETHYLSILANE
TRIMETHYLSILYLMETHYL ACETATE
$C_6H_{14}O_2Si$ | 146.26 | 136-7° | 0.867^{25} | 1.4060^{25}
Flashpoint: 20°C (68°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[2917-65-9] TSCA EC 220-849-2 HMIS: 2-4-0-X 25g ¥47,500

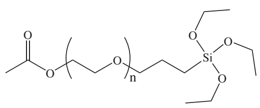
Name | Mw | bp °C/mm | (mp °C) | D_4^{20} | n_D^{20}



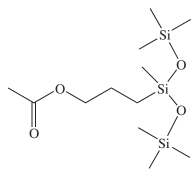
SIA0070.0
4-ACETOXYPHENETHYLTRICHLOROSILANE
$C_{10}H_{11}Cl_3O_2Si$ 297.64 126-9° / 1 (39-41°)
Contains 3-8% isomers
Intermediate for phenolic phases
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[627882-90-0]/[282534-42-3] HMIS: 3-2-1-X 10g ¥26,300



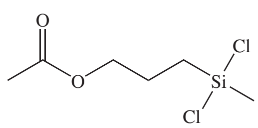
SIA0075.0
3-{2-[ACETOXY(POLYETHYLENEOXY)PROPYL]}HEPTAMETHYLTRISILOXANE, tech-95
600 - 750 1.032 1.4461
Viscosity: 30 cSt Flashpoint: 79°C (174°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Surfactant
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[125997-17-3] TSCA HMIS: 2-1-0-X 25g ¥9,300 100g ¥22,500



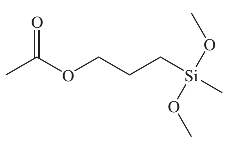
SIA0078.0
2-[(ACETOXY(POLYETHYLENEOXY)PROPYL]TRIETHOXYSILANE, 95%
500 - 700 1.071 1.4527
Viscosity: 50 cSt
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-1-1-X 25g ¥24,100



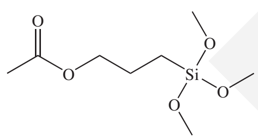
SIA0088.0
3-(3-ACETOXYPROPYL)HEPTAMETHYLTRISILOXANE
$C_{12}H_{30}O_4Si_3$ 322.62 67-70° / 0.8 0.912 1.4098
Surfactant
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18044-09-2] HMIS: 2-2-0-X 25g ¥20,400



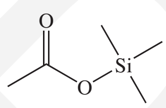
SIA0090.0
3-ACETOXYPROPYLMETHYLDICHLOROSILANE
$C_6H_{12}Cl_2O_2Si$ 215.15 142° / 73 1.151^{25} 1.4434^{25}
Flashpoint: 85°C (185°F)
Acetolysis of polydimethylsiloxane copolymers allows acrylation for photocrosslinking.[1]
1. Bouten, B. et al. *Eur. Polym. J.* **1995**, *31*,1173.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[5290-24-4] TSCA EC 226-126-8 HMIS: 3-2-1-X 25g ¥13,000 750g ¥106,000



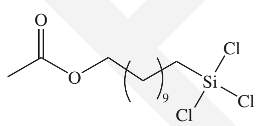
SIA0092.0
3-ACETOXYPROPYLMETHYLDIMETHOXYSILANE
$C_8H_{18}O_4Si$ 206.31 110° / 5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 25g ¥19,900



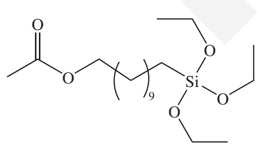
SIA0100.0
3-ACETOXYPROPYLTRIMETHOXYSILANE
$C_8H_{18}O_5Si$ 222.31 92° / 2 1.062 1.4146
γc of treated surfaces: 37.5 mN/m Flashpoint: 93°C (199°F)
Forms sol-gel derived epoxidation catalyst in combination with titanium diisopropoxide bispentanedionate.[1]
1. Müller, C. et al. *Catal. Lett.* **2000**, *64(1), 9-14*, DOI 10.1023/A:109074617565
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[59004-18-1] EC 261-552-8 HMIS: 3-1-1-X 25g ¥8,500 100g ¥19,900 2kg ¥192,000
COMMERCIAL



SIA0110.0
ACETOXYTRIMETHYLSILANE
O-TRIMETHYLSILYL ACETATE
$C_5H_{12}O_2Si$ 132.23 103-4° (-32°) 0.891 1.3890
Flashpoint: 4°C (39°F)
Vapor pressure, 30°: 35 mm
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2754-27-0] (既) 9-1939 TSCA EC 220-404-2 HMIS: 3-4-1-X 25g ¥4,700 100g ¥14,700 2kg ¥105,000
COMMERCIAL



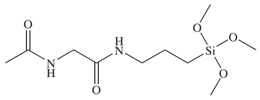
SIA0114.0
11-ACETOXYUNDECYLTRICHLOROSILANE
$C_{13}H_{25}Cl_3O_2Si$ 347.78 147-9° / 1 1.084
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[53605-77-9] HMIS: 3-1-1-X 10g ¥27,100



SIA0115.0
11-ACETOXYUNDECYLTRIETHOXYSILANE
$C_{19}H_{40}O_5Si$ 376.61 163-4° / 0.8 0.936 1.4326
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[959053-85-1] HMIS: 2-2-1-X 1.0g ¥34,200

SILICON COMPOUNDS

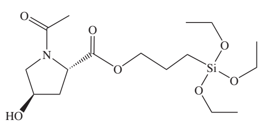
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIA0120.2
N-(ACETYLGLYCYL)-3-AMINOPROPYLTRIMETHOXYSILANE, 5% in methanol

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{10}H_{22}N_2O_5Si$	278.38	Flashpoint: 11°C (52°F)	(171-3°)	0.80	

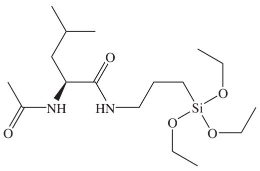
Amino acid-tipped silane
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1274903-53-5] HMIS: 3-4-1-X 25g ¥14,100



SIA0126.0
3-(N-ACETYL-4-HYDROXYPROLYLOXY)PROPYLTRIETHOXYSILANE, 25% in ethanol

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{16}H_{31}NO_7Si$	377.51	Flashpoint: 15°C (59°F)		0.872	

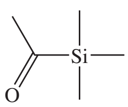
Amino acid-tipped silane
Hydrophilic reagent for biomimetic surface modification
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1300591-79-0] HMIS: 2-3-0-X 5g ¥51,200



SIA0127.0
N-(N-ACETYLLEUCYL)-3-AMINOPROPYLTRIETHOXYSILANE, 12-15% in ethanol

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{17}H_{36}N_2O_5Si$	376.58	Flashpoint: 15°C (59°F)		0.816	

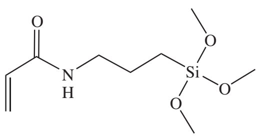
Hydrophobic amino acid-tipped silane
See also SIA0120.0, SIA0126.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1367348-25-1] HMIS: 2-3-1-X 2.5g ¥36,900



SIA0130.0
ACETYLTRIMETHYLSILANE
1-TRIMETHYLSILYLETHANONE

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_5H_{12}OSi$	116.24	113-4°; Flashpoint: 8°C (46°F)		0.811	1.4110

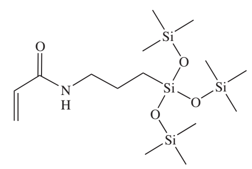
Silyl building block.[1]
1. Larson, G. et al. *Synth. Comm.* **1990,** *20*, 1095.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[13411-48-8] HMIS: 2-4-1-X 5g ¥22,500



SIA0146.0
3-ACRYLAMIDOPROPYLTRIMETHOXYSILANE, tech-95

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_9H_{19}NO_4Si$	233.34			1.062	1.465

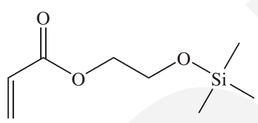
Inhibited with MEHQ
See also SIM6480.73
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[57577-96-5] HMIS: 3-2-1-X store <5°C 10g ¥37,400



SIA0150.0
3-ACRYLAMIDOPROPYLTRIS(TRIMETHYLSILOXY)SILANE, tech-95

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{15}H_{37}NO_4Si_4$	407.80	145-50° / 0.25	(40-43°)		

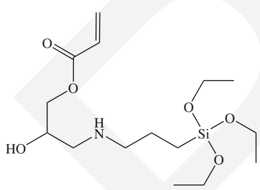
Comonomer for oxygen permeable polymers
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[115258-10-1] HMIS: 2-2-1-X store <5°C 10g ¥51,700



SIA0160.0
(2-ACRYLOXYETHOXY)TRIMETHYLSILANE
2-TRIMETHYLSILOXYETHYLACRYLATE

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_8H_{16}O_3Si$	188.29	90-4° / 6		0.950	1.4260^{25}

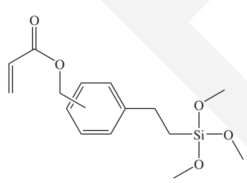
See also SIM6481.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18269-99-3] HMIS: 3-2-1-X store <5°C 25g ¥23,100



SIA0180.0
N-(3-ACRYLOXY-2-HYDROXYPROPYL)-3-AMINOPROPYLTRIETHOXYSILANE, 50% in ethanol

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{15}H_{31}NO_6Si$	349.50	Flashpoint: 15°C (59°F)		0.931	1.4084

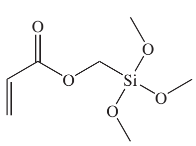
Inhibited with MEHQ
Used to stabilize Stober silica suspensions.[1]
1. Park, B. et al. *J. Mater. Sci.* **1992**, *27*, 5692
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[123198-57-2] HMIS: 3-4-1-X store <5°C 25g ¥46,900



SIA0184.0
(ACRYLOXYMETHYL)PHENETHYLTRIMETHOXYSILANE, tech-95

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{15}H_{22}O_5Si$	310.42				

Inhibited with MEHQ; mixed m-,p-; α-,β- isomers
Coupling agent for UV cure systems w/less oxygen sensitivity
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[141813-19-6](m)/[141813-20-9] (p) HMIS: 3-3-1-X store <5°C 10g ¥42,700

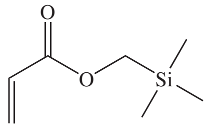


SIA0182.0
ACRYLOXYMETHYLTRIMETHOXYSILANE

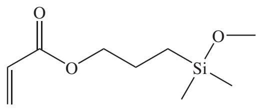
Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_7H_{14}O_5Si$	206.27	42-6° / 0.15		1.060	

Coupling agent, comonomer for ormosils
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[21134-38-3] TSCA-L HMIS: 3-3-1-X store <5°C 25g ¥61,800

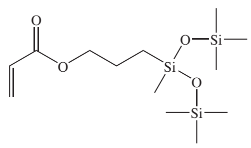
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



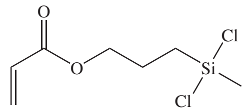
SIA0186.0
ACRYLOXYMETHYLTRIMETHYLSILANE
$C_7H_{14}O_2Si$ 158.27 35° / 6.5 0.868 1.4248^{25}
Undergoes UV polymerization
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[67186-35-0] HMIS: 3-3-0-X store <5°C 10g ¥26,800



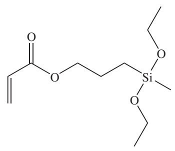
SIA0190.0
(3-ACRYLOXYPROPYL)DIMETHYLMETHOXYSILANE, 95%
$C_9H_{18}O_3Si$ 202.32 54-5° / 0.1
Inhibited with MEHQ Flashpoint: 85°C (185°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[111918-90-2] HMIS: 3-2-1-X store <5°C 5g ¥24,700 25g ¥88,300



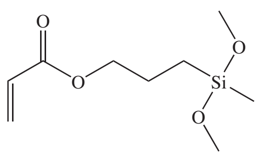
SIA0194.0
(3-ACRYLOXYPROPYL)METHYLBIS(TRIMETHYLSILOXY)SILANE, tech-90
$C_{13}H_{30}O_4Si_3$ 334.63 108° / 2 0.9076 1.422
Inhibited with MEHQ; contains difunctional disiloxane monomer
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[177617-17-3] HMIS: 3-2-0-X store <5°C 5g ¥21,500 25g ¥75,600



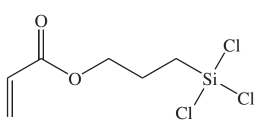
SIA0196.0
(3-ACRYLOXYPROPYL)METHYLDICHLOROSILANE
$C_7H_{12}Cl_2O_2Si$ 227.15 73° / 0.1 1.15 1.4585^{25}
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[71550-63-5] TSCA EC 275-614-7 HMIS: 3-2-1-X store <5°C 5g ¥16,400 25g ¥55,400



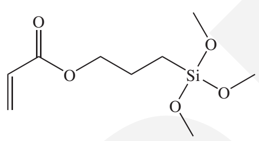
SIA0197.0
(3-ACRYLOXYPROPYL)METHYLDIETHOXYSILANE, 95%
$C_{11}H_{22}O_4Si$ 246.38 40° / 1 0.947 1.4139
Inhibited with MEHQ Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[146666-71-9] HMIS: 3-2-1-X store <5°C 25g ¥23,100



SIA0198.0
(3-ACRYLOXYPROPYL)METHYLDIMETHOXYSILANE, 95%
$C_9H_{18}O_4Si$ 218.33 65° / 0.35 1.01 1.431
Inhibited with MEHQ
Employed in fabrication of photoimageable, low shrinkage multimode waveguides.[1]
1. Xu, C. et al. *Chem. Mater.* **1996,** *8*, 2701.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13732-00-8] TSCA-L HMIS: 3-2-1-X store <5°C 50g ¥17,800 250g ¥62,200

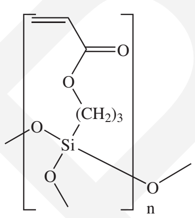


SIA0199.0
(3-ACRYLOXYPROPYL)TRICHLOROSILANE
$C_6H_9Cl_3O_2Si$ 247.58 68° / 0.4 1.26 1.4631
Inhibited with MEHQ Flashpoint: >100°C (>212°F)
See also SIA0200.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[38595-89-0] TSCA-L HMIS: 3-1-1-X store <5°C 5g ¥14,600 25g ¥48,000

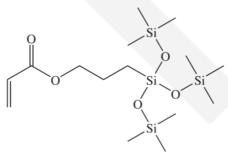


SIA0200.0
(3-ACRYLOXYPROPYL)TRIMETHOXYSILANE, 96%
$C_9H_{18}O_5Si$ 234.32 68° / 0.4 (<-20°) 1.06 1.4155
Inhibited with BHT Flashpoint: 123°C (253°F)
Coupling agent for epoxies, UV cure coatings
Employed in optical fiber coatings.[1]
In combination with dipodal silane, SIB1833.0, increases strength and hydrolytic stability of dental composites.[2]
1. Yokoshima, M. et al. *Chem. Abstr.* 113, 15746d; Jap. Pat. 02133338, 1990.
2. Matinlinna, J. et al. *Acta Odontol. Scand.* **2012**, *70*, 405.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4369-14-6] (既) 2-3727 TSCA HMIS: 3-1-1-X store <5°C 25g ¥13,500 100g ¥36,300 2kg ¥170,000

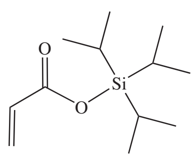
COMMERCIAL



SIA0200.2
(3-ACRYLOXYPROPYL)TRIMETHOXYSILANE, oligomeric hydrolysate
1.2
Viscosity: 8-12 cSt
Employed in rapid prototyping
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-2-1-X store <5°C 25g ¥27,300 100g ¥80,900

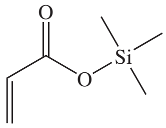


SIA0210.0
(3-ACRYLOXYPROPYL)TRIS(TRIMETHYLSILOXY)SILANE, tech-95
$C_{15}H_{36}O_5Si_4$ 408.79 136-8° / 1 0.88 1.4180
Inhibited with MEHQ; contains difunctional siloxane Flashpoint: 93°C (199°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[17096-12-7] HMIS: 3-2-0-X store <5°C 5g ¥17,200 25g ¥58,600

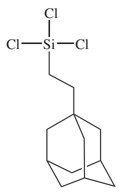


SIA0315.0
ACRYLOXYTRIISOPROPYLSILANE
$C_{12}H_{24}O_2Si$ 228.41 94-6° / 7 0.910 1.4485
Monomer for marine anti-foulant coatings
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[157859-20-6] HMIS: 2-3-1-X store <5°C 25g ¥28,400

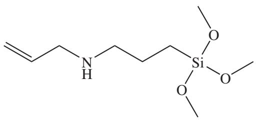
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



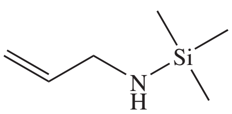
SIA0320.0
ACRYLOXYTRIMETHYLSILANE
O-(TRIMETHYLSILYL)ACRYLATE
$C_6H_{12}O_2Si$ — 144.25 — 64-5° / 100 — 0.8939 — 1.4112
Inhibited with MEHQ — Flashpoint: 26°C (79°F)
See also SIM6491.0, SIT8584.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13688-55-6] TSCA HMIS: 3-3-1-X store <5°C 25g ¥20,400 100g ¥58,600



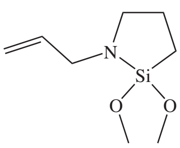
SIA0325.0
ADAMANTYLETHYLTRICHLOROSILANE
$C_{12}H_{19}Cl_3Si$ — 297.73 — 135° / 3 — (36-7°) — 1.2204 — 1.5135
Contains approximately 25% α-isomer — Flashpoint: 155°C (310°F)
Forms silica bonded phases for reverse phase chromatography.[1]
1. Yang, S. S.; Gilpin, R. K. *Anal. Chem.* **1988,** *59*, 2750.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[37843-11-1] TSCA EC 253-687-6 HMIS: 3-1-1-X 5g ¥25,200 25g ¥90,400



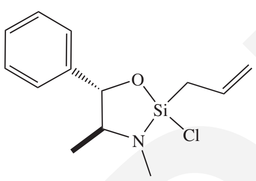
SIA0400.0
3-(N-ALLYLAMINO)PROPYLTRIMETHOXYSILANE, 95%
$C_9H_{21}NO_3Si$ — 219.36 — 106-9° / 25 — 0.989^{25} — 1.499^{25}
Flashpoint: 88°C (190°F)
Coupling agent for polyesters
Coupling agent for acrylic coatings for glass containers.[1]
1. Hashimoto. Y. et al. Eur. Pat. Appl. EP 289,325, 1988.
See also SIA0415.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[31024-46-1] (既) 2-2077 TSCA EC 250-435-7 HMIS: 3-2-1-X 10g ¥17,200 50g ¥58,600



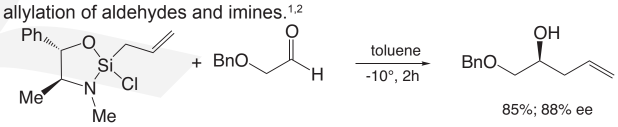
SIA0402.0
ALLYLAMINOTRIMETHYLSILANE, 96%
N-(TRIMETHYLSILYL)ALLYLAMINE
$C_6H_{15}NSi$ — 129.28 — 110-2° — 0.770 — 1.4127^{25}
Flashpoint: 10°C (50°F)
Protected amine; undergoes hydrosilylation
See also SIB1825.7
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[10519-97-8] HMIS: 3-4-1-X 25g ¥21,500 100g ¥62,100



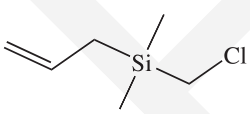
SIA0415.0
N-ALLYL-AZA-2,2-DIMETHOXYSILACYCLOPENTANE
$C_8H_{17}NO_2Si$ — 187.31 — 52-4° / 3
Coupling agent for nanoparticles
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[618914-49-1] HMIS: 3-3-1-X 10g ¥36,300



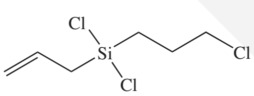
SIA0433.0
(S,S)-2-ALLYL-2-CHLORO-3,4-DIMETHYL-5-PHENYL-[1,3,2]-OXAZASILOLIDINE
1-OXA-3-AZA-2-SILACYCLOPENTANE, 2-CHLORO-3,4-DIMETHYL-5-PHENYL-2-(2-PROPENYL), (4S,5S)
$C_{13}H_{18}ClNOSi$ — 267.82 — 120° / 0.1 — 1.01 — 1.5177
Used in the enantioselective allylation of aldehydes and imines.[1,2]



1. Kinnaird, J. W. A. et al. *J. Am. Chem. Soc.* **2002**, *124,* 7920.
2. Berger, R. et al. *J. Am. Chem. Soc.* **2003,** *125,* 9596.
See also SIP6724.95
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[447440-43-9] HMIS: 3-2-1-X 5g ¥41,600

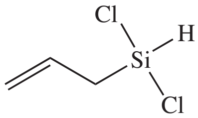


SIA0440.0
ALLYL(CHLOROMETHYL)DIMETHYLSILANE, 95%
$C_6H_{13}ClSi$ — 148.71 — 163-6° / 50 — 0.907 — 1.4490
Contains isomers — Flashpoint: 27°C (81°F)
Grignard is a nucleophilic hydroxymethylating agent.[1]
1. Tamao, K. et al. *Tetrahedron Lett.* **1984,** *25*, 4249.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[75422-66-1] HMIS: 2-3-0-X 10g ¥16,200 50g ¥54,400

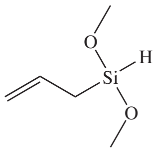


SIA0441.0
ALLYL(3-CHLOROPROPYL)DICHLOROSILANE
$C_6H_{11}Cl_3Si$ — 217.60 — 60-3° / 0.6 — 1.172
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[166970-54-3] HMIS: 3-2-1-X 5g ¥38,500

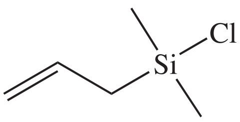
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



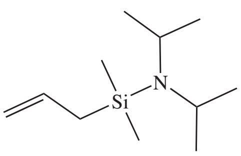
SIA0445.0
ALLYLDICHLOROSILANE
4,4-DICHLORO-4-SILABUTENE
$C_3H_6Cl_2Si$ — Mw 141.07 — bp 97° — D_4 1.086^{27}
Flashpoint: -4°C (25°F)
Pt catalysts induce autopolymerization or may cross-couple with other olefins.[1]
1. Lee, B. et al. *Main Group Chemical News* **1995,** *1*, 53.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[3937-28-8] EC 223-515-4 HMIS: 3-4-2-X 5g ¥17,200 25g ¥58,600



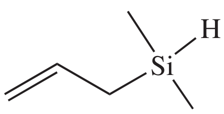
SIA0447.0
ALLYLDIMETHOXYSILANE
$C_5H_{12}O_2Si$ — Mw 132.23 — bp 107-9° — D_4 0.877 — n_D 1.4450
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18147-35-8] HMIS: 3-4-1-X 5g ¥18,800



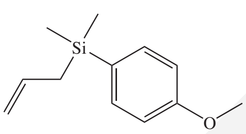
SIA0460.0
ALLYLDIMETHYLCHLOROSILANE, 95%
$C_5H_{11}ClSi$ — Mw 134.68 — bp 110-2° — D_4 0.8964 — n_D 1.4195
Contains β-methylvinyl isomer
Flashpoint: 5°C (41°F)
Reagent for steroid derivatization for GC/MS analysis.[1,2]
Used in intramolecular, stereoselective allylation of hemiacetals.[3]
1. Philippou, G. *J. Chromatogr.* **1976,** *129*, 384.
2. Poole, C. F.; Zlatkis, A. *J. Chromatogr. Sci.* **1979,** *17*, 115.
3. Esteban, J. et al. *Org. Lett.* **2008**, *10*, 4843.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4028-23-3] (既) 2-2042 TSCA EC 223-706-2 HMIS: 3-4-1-X 5g ¥13,500 25g ¥43,800



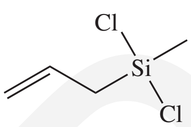
SIA0461.0
ALLYLDIMETHYL(DIISOPROPYLAMINO)SILANE
$C_{11}H_{25}NSi$ — Mw 199.42 — bp 79-81° / 13 — D_4 0.815 — n_D 1.4470
Flashpoint: 62°C (144°F)
Stereoselective α-hydroxyallylation reagent.[1]
1. Tamao, K. et al. *J. Org. Chem.* **1987,** *52*, 957.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[106948-24-7] TSCA HMIS: 3-2-1-X 10g ¥54,900



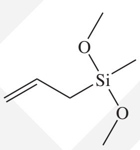
SIA0464.0
ALLYLDIMETHYLSILANE, 95%
$C_5H_{12}Si$ — Mw 100.24 — bp 69-70° — D_4 0.705^{25} — n_D 1.4029^{25}
Flashpoint: -20°C (-4°F)
Dry-development resist produced by plasma polymerization.[1]
1. Fujitsu, *Chem. Abstr.*101, 31148n; Jap. Patent 59013323, 1984.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[3937-30-2] TSCA HMIS: 2-4-2-X 5g ¥17,800



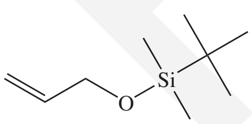
SIA0469.0
ALLYL(4-METHOXYPHENYL)DIMETHYLSILANE
$C_{12}H_{18}OSi$ — Mw 206.36 — bp 253° — D_4 0.935 — n_D 1.519
Flashpoint: 102°C (216°F)
See also SIV9079.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[68469-60-3] HMIS: 2-1-0-X 5g ¥26,800



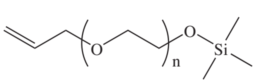
SIA0470.0
ALLYLMETHYLDICHLOROSILANE, 95%
3-(DICHLOROMETHYLSILYL)-1-PROPENE
$C_4H_8Cl_2Si$ — Mw 155.10 — bp 119-20° — D_4 1.076 — n_D 1.4419
Flashpoint: 27°C (81°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1873-92-3] (既) 2-2042 TSCA EC 217-498-2 HMIS: 3-3-2-X 25g ¥27,300 100g ¥80,900



SIA0485.0
ALLYLMETHYLDIMETHOXYSILANE, tech-95
$C_6H_{14}O_2Si$ — Mw 146.26 — bp 127-8° — D_4 0.871^{25} — n_D 1.4055^{25}
Contains β-methylvinyl isomer
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[67681-66-7] EC 266-901-8 HMIS: 3-3-1-X 5g ¥26,300



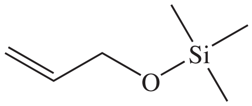
SIA0476.0
ALLYLOXY-t-BUTYLDIMETHYLSILANE
$C_9H_{20}OSi$ — Mw 172.35 — bp 120° / 50 — D_4 0.811 — n_D 1.4210
Flashpoint: 32°C (90°F)
Undergoes hydroboration and hydrosilylation
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[85807-85-8] HMIS: 3-3-1-X 10g ¥21,500



SIA0479.0
O-ALLYLOXY(POLYETHYLENEOXY)TRIMETHYLSILANE, tech-95
Mw 470 - 560 — D_4 1.040 — n_D 1.4555
Average of 10 -(OCH_2CH_2)- units
Viscosity: 20 - 25 cSt
Hydrophilic monomer
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-3-1-X 25g ¥13,000 100g ¥34,500

SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIA0480.0 ALLYLOXYTRIMETHYLSILANE *O-TRIMETHYLSILYLALLYL ALCOHOL* $C_6H_{14}OSi$	130.26	100-2° Flashpoint: 0°C (32°F)		0.789	1.3970



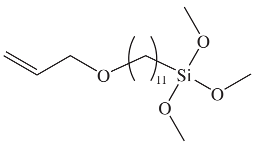
Regioselective silylating agent.[1]
For the S-allylation of sulfides.[2]
Can be isomerized to the enol silyl ether of propanal.[3]

1. Chan, T. et al. *J. Organomet. Chem.* **1979,** *179*, C24.
2. Vedejs, E. et al. *J. Org. Chem.* **1981,** *46*, 3353.
3. Fielding, J.; Roberts, B. P. *Tetrahedron Lett.* **2001,** *42*, 4061.

See also SIA0476.0, SIM6497.0, SIV9089.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18146-00-4] (既) 2-2960 TSCA EC 242-031-4 HMIS: 3-4-1-X 25g ¥16,700 100g ¥46,400

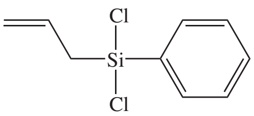
4-ALLYLOXY-(2-TRIMETHYLSILOXY)DIPHENYLKETONE-
see SIT8570.5 2-TRIMETHYLSILOXY-4-ALLYLOXYDIPHENYLKETONE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIA0482.0 11-ALLYLOXYUNDECYLTRIMETHOXYSILANE $C_{17}H_{36}O_4Si$	332.56	140° / 0.5		0.914	1.4415



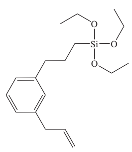
ω-olefin for functional self-assembled monolayers (SAMs)
See also SID4618.0, SIU9049.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1196453-35-6] HMIS: 2-1-0-X 5g ¥42,700

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIA0486.0 ALLYLPHENYLDICHLOROSILANE, 95% $C_9H_{10}Cl_2Si$	217.17	100-2° / 8 Flashpoint: 76°C (169°F)		1.168^{25}	1.5351^{25}



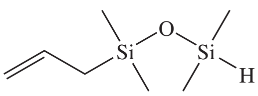
Allylation synthon
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7719-03-1] TSCA EC 231-747-2 HMIS: 3-2-1-X 50g ¥65,000

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIA0489.0 m-ALLYLPHENYLPROPYLTRIETHOXYSILANE $C_{18}H_{30}O_3Si$	322.52				



Coupling agent for amine functional aromatic optical coatings
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-2-1-X 5g ¥40,600

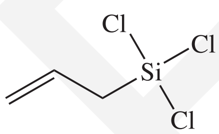
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIA0490.0 1-ALLYL-1,1,3,3-TETRAMETHYLDISILOXANE $C_7H_{18}OSi_2$	174.39	131-2° Flashpoint: 10°C (50°F)		0.8001	1.4060



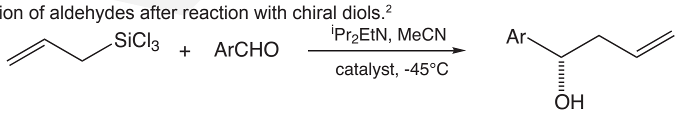
See also SIV9097.5
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18387-26-3] HMIS: 2-3-1-X 5g ¥20,400

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIA0520.0 ALLYLTRICHLOROSILANE $C_3H_5Cl_3Si$	175.52	117-8°		1.201	1.4460

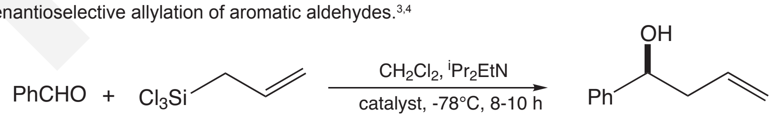
Vapor pressure, 16˚: 10 mm — Flashpoint: 31°C (88°F)
ΔHvap: 39.3 kJ/mole — TOXICITY: ivn mouse, LD50: 56 mg/kg



Review of synthetic utility.[1]
Effects asymmetric allylation of aldehydes after reaction with chiral diols.[2]



Used in the highly enantioselective allylation of aromatic aldehydes.[3,4]

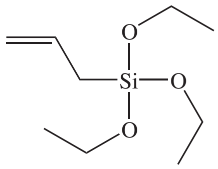


Enantioselectively allylates aryl aldehydes with high ee values.[5]
Undergoes enantioselective allylation of aldehydes to form homoallylic alcohols.[6]
Allylates carbonyls with base catalysis as opposed to allyltrimethylsilane (SIA0555.0), which requires Lewis acid catalysis.[7]
Chiral Phosphoramides catalyze the enantioselective allylation of aromatic, heteroaromatic, as well as cinnamyl aldehydes.[8]

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 10-14.
2. Wang, Z. et al. *J. Chem. Soc., Chem. Commun.* **1996,** 2261.
3. Shimada. T. et al. *Org. Lett.* **2002,** *4*, 2799.
4. Malkov, A. et al. *Org. Lett.* **2002,** *4*, 1047.
5. Simonini, V. et al. *Adv. Synth. Catal.* **2008**, *350*, 561.
6. Massa, A. et al. *Tetrahedron: Asymmetry* **2009**, *20*, 202.
7. Kobayashi, S.; Nishio, K. *Tetrahedron Lett.* **1993**, *34*, 3453.
8. Denmark, S. E. et al. *J. Org. Chem.* **1994**, *59*, 6161.

See also SIO6708.0, SIV9110.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[107-37-9] (既) 2-2037 TSCA EC 203-485-9 HMIS: 3-3-2-X 10g ¥11,400 50g ¥35,300

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

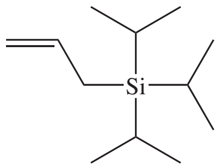


SIA0525.0
ALLYLTRIETHOXYSILANE
3-(TRIETHOXYSILYL)-1-PROPENE

$C_9H_{20}O_3Si$	204.34	176°		0.9030	1.4074

Vapor pressure, 100°: 50 mm — Flashpoint: 47°C (117°F)
Dipole moment: 1.79 debye

Extensive review on the use in silicon-based cross-coupling reactions.[1]
1. Denmark, S. E. et al. *Organic Reactions,* Vol. 75, Denmark, S. E. Ed., John Wiley and Sons, 233, **2011**.
See also SIA0489.0, SIA0540.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2550-04-1] (既) 2-2066 TSCA EC 219-843-2 HMIS: 2-2-1-X 10g ¥12,700 50g ¥40,600

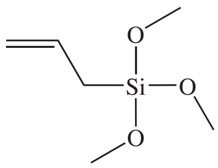


SIA0535.0
ALLYLTRIISOPROPYLSILANE

$C_{12}H_{26}Si$	198.43	130° / 16		0.824	1.4670

Flashpoint: 76°C (169°F)

Alkylated by primary alkyl bromides with greater regiospecificity than allyltrimethylsilane.[1]
1. Muchowski, J. et al. *Tetrahedron Lett.* **1985,** *26*, 5375.
F&F: Vol 13, p 11
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[24400-84-8] HMIS: 2-2-0-X 5g ¥36,300



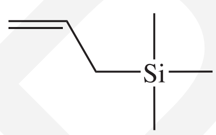
SIA0540.0
ALLYLTRIMETHOXYSILANE

$C_6H_{14}O_3Si$	162.26	146-8°		0.963^{25}	1.4036^{25}

Flashpoint: 46°C (115°F)

Adhesion promoter for vinyl-addition silicones
Allylation of ketones, aldehydes and imines with dual activation of a Lewis Acid and fluoride ion.[1]
Used in the regioselective generation of the thermodynamically more stable enol trimethoxysilyl ethers, which in turn are used in the asymmetric generation of quaternary carbon centers.[2]
Converts arylselenyl bromides to arylallylselenides.[3]
Allylates aryl iodides.[4]
1. Yamasaki, S. et al. *J. Am. Chem. Soc.* **2002,** *124*, 6536.
2. Ichibakase, T. et al. *Tetrahedron Lett.* **2008**, *49*, 4427.
3. Bhadra, S. et al. *J. Org. Chem.* **2010**, *75*, 4864.
4. Mowery, M. E.; DeShong, P. *J. Org. Chem.* **1999**, *64,* 1684.
F&F: Vol 18, p 14; Vol 19, p 360; Vol 20, p 85; Vol 21, p 3, Vol 12, p 395
See also SIA0525.0, SIB1832.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2551-83-9] (既) 2-2066 TSCA EC 219-855-8 HMIS: 3-2-1-X 10g ¥10,900 50g ¥33,200 2kg ¥205,000

COMMERCIAL

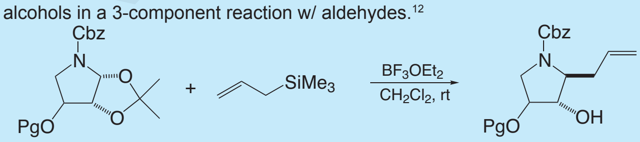


SIA0555.0
ALLYLTRIMETHYLSILANE

$C_6H_{14}Si$	114.26	85-6°		0.7193	1.4074

Flashpoint: 7°C (45°F)

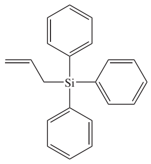
Versatile synthon- transfers allyl group, highly nucleophilic double bond
Key reviews.[1,2]
Undergoes polymerization with zirconocene complexes.[5]
Provides functional termination of living carbocationic polymerized polyisobutylenes.[6]
Allylates dioxolanes.[7]
Allylates imines under fluoride catalysis.[8]
Provides alternative for the formation of trans-allyl-2,3-O-isopropylidene-protected pyrrolidines.[9]
Carries out deoxygenative allylation of benzylic alcohols.[10]
Allylates lithium alkoxides w/ loss of the lithium oxide.[11]
Forms benzylic homoallylic alcohols in a 3-component reaction w/ aldehydes.[12]



Diallylates ketones via their ketals.[13]
1. *Handbook for Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 14-24.
2. Weber, W. In *Silicon Reagents for Organic Synthesis;* Springer-Verlag: 1983, p173.
3. Fleming, I. *Synthesis* **1979,** 761.
4. Hosomani, N. *Acc. Chem. Res.* **1988,** *21*, 200.
5. Habane, S. et al. *Macromol. Chem. Phys.* **1998,** *199*, 2211.
6. Wilczek, L. et al. *J. Polym. Sci., Part A: Polym. Chem.* **1987,** *25*, 3255.
7. Dussault, P. H.;Liu, X. *Org. Lett.* **1999,** *1*, 1391.
8. Weng, D. K. et al. *J. Org. Chem.* **1999,** *64*, 4233.
9. De Armas, P. et al. *Org. Lett.* **2000,** *3*, 3513.
10. De, S. K.; Gibbs, R. A. *Tetrahedron Lett.* **2005**, *46*, 8345.
11. Kabalka, G. W. et al. *Organometallics* **2007**, *26*, 4112.
12. Kataki, D.; Phukan, P. *Tetrahedron Lett.* **2009**, *50*, 1958.
13. Galy, N. et al. *Tetrahedron* **2011**, *67*, 1448.
F&F: Vol. 7, p 370; Vol. 8, p 273; Vol. 9, p 155; Vol. 10, p 1, p 4, p 439; Vol. 11, p 16, p 532; Vol.12, p 223; Vol. 13, p 11, p 295, p 305, p 343; Vol. 14, p 18; Vol. 15, p 286, p 378, p 403, p 411; Vol. 21, p 11, p 12, p 89.
See also SIM6513.0
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[762-72-1] (既) 2-3737 TSCA EC 212-104-5 HMIS: 2-4-0-X 25g ¥13,800 100g ¥36,800 1.5kg ¥203,000

COMMERCIAL

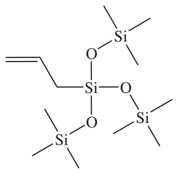
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIA0575.0
ALLYLTRIPHENYLSILANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{21}H_{20}Si$	300.48		(88-90°)		

Provides stereoselective synthesis of dienes.[1]
1. Ikeda, Y. et al. *Bull. Chem. Soc. Jpn.* **1986,** *59*, 657.
See also SIV9265.0
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[18752-21-1] HMIS: 2-1-0-X 2.5g ¥17,200



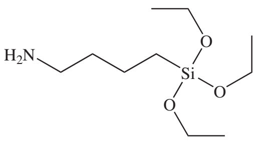
SIA0585.0
ALLYLTRIS(TRIMETHYLSILOXY)SILANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{12}H_{32}O_3Si_4$	336.73	110-1° / 20 Flashpoint: 67°C (153°F)		0.861^{25}	1.4008

Reaction with fluoroalkanoyl peroxides yields fluorinated siloxanes.[1]
1. Sawada, H. et al. *Chem. Abstr.* 115, 256270k; *Yukagaku* **1991,** *40*, 730.
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[7087-21-0] HMIS: 2-2-0-X 10g ¥20,700 50g ¥72,400

ALUMINOSILANE- see SID2780.0 DI-s-BUTOXYALUMINOXYTRIETHOXYSILANE

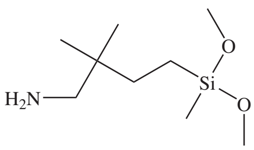
ALUMINUM SILICATE - see SIK6463.5, KAOLIN, calcined



SIA0587.0
4-AMINOBUTYLTRIETHOXYSILANE, 95%

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{10}H_{25}NO_3Si$	235.40	114-6° / 14 Flashpoint: 109°C (228°F) TOXICITY: oral rat, LD50: 1,620 mg/kg		0.941^{25}	1.4270^{25}

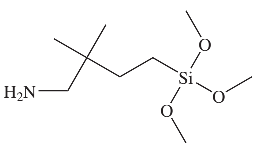
Amino-functional coupling agent
See also SIA0587.07
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3069-30-5] HMIS: 2-1-1-X 10g ¥17,000 50g ¥57,000



SIA0587.05
4-AMINO-3,3-DIMETHYLBUTYLMETHYLDIMETHOXYSILANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_9H_{23}NO_2Si$	205.37	Flashpoint: 100°C (212°F) TOXICITY: oral rat, LD50: 631 mg/kg		0.9248^{25}	1.4365

Comonomer for non-yellowing textile lubricants
See also SIA0605.0, SIP6828.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[156849-43-3] TSCA HMIS: 3-2-1-X 25g ¥13,500 100g ¥36,300

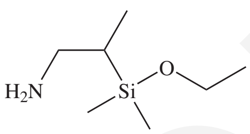


SIA0587.07
4-AMINO-3,3-DIMETHYLBUTYLTRIMETHOXYSILANE
AMINONEOHEXYLTRIMETHOXYSILANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_9H_{23}NO_3Si$	221.37	230° Flashpoint: 97°C (207°F)		0.977	1.4302

Sterically hindered primary amine coupling agent
Non-yellowing aminosilane coupling agent for flexible adhesives and sealants
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[157923-74-5] TSCA HMIS: 3-1-1-X 25g ¥9,800 100g ¥28,900 2kg ¥156,000

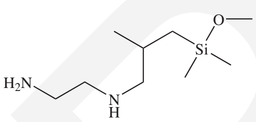
COMMERCIAL



SIA0587.1
1-AMINO-2-(DIMETHYLETHOXYSILYL)PROPANE, 85%

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_7H_{19}NOSi$	161.32	101-7° / 100		0.85	1.431

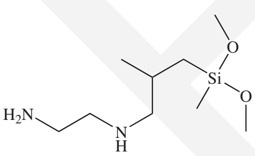
Contains 3-aminopropyldimethylethoxysilane
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 5g ¥24,700



SIA0587.2
N-(2-AMINOETHYL)-3-AMINOISOBUTYLDIMETHYLMETHOXYSILANE, 95%

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_9H_{24}N_2OSi$	204.39	85-9° / 2 Flashpoint: 88°C (190°F)		0.900^{25}	1.4513^{25}

Amino-functional coupling agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[31024-49-4] HMIS: 3-2-1-X 25g ¥31,000

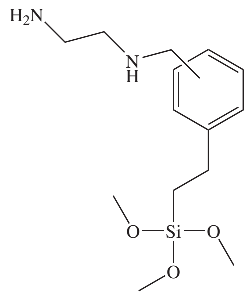


SIA0587.5
N-(2-AMINOETHYL)-3-AMINOISOBUTYLMETHYLDIMETHOXYSILANE, 95%

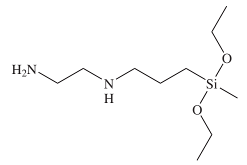
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_9H_{24}N_2O_2Si$	220.39	131° / 15 Flashpoint: 96°C (205°F)		0.960	1.4518

Amino-functional coupling agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[23410-40-4] TSCA EC 245-642-4 HMIS: 3-2-1-X 25g ¥27,300

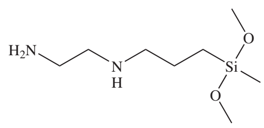
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIA0588.0
(AMINOETHYLAMINOMETHYL)PHENETHYLTRIMETHOXYSILANE, tech-90
$C_{14}H_{26}N_2O_3Si$ — 298.46 — 126-30° / 0.2 — 1.02 — 1.5083
Mixed m-,p- isomers — Flashpoint: >110°C (>230°F)
Coupling agent for polyimides.[1]
Photochemically sensitive (194nm).[2]
Forms self assembled monolayers.[3]
Reagent for charge heterogeneity in micropatterning.[4]
1. Arkles, B. et al. *Modern Plastics* **1980**, *57*, 64.
2. Dressick, W. et al. *Thin Solid Films* **1996,** *284*, 568.
3. Harnett, C. et al. *Appl. Phys. Lett.* **2000,** *76*, 2466.
4. Chen, J. et al. *Nano Lett.* **2002,** 2, 393.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[74113-77-2] TSCA HMIS: 3-1-1-X — 25g ¥25,200 — 100g ¥74,000

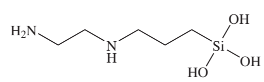


SIA0588.8
N-(2-AMINOETHYL)-3-AMINOPROPYLMETHYLDIETHOXYSILANE
$C_{10}H_{26}N_2O_2Si$ — 234.41 — 108-110° / 1.5 — 0.923 — 1.445
Flashpoint: >110°C (>230°F)
Adhesion promoter for silanol-functional silicones on metal substrates
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[70240-34-5] EC 274-494-3 HMIS: 3-2-1-X — 25g ¥16,200



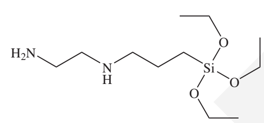
SIA0589.0 サイラエース **S310**
N-(2-AMINOETHYL)-3-AMINOPROPYLMETHYLDIMETHOXYSILANE, tech-95
$C_8H_{22}N_2O_2Si$ — 206.36 — 265° — 0.975^{25} — 1.4447^{25}
Specific wetting surface: 380 m²/g — Flashpoint: 90°C (194°F)
Autoignition temperature: 280˚C
Comonomer for silicones in textile softeners and hair care formulations
Coupling agent for furan-quartz sand floor coating systems
Adhesion promoter for urea-formaldehyde binders on flexible substrates
See also SIA0587.5, SIP6828.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water — サイラエース S310 — 100g ¥4,800 — 1kg ¥9,300
[3069-29-2] (既) 2-2084 TSCA EC 221-336-6 HMIS: 3-1-1-X — 25g inquire — 2kg inquire — 16kg inquire

COMMERCIAL

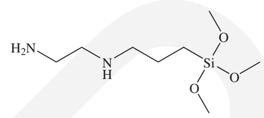


SIA0590.0
N-(2-AMINOETHYL)-3-AMINOPROPYLSILANETRIOL, 25% in water, mainly oligomers
$C_5H_{16}N_2O_3Si$ — 180.28 — 1.00
pH: 10.0-10.5 — Flashpoint: >110°C (>230°F)
Internal hydrogen bonding stabilizes solution
Additive for CMP slurries
Aqueous primer, adhesion promoter for resin-to-metal applications
See also WSA-7021 for greater hydrolytic stability
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[68400-09-9] TSCA HMIS: 2-0-0-X — 100g ¥6,100 — 2kg ¥40,500 — 18kg ¥284,000

COMMERCIAL

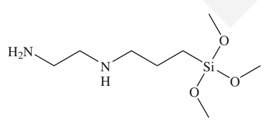


SIA0590.5
N-(2-AMINOETHYL)-3-AMINOPROPYLTRIETHOXYSILANE, 95%
$C_{11}H_{28}N_2O_3Si$ — 264.55 — 156° / 15 — 0.994 — 1.4367^{25}
Flashpoint: 148°C (298°F)
Coupling agent with slower hydrolysis than SIA0591.0, SIA0592.6
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5089-72-5] (既) 2-2059 TSCA EC 225-806-1 HMIS: 3-1-1-X — 25g ¥19,400



SIA0591.0 サイラエース **S320**
N-(2-AMINOETHYL)-3-AMINOPROPYLTRIMETHOXYSILANE, tech-95
N-[3-(TRIMETHOXYSILYL)PROPYL]ETHYLENEDIAMINE; DAMO
$C_8H_{22}N_2O_3Si$ — 222.36 — 140° / 15 — 1.019^{25} — 1.450^{25}
Contains 2-6% N,N'-Bis[(trimethoxysilyl)propyl]ethylenediamine — Flashpoint: 150°C (302°F)
Viscosity: 6.5 cSt — TOXICITY: oral rat, LD50: 7,460 mg/kg
Surface tension: 36.5 mN/m — Autoignition temperature: 300˚C
Specific wetting surface: 358 m²/g — Coefficient of thermal expansion: 0.8×10^{-3}
Coupling agent for polyamides, polycarbonates (e.g. in CDs), polyesters and copper/brass adhesion
Film-forming coupling agent/primer, fiberglass size component
For cyclic version see SID3543.0, for pre-hydrolyzed version see SIA0590.0
Used in the immobilization of copper (II) catalyst on silica.[1]
Used together w/ SID3396.0 to anchor $PdCl_2$ catalyst to silica for acceleration of the Tsuji-Trost reaction.[2]
1. Wu, Q.; Wang, L. *Synthesis* **2008**, 2007.
2. Noda, H. et al. *Angew. Chem., Int. Ed. Engl.* **2012**, *51*, 8017.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water — サイラエース S320 — 100g ¥4,400 — 1kg ¥9,300
[1760-24-3] (既) 2-2083 TSCA EC 217-164-6 HMIS: 3-1-1-X — 25g inquire — 2kg inquire — 16kg inquire

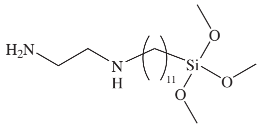
COMMERCIAL



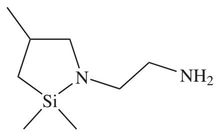
SIA0591.1
N-(2-AMINOETHYL)-3-AMINOPROPYLTRIMETHOXYSILANE, 98%
N-[3-(TRIMETHOXYSILYL)PROPYL]ETHYLENEDIAMINE; DAMO
$C_8H_{22}N_2O_3Si$ — 222.36 — 140° / 15 — 1.019^{25} — 1.450^{25}
Flashpoint: 150°C (302°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1760-24-3] TSCA EC 217-164-6 HMIS: 3-1-1-X — 25g ¥6,200 — 100g ¥12,200 — 2kg ¥52,000

COMMERCIAL

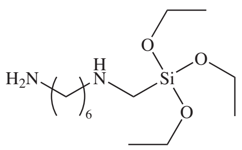
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



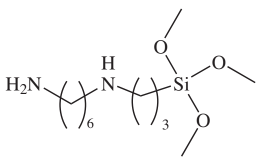
SIA0595.0
N-(2-AMINOETHYL)-11-AMINOUNDECYLTRIMETHOXYSILANE
$C_{16}H_{38}N_2O_3Si$ 334.57 155-9° / 0.4 0.873^{25} 1.4515
Coupling agent with extended spacer-group for remote substrate binding
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[121772-92-7] HMIS: 3-1-1-X 5g ¥40,600



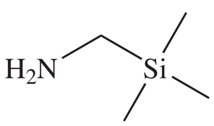
SIA0592.0
N-(2-AMINOETHYL)-2,2,4-TRIMETHYL-1-AZA-2-SILACYCLOPENTANE
$C_8H_{20}N_2Si$ 172.35 54-6° / 2 0.905 1.4769
Coupling agent for vapor phase modification of nanoparticles
See also SID3543.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18246-33-8] HMIS: 3-2-1-X 10g ¥24,100



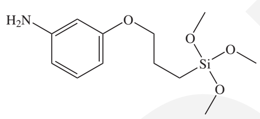
SIA0592.6
N-(6-AMINOHEXYL)AMINOMETHYLTRIETHOXYSILANE, 95%
$C_{13}H_{32}N_2O_3Si$ 292.49 160° / 0.1 0.928^{25} 1.4385^{25}
Flashpoint: >110°C (>230°F)
Long-chain amino coupling agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[15129-36-9] HMIS: 3-2-1-X 25g ¥11,100 100g ¥28,400



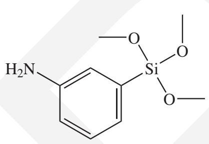
SIA0594.0
N-(6-AMINOHEXYL)AMINOPROPYLTRIMETHOXYSILANE, 95%
$C_{12}H_{30}N_2O_3Si$ 278.47 160-5° / 0.15 1.11 1.4501
Flashpoint: >110°C (>230°F)
Employed in immobilization of DNA.[1]
Employed for immobilization of PCR primers on beads.[2]
1. Kneuer, C. et al. *Int'l. J. Pharmaceutics* **2000,** *196*, 257.
2. Andreadis, J. et al. *Nuc. Acid Res.* **2000,** *28*, E-5.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[51895-58-0] HMIS: 3-1-1-X 10g ¥16,200 50g ¥44,800



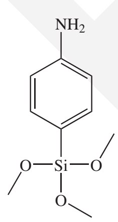
SIA0596.0
AMINOMETHYLTRIMETHYLSILANE
(TRIMETHYLSILYL)METHYLAMINE
$C_4H_{13}NSi$ 103.24 94-5° 0.7697 1.4168
Hygroscopic
Flashpoint: 9°C (48°F)
Reacts with nitrourea to form corresponding α-silylurea.[1]
Forms imines which when reacted with fluoride ion generate 2-aza-allylanion chemistry.[2,3,4]
Form imines which are precursors to imidazolidines.[5,6]
1. Seyferth, D. et al. *J. Organomet. Chem.* **1972,** *44*, 279.
2. Achiwa, K. et al. *Chem. Lett.* **1984,** 2041.
3. Tsuge, O. et al. *Bull. Chem. Soc. Jpn.* **1986,** *59*, 2537.
4. Imai, N. et al. *Chem. Pharm. Bull.* **1987,** *35*, 2085.
5. Achiwa, K.; Sekiya, M. *Chem. Lett.* **1981,** 1213.
6. Achiwa, K. et al. *Chem. Pharm. Bull.* **1983,** *31*, 3939.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18166-02-4] HMIS: 3-4-0-X 5g ¥41,600 25g ¥153,900



SIA0598.0
3-(m-AMINOPHENOXY)PROPYLTRIMETHOXYSILANE, tech-95
$C_{12}H_{21}NO_4Si$ 271.39 125-135° / 0.5 1.02 1.495
Amber liquid
High temperature coupling agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[55648-29-8] TSCA HMIS: 3-1-1-X 10g ¥19,400 50g ¥67,100

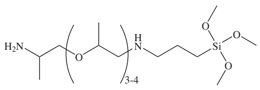


SIA0599.0
m-AMINOPHENYLTRIMETHOXYSILANE, 95%
$C_9H_{15}NO_3Si$ 213.31 110-4° / 0.6 1.19 1.5187
Contains other isomers
Flashpoint: 180°C (356°F)
Coupling agent for polyimides used in electronics
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[70411-42-6] TSCA-L HMIS: 3-1-1-X 5g ¥32,600



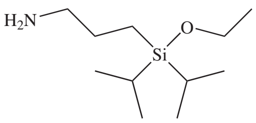
SIA0599.1
p-AMINOPHENYLTRIMETHOXYSILANE, 95%
$C_9H_{15}NO_3Si$ 213.31 110-4° / 0.6 (60-62°)
Contains other isomers
Flashpoint: 180°C (356°F)
Coupler for silica-poly(phenyleneterephthalamide) composite films.[1]
Together with phenyltrimethoxysilane, SIP6822.0, can be used to increase the dispersibility of mesoporous silica.[2]
1. Mark, J. et al. *J. Mater. Chem.* **1997,** *7*, 259.
2. Banet, P. et al. *Langmuir* **2008**, *24*, 9030.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[33976-43-1] EC 251-772-2 HMIS: 3-1-1-X 5g ¥42,300

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



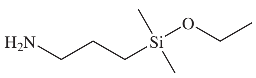
SIA0599.4
N-3-[(AMINO(POLYPROPYLENOXY)]AMINOPROPYLTRIMETHOXYSILANE, 60 - 65% | Mw: 337 - 435 | D_4^{20}: 0.984 | n_D^{20}: 1.4508

3-4 propylenoxy units
Contains amine-terminated polypropylene oxide
Coupling agent with film-forming capability
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-2-1-X | 25g ¥26,300



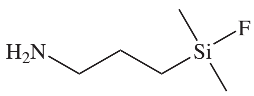
SIA0602.0
3-AMINOPROPYLDIISOPROPYLETHOXYSILANE
$C_{11}H_{27}NOSi$ | Mw: 217.43 | bp: 78-80° / 0.4 | D_4^{20}: 0.872[25] | n_D^{20}: 1.4489

Forms hydrolytically stable amino-functional bonded phases and monolayers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[117559-36-1] | HMIS: 3-2-0-X | 5g ¥19,400 | 25g ¥67,100



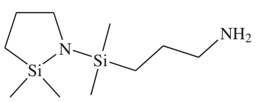
SIA0603.0
3-AMINOPROPYLDIMETHYLETHOXYSILANE
$C_7H_{19}NOSi$ | Mw: 161.32 | bp: 78-9° / 24 | D_4^{20}: 0.857[25] | n_D^{20}: 1.4276[25]

ΔHform: 618 kJ/mole | Flashpoint: 73°C (163°F)
Coupling agent for DNA array technology
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18306-79-1] | TSCA | HMIS: 3-2-1-X | 5g ¥16,200 | 25g ¥54,400



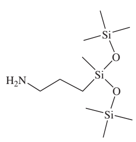
SIA0603.4
3-AMINOPROPYLDIMETHYLFLUOROSILANE, 95%
$C_5H_{14}FNSi$ | Mw: 135.26 | bp: 141-5° | D_4^{20}: 0.905

Contains isomers
Forms monolayers on oxide surfaces
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[153487-58-2] | HMIS: 3-4-1-X | 10g ¥40,000



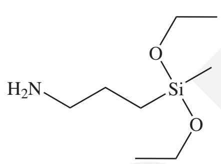
SIA0604.0
N-(3-AMINOPROPYLDIMETHYLSILYL)AZA-2,2-DIMETHYL-2-SILACYCLOPENTANE
3-[(2,2-DIMETHYL-1-AZA-2-SILACYCLOPENT-1-YL)DIMETHYLSILYL]-1-PROPANAMINE
$C_{10}H_{26}N_2Si_2$ | Mw: 230.50 | n_D^{20}: 1.4705

Employed in vapor phase derivatization of porous silica.[1]
1. Brandhuber, D. et al. *J. Mater. Chem.* **2005,** *15*, 3896.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[388606-32-4] | HMIS: 3-1-1-X | 10g ¥31,600



SIA0604.5
3-AMINOPROPYLMETHYLBIS(TRIMETHYLSILOXY)SILANE
$C_{10}H_{29}NO_2Si_3$ | Mw: 279.61 | bp: 75-8° / 0.75 | D_4^{20}: 0.856 | n_D^{20}: 1.4152

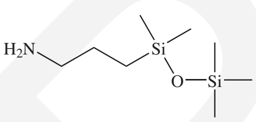
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[42292-18-2] | HMIS: 2-2-0-X store <5°C | 10g ¥9,800 | 50g ¥28,900



SIA0605.0
3-AMINOPROPYLMETHYLDIETHOXYSILANE, 95%
$C_8H_{21}NO_2Si$ | Mw: 191.34 | bp: 85-8° / 8 | D_4^{20}: 0.916 | n_D^{20}: 1.4272

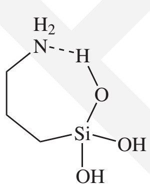
Flashpoint: 85°C (185°F)
TOXICITY: oral rat, LD50: 4,760 mg/kg
Coupling agent for foundry resins, including phenolic novolaks and resols
Vapor phase deposition >150° on silica yields high density amine functionality.[1]
1. Ek, S. et al. *Langmuir* **2003**, *19*, 3461.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3179-76-8] | TSCA | EC 221-660-8 | HMIS: 3-2-1-X | 25g ¥3,400 | 2kg ¥54,300 | 15kg ¥264,000

COMMERCIAL



SIA0607.0
3-AMINOPROPYLPENTAMETHYLDISILOXANE
3-(PENTAMETHYLSILOXANYL)PROPANAMINE
$C_8H_{23}NOSi_2$ | Mw: 205.45 | bp: 67-70° / 6 | D_4^{20}: 0.843 | n_D^{20}: 1.4135

HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[23029-21-2] | HMIS: 2-2-0-X | 5g ¥28,400



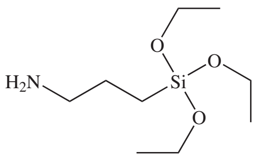
SIA0608.0
3-AMINOPROPYLSILANETRIOL, 22-25% in water
$C_3H_{11}NO_3Si$ | Mw: 137.21 | D_4^{20}: 1.06

pH: 10.0-10.5 | Flashpoint: >110°C (>230°F)
Mainly oligomers; monomeric at concentrations <5%
Water-borne, VOC-free coupling agent
Internal hydrogen bonding stabilizes solution
See also WSA-7011 for greater hydrolytic stability
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[58160-99-9] / [29159-37-3] | TSCA | EC 261-145-5 | HMIS: 2-0-0-X | 25g ¥6,100 | 2kg ¥40,500 | 18kg ¥193,000

COMMERCIAL

SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

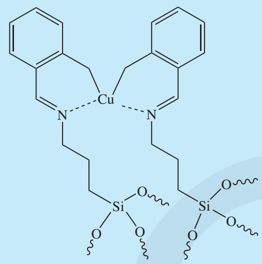


SIA0610.0 サイラエース **S330**
3-AMINOPROPYLTRIETHOXYSILANE
GAPS, AMEO, A-1100
$C_9H_{23}NO_3Si$ — Mw 221.37 — bp 122-3° / 30 — D_4^{20} 0.951 — n_D^{20} 1.4225

Viscosity: 1.6 cSt
ΔHvap: 49.4 kJ/mole
Treated surface contact angle, water: 59°
γc of treated surfaces: 37.5 mN/m
Specific wetting surface: 353 m^2/g

Flashpoint: 104°C (219°F)
TOXICITY: oral rat, LD50: 1,780 mg/kg
Vapor pressure, 100˚: 10 mm
Primary irritation index: 6.50

Widely used coupling agent for phenolic, epoxy, polyamide and polycarbonate resins
Effects imobilization of enzymes.[1]
Used to bind Cu(salicylaldimine) to silica.[2]




Aminosilanes are widely used as coupling agents for fiberglass insulation and composites

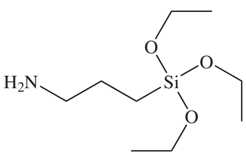
1. *Enzymes* **1976,** *84*, 55915.
2. Murphy, E. F. et al. *Inorg. Chem.* **2003,** *42*, 2559.

See also SIA0608.0 for pre-hydrolyzed version; SID4068.0 for blocked amine version
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water

[919-30-2] (既) 2-2061 TSCA EC 213-048-4 HMIS: 3-1-1-X

サイラエース S330 100g ¥4,900 1kg ¥9,300
25g inquire 2kg inquire 16kg inquire

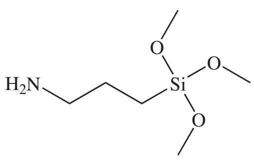
COMMERCIAL



SIA0610.1
3-AMINOPROPYLTRIETHOXYSILANE 99+%
$C_9H_{23}NO_3Si$ — Mw 221.37 — bp 122-3° / 30 — D_4^{20} 0.951 — n_D^{20} 1.4225
Flashpoint: 104°C (219°F)

Low fluorescence grade for high throughput screening
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water

[919-30-2] (既) 2-2061 TSCA EC 213-048-4 HMIS: 3-1-1-X 25g ¥27,800*
* in fluoropolymer bottle



SIA0611.0
3-AMINOPROPYLTRIMETHOXYSILANE
$C_6H_{17}NO_3Si$ — Mw 179.29 — bp 80° / 8 — D_4^{20} 1.027 — n_D^{20} 1.4240

Vapor pressure, 67˚: 5 mm

Flashpoint: 83°C (181°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Autoignition temperature: 300˚C

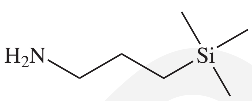
Coupling agent with superior reactivity in vapor phase and non-aqueous surface treatments
Hydrolysis rate vs SIA0610.0: 6:1
Used to immobilize Cu and Zn Schiff base precatalysts for formation of cyclic carbonates.[1]

1. Tasci, Z.; Ulusoy, M. *J. Organomet. Chem.* **2012**, *713,* 104.

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water

[13822-56-5] (既) 2-2061 TSCA EC 237-511-5 HMIS: 3-2-1-X 25g ¥4,500 2kg ¥50,000 18kg ¥267,000

COMMERCIAL

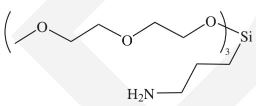


SIA0612.0
3-AMINOPROPYLTRIMETHYLSILANE
$C_6H_{17}NSi$ — Mw 131.30 — bp 58° / 30 — D_4^{20} 0.7831^{25} — n_D^{20} 1.4661^{25}

pKa: 10.75

See also SIA0604.5, SIA0620.0
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid

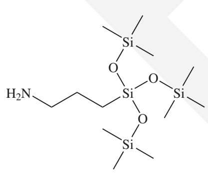
[18187-14-9] HMIS: 3-3-0-X 5g ¥52,800



SIA0614.0
3-AMINOPROPYLTRIS(METHOXYETHOXYETHOXY)SILANE, 95%
$C_{18}H_{41}NO_9Si$ — Mw 443.61 — D_4^{20} 1.066 — n_D^{20} 1.448
Flashpoint: 68°C (154°F)

Coupling agent for melt compounding of polyamides and epoxides
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water

[87994-64-7] EC 289-365-7 HMIS: 3-2-1-X 25g ¥16,200



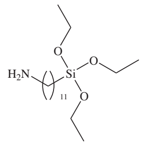
SIA0620.0
3-AMINOPROPYLTRIS(TRIMETHYLSILOXY)SILANE, 95%
$C_{12}H_{35}NO_3Si$ — Mw 353.76 — bp 152° / 47 — D_4^{20} 0.891^{25} — n_D^{20} 1.4110^{25}
Flashpoint: >110°C (>230°F)

See also SIA0604.5, 3-AMINOPROPYLMETHYLBIS(TRIMETHYLSILOXY)SILANE
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid

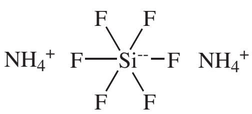
[25357-81-7] TSCA HMIS: 2-1-0-X 10g ¥15,100 50g ¥50,100

AMINOTRIPHENYLSILANE - see SIT8628.0 TRIPHENYLAMINOSILANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIA0630.0
11-AMINOUNDECYLTRIETHOXYSILANE
$C_{17}H_{39}NO_3Si$ | 333.59 | 128-32° / 1 | | 0.895^{25} | 1.4352^{25}
Contains ~ 5% isomers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[116821-45-5] HMIS: 2-2-1-X 1.0g ¥38,500

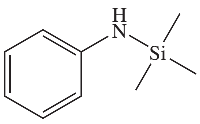


SIA0705.0
AMMONIUM HEXAFLUOROSILICATE
$H_8F_6N_2Si$ 劇物 | 178.14 | | | 2.011 |
Fluoride ion source
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[16919-19-0] (既) 1-313 TSCA EC 240-968-3 HMIS: 3-0-0-X 250g ¥7,700 2.5kg ¥23,300

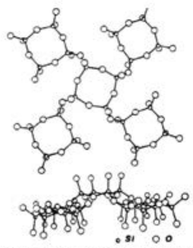
AMYLTRICHLOROSILANE - see SIP6720.0 PENTYLTRICHLOROSILANE

AMYLTRIETHOXYSILANE - see SIP6720.2 PENTYLTRIETHOXYSILANE

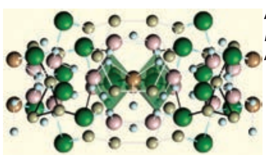
ANHYDRIDE FUNCTIONAL SILANE - see SIT8192.6 3-(TRIETHOXYSILYL)PROPYLSUCCINIC ANHYDRIDE



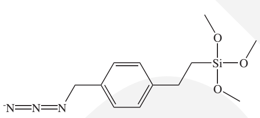
SIA0710.0
ANILINOTRIMETHYLSILANE
N-TRIMETHYLSILYLANILINE
$C_9H_{15}NSi$ | 165.31 | 98-9° / 19 | | 0.940 | 1.5220
Dipole moment: 1.37 debye
Dielectric constant: 1000Hz: 3.90
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3768-55-6] TSCA EC 223-197-7 HMIS: 3-2-1-X 25g ¥19,400


Structure of sheet silicate ion in apophyllite.

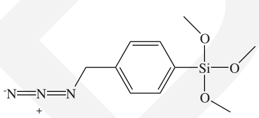
SIA0740.0
APOPHYLLITE, pieces
FLUORAPOPHYLLITE
$Ca_4KO_{20}Si_8(F,OH)\cdot 8H_2O$ | | | | 2.35 | 1.53-1.57
Mohs Hardness: 4.5-5.0
A tectosilicate (framework of linked SiO_4 tetrahedron with all oxygen atoms shared)
Starting point for alkoxyfunctional sheet polymers.[1]
1. Yeh, L. et al. *Polym. Prepr.* **1991,** *32(3)*, 508.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[58572-15-9] TSCA-E HMIS: 1-0-0-X 250g ¥27,800


Crystal structure image courtesy of webmineral.com

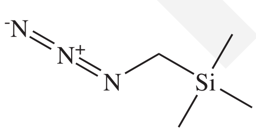
SIA0760.0
ATTAPULGITE
PALYGORSKITE, FULLER'S EARTH
$Al_2O_3MgOSiO_2\cdot H_2O$ | 411.35 | | (>900° dec.) | 2.61-2.62 | 1.57
Particle Size: <35 μm
Typical bulk density, not compacted: 0.21 g/cm³
Surface area: 50 m²/g
Mohs Hardness: 2.0-2.5
Monoclinic prismatic
Open channel structure, elongate crystal
Exhibits sorptive properties, used as desiccant, pharmaceuticals adjuvant
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12174-11-7] TSCA-E HMIS: 1-0-0-X 500g ¥8,500 8kg ¥49,000



SIA0770.0
(AZIDOMETHYL)PHENETHYLTRIMETHOXYSILANE, tech-90
$C_{12}H_{19}N_3O_3Si$ | 281.39 | | | 1.11 | 1.497^{25}
CAUTION: CAN FORM EXPLOSIVE COMPOUNDS IN CONTACT WITH COPPER AND SILVER COMPOUNDS
Mixed isomers
Reagent for "click" chemistry
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1245946-78-4] HMIS: 4-2-1-X 5g ¥27,300



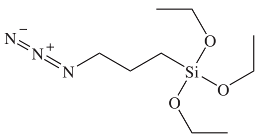
SIA0774.0
p-AZIDOMETHYLPHENYLTRIMETHOXYSILANE, 90%
$C_{10}H_{15}N_3O_3Si$ | 253.33 | | | 1.14 | 1.497^{25}
AVOID CONTACT WITH METALS
See also SIA0770.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[83315-74-6] HMIS: 4-2-1-X 2.5g ¥38,500



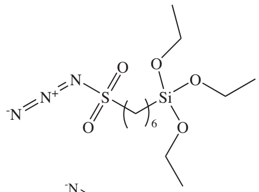
SIA0775.0
(AZIDOMETHYL)TRIMETHYLSILANE, 95%
TRIMETHYLSILYLMETHYL AZIDE
$C_4H_{11}N_3Si$ | 129.24 | 50° / 60 | | 0.87 |
AVOID CONTACT WITH METALS
Flashpoint: 6°C (43°F)
Review of synthetic utility.[1]
Intermediate for trimethylsilyltriazoles.[2]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 657.
2. Tsuge, O. et al. *Chem. Lett.* **1983**, 1131.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[87576-94-1] HMIS: 3-3-1-X 2.5g ¥51,200

SILICON COMPOUNDS

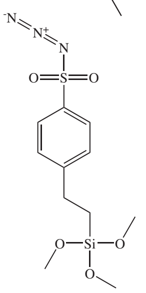
Name | **Mw** | **bp °C/mm** | **(mp °C)** | **D_4^{20}** | **n_D^{20}**



SIA0777.0
3-AZIDOPROPYLTRIETHOXYSILANE
$C_9H_{21}N_3O_3Si$ 247.37
AVOID CONTACT WITH METALS
Used with click chemistry to introduce and immobilize discrete complexes onto the SBA-15 surface.[1]
Used in the preparation of poly-L-lysine to silica nanoparticles.[2]
1. Nakazawa, J. et al. *J. Am. Chem. Soc.* **2012**, *134*, 2750.
2. Kar, M. et al. *Langmuir*, **2010**, *26*, 5772.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[83315-69-9] HMIS: 4-1-1-X 1.0 g ¥35,300

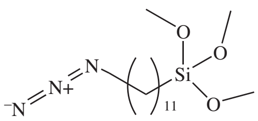


SIA0780.0
6-AZIDOSULFONYLHEXYLTRIETHOXYSILANE, tech-95
1-TRIETHOXYSILYL-6-SULFONAZIDE-n-HEXANE
$C_{12}H_{27}N_3O_5SSi$ 353.51 1.147 1.4634
AVOID CONTACT WITH METALS
Amber-brown liquid Flashpoint: 114°C (237°F)
Inserts nitrenes into aliphatics and aromatics at temperatures >110°C
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[96550-26-4] HMIS: 3-1-1-X 25g ¥43,800

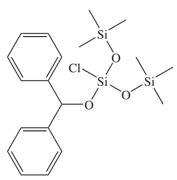


SIA0790.0
4-(AZIDOSULFONYL)PHENETHYLTRIMETHOXYSILANE, 22-25% in methanol/toluene
4-[2-(TRIMETHOXYSILYL)ETHYL]-1-BENZENESULFONYL AZIDE
$C_{11}H_{17}N_3O_5SSi$ 331.42 0.90 1.55
AVOID CONTACT WITH METALS
Contains hydrolysis oligomers Flashpoint: 29°C (4°F)
Extremely reactive coupling agent
Inserts nitrenes into aliphatics and aromatics at temperatures >110°C
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[68479-60-7] TSCA EC 270-862-2 HMIS: 3-4-1-X 25g ¥41,100

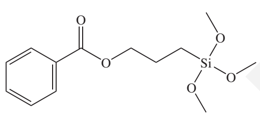
AZIDOTRIMETHYLSILANE - see SIT8580.0 TRIMETHYLSILYLAZIDE



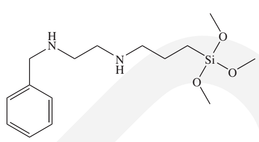
SIA0795.0
11-AZIDOUNDECYLTRIMETHOXYSILANE, 95%
$C_{14}H_{31}N_3O_3Si$ 317.50 111° / 0.05
AVOID CONTACT WITH METALS
Forms "click" functionalized surfaces
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[334521-23-2] HMIS: 3-1-1-X 2.5g ¥35,300



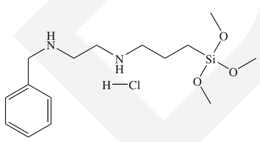
SIB0950.0
BENZHYDRYLOXYBIS(TRIMETHYLSILOXY)CHLOROSILANE, 95%
$C_{19}H_{29}ClO_3Si_3$ 425.15 135-40° / 0.25 1.0345
Blocking agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[309963-45-9] HMIS: 3-2-1-X store <5°C 5g ¥52,200



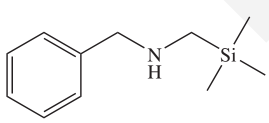
SIB0959.0
BENZOYLOXYPROPYLTRIMETHOXYSILANE
$C_{13}H_{20}O_5Si$ 284.38 145° / 0.2 1.104 1.4806
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[76241-02-6] TSCA HMIS: 3-2-1-X 25g ¥24,100



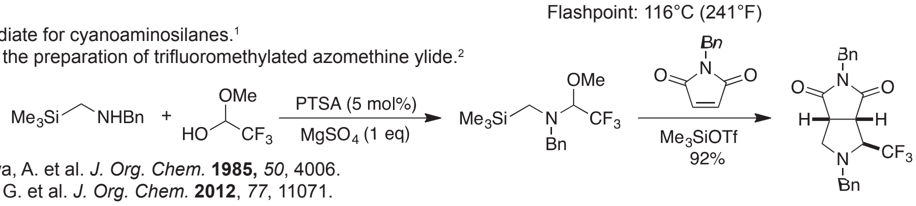
SIB0956.0
N-(2-N-BENZYLAMINOETHYL)-3-AMINOPROPYLTRIMETHOXYSILANE, tech-90
$C_{15}H_{28}N_2O_3Si$ 312.48 1.035 1.4902
Contains aminoethylaminopropyltrimethoxysilane Flashpoint: 69°C (156°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[209866-89-7] TSCA HMIS: 3-2-1-X 25g ¥11,900 100g ¥31,000



SIB0957.0
N-(2-N-BENZYLAMINOETHYL)-3-AMINOPROPYLTRIMETHOXYSILANE hydrochloride, 50% in methanol
$C_{15}H_{28}N_2O_3Si{\cdot}HCl$ 348.95 0.942 1.4104
Amber liquid Flashpoint: 9°C (48°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[623938-90-9] TSCA HMIS: 3-3-1-X 25g ¥8,800 100g ¥20,700

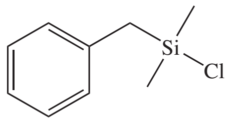


SIB0960.0
N-BENZYLAMINOMETHYLTRIMETHYLSILANE
$C_{11}H_{19}NSi$ 193.36 90° / 5 0.88 1.4960
Flashpoint: 116°C (241°F)
Intermediate for cyanoaminosilanes.[1]
Used in the preparation of trifluoromethylated azomethine ylide.[2]

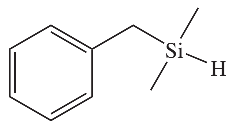


1. Padwa, A. et al. *J. Org. Chem.* **1985**, *50*, 4006.
2. Tran, G. et al. *J. Org. Chem.* **2012**, *77*, 11071.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[53215-95-5] HMIS: 3-2-0-X 5g ¥16,400 25g ¥55,400

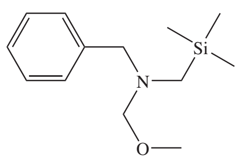
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



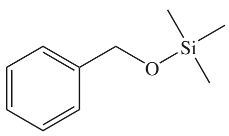
SIB0962.0
BENZYLDIMETHYLCHLOROSILANE
$C_9H_{13}ClSi$ 184.74 75-6° / 15 0.949 1.5040
Flashpoint: 73°C (163°F)
Useful for the preparation of benzyldimethylsilyl derivatives capable of cross-coupling reactions.[1,2]
1. Zhao, Z.; Snieckus, V. *Org. Lett.* **2005**, *7*, 2523.
2. Trost, B. M.; Machacek, M. R.; Ball, Z. T. *Org. Lett.* **2003**, *5*, 1895.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1833-31-4] TSCA HMIS: 3-2-1-X 10g ¥21,500 50g ¥75,600



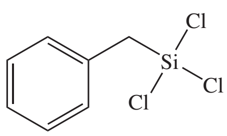
SIB0964.0
BENZYLDIMETHYLSILANE
$C_9H_{14}Si$ 150.30 70° / 15 0.949 1.5040
Flashpoint: 65°C (149°F)
Intermediate for aminosubstituted vinylsilanes and pyrollidones.[1]
Useful for the preparation of benzyldimethylsilyl derivatives capable of cross-coupling reactions.[2]
1. Mlyra, K. et al. *Org. Lett.* **2000,** *2*, 385.
2. Singh, R.; Singh, G. C.; Ghosh, S.K. *Eur. J. Org. Chem.* **2007**, 5376.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[1631-70-5] TSCA HMIS: 2-2-1-X 10g ¥21,500



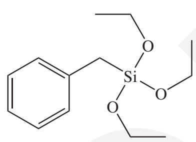
SIB0966.0
N-BENZYL-N-METHOXYMETHYL-N-(TRIMETHYLSILYLMETHYL)AMINE, 96%
$C_{13}H_{23}NOSi$ 237.41 76° / 0.3 0.928 1.492
Flashpoint: 66°C (151°F)
Forms chiral pyrrolidines by asymmetric 1,3-dipolar addition.[1]
1. Kotain, L. et al. *Org. Process Res. Dev.* **2005**, *9*, 193.
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[93102-05-7] HMIS: 2-2-0-X 5g ¥28,900



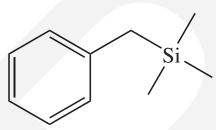
SIB0968.0
BENZYLOXYTRIMETHYLSILANE
BENZYL TRIMETHYLSILYL ETHER
$C_{10}H_{16}OSi$ 180.32 92° / 19 0.916 1.4770
Flashpoint: 73°C (163°F)
In combination with TMS triflate cleaves β-lactams to chiral β-amidocyanides.[1]
With fluoride effects ring-opening polymerization of caprolactone.[2]
1. Kita, Y. et al. *J. Org. Chem.* **1994,** *59*, 938.
2. Endo, T. et al. Jap. Pat. App. 04283591, 1991; *Chem. Abstr.* 118,1030208.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[14642-79-6] HMIS: 2-2-1-X 25g ¥17,800



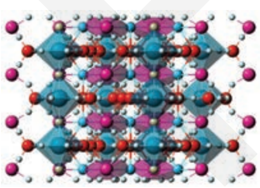
SIB0970.0
BENZYLTRICHLOROSILANE
$C_7H_7Cl_3Si$ 225.58 140-2° / 10 1.288 1.527
Dipole moment: 1.78 debye
Flashpoint: 87°C (189°F)
TOXICITY: oral rat, LD50: 2,830 mg/kg
See also SIC2470.0, SID4555.5, SIP6722.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[770-10-5] TSCA EC 212-219-0 HMIS: 3-2-1-X 25g ¥21,500 100g ¥62,100



SIB0971.0
BENZYLTRIETHOXYSILANE
$C_{13}H_{22}O_3Si$ 254.40 148° / 26 0.986 1.4628[25]
Flashpoint: 127°C (261°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2549-99-7] TSCA EC 219-841-1 HMIS: 2-1-0-X 10g ¥14,600 50g ¥54,400

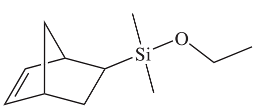


SIB0973.0
BENZYLTRIMETHYLSILANE
$C_{10}H_{16}Si$ 164.32 190-1° 0.8933 1.4941
Flashpoint: 62°C (144°F)
Source of benzyl anions.[1]
1. Benneteau, B. et al. *Bull. Chem. Soc. Fr.* **1985,** *90*, 11.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[770-09-2] TSCA EC 212-218-5 HMIS: 2-2-0-X 10g ¥13,300



Crystal structure image courtesy of webmineral.com

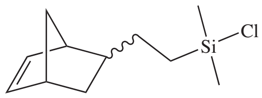
SIB0980.0
BERYL
BERYLLIUM ALUMINUM SILICATE
$Al_2Be_3O_{18}Si_6$ 537.49 (1,410°) 2.66 1.56-1.57
-80 mesh powder
TOXICITY: carcinogenic by inhalation
Mohs Hardness: 7.5-8
High thermal conductivity filler
A cyclosilicate (framework derived from rings of linked SiO_4 tetrahedra w/Si:O ratio 1:3)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1302-52-9] TSCA-E EC 215-101-7 HMIS: 4-0-0-X 500g ¥31,100



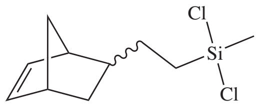
SIB0981.0
(5-BICYCLO[2.2.1]HEPT-2-ENYL)DIMETHYLETHOXYSILANE
$C_{11}H_{20}OSi$ 196.36 67° / 3.5 0.926[25] 1.4604[25]
Undergoes ROMP reactions
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[899823-76-8] HMIS: 2-2-1-X 25g ¥28,900

Gelest

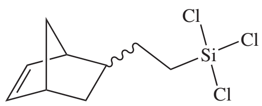
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



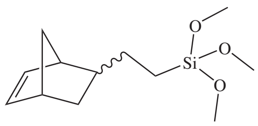
SIB0982.0
[(5-BICYCLO[2.2.1]HEPT-2-ENYL)ETHYL]DIMETHYLCHLOROSILANE, tech-95, endo/exo isomers
$C_{11}H_{19}ClSi$ 214.81 231-2° 0.991 1.4800
Flashpoint: 104°C (219°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[120543-78-4] HMIS: 3-1-1-X 25g ¥30,500



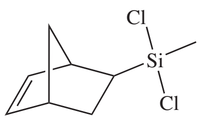
SIB0984.0
[(5-BICYCLO[2.2.1]HEPT-2-ENYL)ETHYL]METHYLDICHLOROSILANE, tech-95, endo/exo isomers
$C_{10}H_{16}Cl_2Si$ 235.23 85-7° / 1 1.09
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[198570-38-6] HMIS: 3-1-1-X 25g ¥30,000



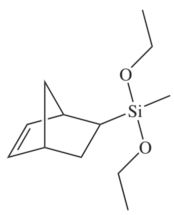
SIB0986.0
[(5-BICYCLO[2.2.1]HEPT-2-ENYL)ETHYL]TRICHLOROSILANE, tech-95, endo/exo isomers
$C_9H_{13}Cl_3Si$ 255.64 91-3° / 1 1.223 1.5010
Flashpoint: >110°C (>230°F)
See also SIC2464.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[54076-73-2] HMIS: 3-1-1-X 25g ¥39,500



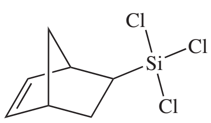
SIB0988.0
[(5-BICYCLO[2.2.1]HEPT-2-ENYL)ETHYL]TRIMETHOXYSILANE, tech-95, endo/exo isomers
$C_{12}H_{22}O_3Si$ 242.39 65° / 10 1.02 1.458
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[68323-30-8] HMIS: 2-1-1-X 25g ¥38,500



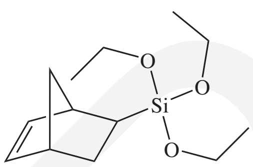
SIB0990.0
(5-BICYCLO[2.2.1]HEPT-2-ENYL)METHYLDICHLOROSILANE, 95%
$C_8H_{12}Cl_2Si$ 207.17 74-5° / 10 1.151 1.4938
Flashpoint: 86°C (187°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18245-94-8] TSCA EC 242-122-9 HMIS: 3-2-1-X 10g ¥20,700



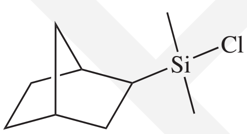
SIB0990.3
(5-BICYCLO[2.2.1]HEPT-2-ENYL)METHYLDIETHOXYSILANE
$C_{12}H_{22}O_2Si$ 226.39 65-7° / 1 0.959 1.4525^{25}
Comonomer for ROMP reactive resins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[113276-73-6] HMIS: 2-2-1-X 25g ¥21,000



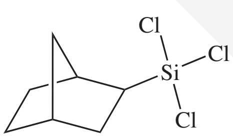
SIB0991.0
(5-BICYCLO[2.2.1]HEPT-2-ENYL)TRICHLOROSILANE
$C_7H_9Cl_3Si$ 227.59 75-6° / 10 1.2973 1.4988
Flashpoint: 87°C (189°F)
See also SIC2464.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[14319-64-3] TSCA HMIS: 3-2-1-X 10g ¥19,400 50g ¥67,100



SIB0992.0
(5-BICYCLO[2.2.1]HEPT-2-ENYL)TRIETHOXYSILANE
NORBORNENYLTRIETHOXYSILANE
$C_{13}H_{24}O_3Si$ 256.42 106-8° / 8 0.960 1.4486
Flashpoint: 98°C (208°F)
Coupling agent for norbornadiene rubbers
Component in low dielectric constant films
Undergoes ring-opening metathetic polymerization (ROMP) with $RuCl_2(P(C_6H_5)_3)_3$.[1]
1. Finkelstein, E. *10th Int'l Organosilicon Symp. Proc.* **1993,** P-120.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18401-43-9] TSCA EC 242-278-8 HMIS: 2-2-1-X 10g ¥12,500 50g ¥39,500

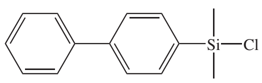


SIB0994.0
(5-BICYCLO[2.2.1]HEPTYL)DIMETHYLCHLOROSILANE
$C_9H_{17}ClSi$ 188.77 52-5° / 1 0.99
Flashpoint: 87°C (189°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[117046-42-1] HMIS: 3-2-1-X 25g ¥28,400

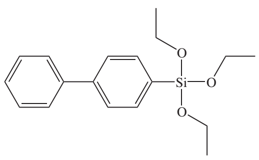


SIB0997.0
(5-BICYCLO[2.2.1]HEPTYL)TRICHLOROSILANE
$C_7H_{11}Cl_3Si$ 229.61 63-4° / 4.5 1.2678 1.4919
Flashpoint: 83°C (181°F)
See also SIA0325.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18245-29-9] TSCA EC 242-121-3 HMIS: 3-2-1-X 10g ¥14,600

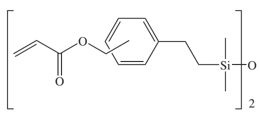
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



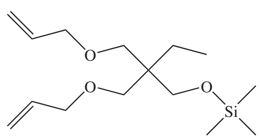
SIB0999.0
4-BIPHENYLYLDIMETHYLCHLOROSILANE
$C_{14}H_{15}ClSi$ — Mw 246.81 — bp 125° / 0.4 — (69-71°)
High refractive index blocking agent
See also SIP6723.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[41081-31-6] HMIS: 3-1-1-X 2.5g ¥40,600



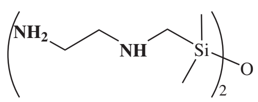
SIB0999.5
4-BIPHENYLYLTRIETHOXYSILANE
$C_{18}H_{24}O_3Si$ — Mw 316.47 — bp 152° / 0.25 — D_4^{20} 1.05 — n_D^{20} 1.5278
Forms high refractive index resins
See also SIN6596.8, SIP6723.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18056-97-8] HMIS: 2-2-1-X 5g ¥36,300



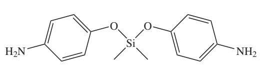
SIB1000.0
1,3-BIS[(ACRYLOXYMETHYL)PHENETHYL]TETRAMETHYLDISILOXANE, tech-95
$C_{28}H_{38}O_5Si_2$ — Mw 510.78 — n_D 1.527[23]
Mixed isomers; inhibited with MEHQ — Flashpoint: 110°C (230°F)
Crosslinker for UV cure systems
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[140220-31-1] HMIS: 3-1-0-X store <5°C 5g ¥20,400



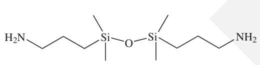
SIB1020.0
2,2-BIS(ALLYLOXYMETHYL)-1-TRIMETHYLSILOXYBUTANE, 95%
$C_{15}H_{30}O_3Si$ — Mw 286.48 — bp 140-4° / 25 — D_4^{20} 0.892 — n_D^{20} 1.4367
Contains monoallyloxybis(trimethylsiloxy)silane analog
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[211923-87-4] HMIS: 2-2-1-X 25g ¥16,200



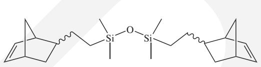
SIB1021.5
1,3-BIS(2-AMINOETHYLAMINOMETHYL)TETRAMETHYLDISILOXANE, tech-95
$C_{10}H_{30}N_4OSi_2$ — Mw 278.55 — bp 140-5° / 2 — D_4^{20} 0.941
Curing agent for epoxies
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[83936-41-8] (既) 7-455 HMIS: 3-2-0-X 25g ¥55,400



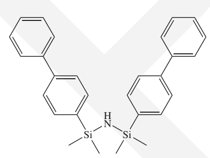
SIB1022.0
BIS(p-AMINOPHENOXY)DIMETHYLSILANE
$C_{14}H_{18}N_2O_2Si$ — Mw 274.39 — bp 195-9° / 0.5 — (60-64°)
Flashpoint: >110°C (>230°F)
Intermediate for polyimides
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1223-16-1] HMIS: 3-1-0-X 5g ¥16,200 25g ¥54,400



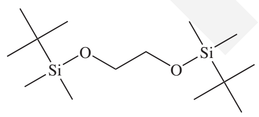
SIB1024.0
1,3-BIS(3-AMINOPROPYL)TETRAMETHYLDISILOXANE
$C_{10}H_{28}N_2OSi_2$ — Mw 248.52 — bp 132-9° / 11 — D 0.897[25] — n_D 1.4480[25]
Contains isomers — Flashpoint: 91°C (196°F)
pKb: 5.5
Endcapper for aminopropyl terminated silicones
Plasticizing hardener for epoxies
Monomer for polyimides, polyamides
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2469-55-8] (既) 7-453 TSCA EC 219-588-7 HMIS: 3-2-0-X 10g ¥12,500 50g ¥39,500 2kg ¥264,000
COMMERCIAL



SIB1026.2
1,3-BIS[(BICYCLO[2.2.1]HEPT-2-ENYL)ETHYL]TETRAMETHYLDISILOXANE
$C_{22}H_{38}OSi_2$ — Mw 374.72 — bp 145-150° / 5 — D_4^{20} 0.944 — n_D^{20} 1.4830
Mixed endo/exo isomers — Flashpoint: >110°C (>230°F)
Oxygen etch resistant monomer for photoresists
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[198570-39-7] HMIS: 2-1-0-X 10g ¥36,900



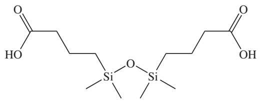
SIB1026.4
1,3-BIS(4-BIPHENYL)-1,1,3,3-TETRAMETHYLDISILAZANE, 95%
$C_{28}H_{31}NSi_2$ — Mw 437.73 — bp 220-5° / 1 — (74-76°)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[916667-75-9] HMIS: 2-1-1-X 10g ¥44,300



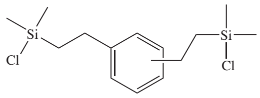
SIB1026.8
1,2-BIS(t-BUTYLDIMETHYLSILOXY)ETHANE
$C_{14}H_{34}O_2Si_2$ — Mw 290.95 — bp 121-3° / 10 — (45-6°)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[66548-22-9] HMIS: 2-2-1-X 25g ¥22,500

SILICON COMPOUNDS

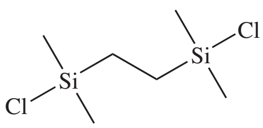
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



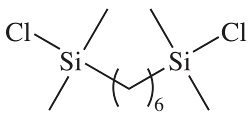
SIB1027.0
1,3-BIS(3-CARBOXYPROPYL)TETRAMETHYLDISILOXANE
$C_{12}H_{26}O_5Si_2$ 306.51 (46-9°)
Monomer for silicone modified polyamides and carbohydrates
Forms metal chelating polymers by reaction with azomethine complexes.[1]
1. Marcu, M. et al. *J. Appl. Organometallic Chem.* **2003**, *17*, 693.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[3353-68-2] TSCA HMIS: 2-1-0-X 10g ¥20,400 50g ¥71,300



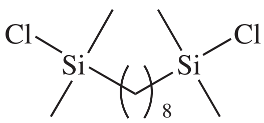
SIB1030.0
BIS[2-(CHLORODIMETHYLSILYL)ETHYL]BENZENE
$C_{14}H_{24}Cl_2Si_2$ 319.42 116-7° / 0.2 1.02
Mixed isomers Flashpoint: 187°C (369°F)
Intermediate for silahydrocarbon polymers
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[74129-20-7] TSCA HMIS: 3-1-1-X 50g ¥54,400



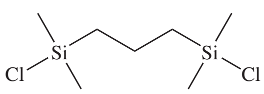
SIB1042.0
1,2-BIS(CHLORODIMETHYLSILYL)ETHANE
TETRAMETHYLDICHLORODISILETHYLENE
$C_6H_{16}Cl_2Si_2$ 215.27 198-9° (36-9°)
Flashpoint: 40°C (104°F)
Review of synthetic utility.[1]
Reagent for protection of primary amines, including amino acids.[2]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 48-50.
2. Djuric, S. et al. *Tetrahedron Lett.* **1981,** *22*, 1787.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13528-93-3] TSCA EC 236-871-0 HMIS: 3-2-1-X 25g ¥9,300 100g ¥22,500



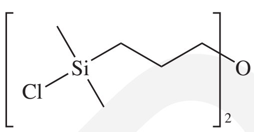
SIB1046.0
1,6-BIS(CHLORODIMETHYLSILYL)HEXANE, 95%
$C_{10}H_{24}Cl_2Si_2$ 271.38 113-6° / 3 0.961 1.4538
Flashpoint: 150°C (302°F)
See also SIB1048.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[14799-66-7] HMIS: 3-1-1-X 25g ¥19,900



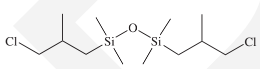
SIB1048.0
1,8-BIS(CHLORODIMETHYLSILYL)OCTANE, 95%
$C_{12}H_{28}Cl_2Si_2$ 299.43 106-7° / 0.4 0.946 1.4540
Flashpoint: 180°C (356°F)
Intermediate for silahydrocarbon polymers
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[5089-28-1] EC 225-804-0 HMIS: 3-1-1-X 25g ¥14,600 100g ¥39,500



SIB1048.2
1,3-BIS(CHLORODIMETHYLSILYL)PROPANE
$C_7H_{18}Cl_2Si_2$ 229.30 94° / 19 1.0244 1.4647
Forms cyclic derivatives of polyalkyleneoxides suitable for anionic copolymerization.[1]
1. Zundel, T. et al. *Macromol.* **1998,** *31*, 2724.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2295-06-9] HMIS: 3-2-1-X 5g ¥31,000

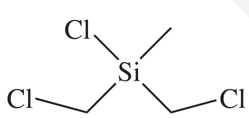


SIB1048.3
BIS[(3-CHLORODIMETHYLSILYL)PROPYL] ETHER
$C_{10}H_{24}Cl_2OSi_2$ 287.37 107-9° / 0.5 1.4522^{25}
Flashpoint: >110°C (>230°F)
Ether bridged dipodal silane; intermediate for hybrid silicones
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 5g ¥41,100



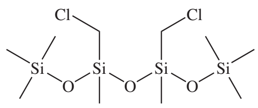
SIB1048.8
1,3-BIS(3-CHLOROISOBUTYL)TETRAMETHYLDISILOXANE
$C_{12}H_{28}Cl_2OSi_2$ 315.43 130-5° / 5 0.989 1.4528^{25}
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18388-70-0] HMIS: 3-1-0-X 25g ¥11,900 100g ¥31,000

SIB1051.0
BIS(CHLOROMETHYL)DIMETHYLSILANE
$C_4H_{10}Cl_2Si$ 157.11 163-4° 1.075 1.4567^{25}
Dipole moment: 2.21 debye Flashpoint: 46°C (115°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2917-46-6] TSCA EC 220-848-7 HMIS: 2-2-0-X 10g ¥14,100 50g ¥45,900



SIB1053.0
BIS(CHLOROMETHYL)METHYLCHLOROSILANE, 95%
$C_3H_7Cl_3Si$ 177.53 172-3° 1.08 1.4708^{25}
Dipole moment: 2.21 debye Flashpoint: 42°C (108°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18171-56-7] TSCA EC 242-057-6 HMIS: 3-2-1-X 25g ¥41,100

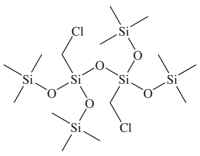
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIB1053.5
3,5-BIS(CHLOROMETHYL)OCTAMETHYLTETRASILOXANE, 95%

$C_{10}H_{28}Cl_2O_3Si_4$	379.58	128° / 10	(-77°)	1.006^{25}	1.4210

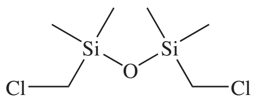
Viscosity: 3.6 cSt.
Functionalizeable building block
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[17988-79-3] HMIS: 2-2-0-X 25g ¥25,200



SIB1054.0
1,3-BIS(CHLOROMETHYL)-1,1,3,3-TETRAKIS(TRIMETHYLSILOXY)DISILOXANE, 95%

$C_{14}H_{40}Cl_2O_5Si_6$	527.90	122-4° / 1		0.9944	1.4169

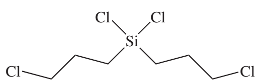
Functionalizeable building block
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[17909-34-1] HMIS: 2-1-0-X 25g ¥59,700



SIB1055.0
1,3-BIS(CHLOROMETHYL)TETRAMETHYLDISILOXANE

$C_6H_{16}Cl_2OSi_2$	231.27	204-5°	(-90°)	1.050	1.4400

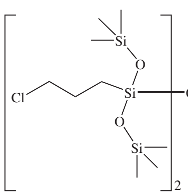
Flashpoint: 73°C (163°F)
Viscosity, 0°: 3.5 cSt
Viscosity, 25°: 2.0 cSt
ΔHvap: 38.5 kJ/mole
End-capper for silicones allowing transition to organic blocks
Intermediate for siloxane-modified polyimides
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2362-10-9] (既) 7-500 TSCA EC 219-109-1 HMIS: 2-2-0-X 25g ¥11,900 100g ¥31,000



SIB1055.3
BIS(3-CHLOROPROPYL)DICHLOROSILANE

$C_6H_{12}Cl_4Si$	254.06	82° / 0.3		1.272	1.4902

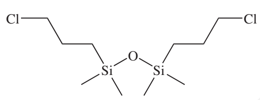
Flashpoint: 145°C (293°F)
Intermediate for difunctional monomers and coupling agents
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[33317-65-6] TSCA EC 251-455-9 HMIS: 3-2-1-X 10g ¥67,100



SIB1055.8
1,3-BIS(3-CHLOROPROPYL)TETRAKIS(TRIMETHYLSILOXY)DISILOXANE, tech-95

$C_{18}H_{48}Cl_2O_5Si_6$	584.00			1.03	1.427

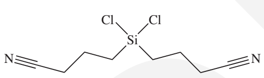
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[163124-51-4] HMIS: 2-2-0-X 25g ¥25,700



SIB1056.0
1,3-BIS(3-CHLOROPROPYL)TETRAMETHYLDISILOXANE

$C_{10}H_{24}Cl_2OSi_2$	287.38	128° / 7		0.996^{25}	1.4484^{25}

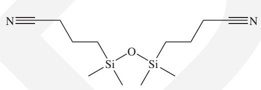
Flashpoint: 92°C (198°F)
See also SIB1048.8, SIB1055.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18132-72-4] (既) 7-500 TSCA EC 242-018-3 HMIS: 2-2-0-X 25g ¥25,200 100g ¥74,000



SIB1057.0
BIS(CYANOPROPYL)DICHLOROSILANE

$C_8H_{12}Cl_2N_2Si$ 劇物	235.19	173-7° / 1		1.166^{25}	1.4799

Flashpoint: 95°C (203°F)
Forms polymers used as polar phases in gas chromatography
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1071-17-6] TSCA HMIS: 3-1-1-X 10g ¥42,200

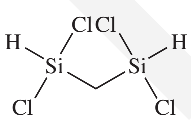


SIB1058.0
1,3-BIS(CYANOPROPYL)TETRAMETHYLDISILOXANE, 95%

$C_{12}H_{24}N_2OSi_2$ 劇物	268.51	161-2° / 2		0.934	1.4441

Flashpoint: 105°C (221°F)
Silylates capillary GC columns imparting polarity.[1]
1. Blum, W. *J. High Resol. Chrom., Chromatog. Comm.* **1986,** *9*, 120.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18027-80-0] HMIS: 2-1-0-X 10g ¥15,400

1,2-BIS(DICHLOROMETHYLSILYL)ETHANE - see SIB1614.0 1,2-BIS(METHYLDICHLOROSILYL)ETHANE



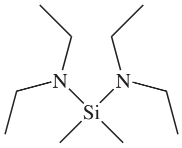
SIB1064.0
BIS(DICHLOROSILYL)METHANE, tech-95

$CH_4Cl_4Si_2$	214.03	146-7°		1.37	1.466

HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18081-42-0] HMIS: 3-3-1-X 5g ¥19,400 25g ¥67,100

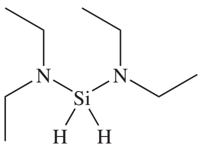
SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



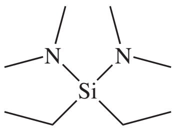
SIB1068.0
BIS(DIETHYLAMINO)DIMETHYLSILANE
$C_{10}H_{26}N_2Si$ 202.42 192-5° 0.826 1.435
Flashpoint: 35°C (95°F)

Silylates diamines to cyclic diaminosilanes.[1]
1. Schwartz, E. et al. *J. Org. Chem.* **1981,** *50*, 5469.
See also SID4040.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4669-59-4] TSCA EC 225-116-0 HMIS: 3-3-1-X 50g ¥39,500



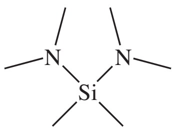
SIB1069.0
BIS(DIETHYLAMINO)SILANE
$C_8H_{22}N_2Si$ 174.16 70° / 30 0.804

ALD precursor for $HfSiO_x$ dielectric films.[1]
1. Katamreddy, R. et al. *J. Electrochem. Soc.* **2008**, *155*, G163.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[27804-64-4] HMIS: 4-2-1-X 10g ¥27,300



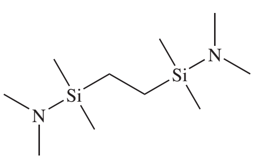
SIB1070.0
BIS(DIMETHYLAMINO)DIETHYLSILANE
$C_8H_{22}N_2Si$ 174.36 62-3° / 15 0.837[24] 1.4362
Flashpoint: 30°C (86°F)

Couples silanol terminated siloxanes
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[33287-52-4] HMIS: 3-3-1-X 50g ¥51,700



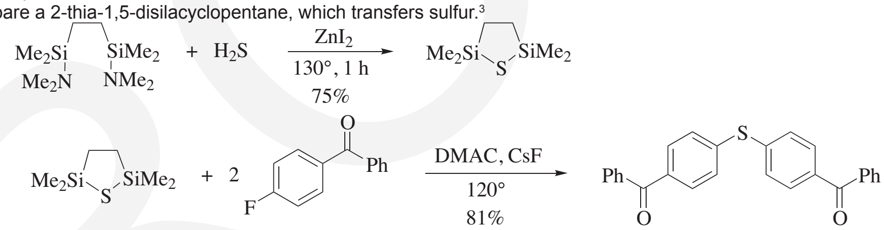
SIB1072.0
BIS(DIMETHYLAMINO)DIMETHYLSILANE
$C_6H_{18}N_2Si$ 146.31 128-9° (-98°) 0.810 1.4169[22]
Flashpoint: -3°C (27°F)

Couples silanol terminated siloxanes
See also SIB1185.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[3768-58-9] TSCA EC 223-200-1 HMIS: 3-4-1-X 25g ¥11,900 100g ¥31,000

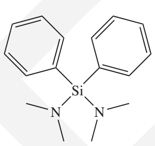


SIB1073.0
1,2-BIS(DIMETHYLAMINODIMETHYLSILYL)ETHANE, 96%
ETHYLENEBIS(TETRAMETHYLSILANAMINE)
$C_{10}H_{28}N_2Si_2$ 232.52 101-3° / 13 0.824 1.4460
Flashpoint: 46°C (115°F)

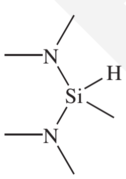
Review of synthetic utility.[1]
Protecting group for aromatic amines.[2]
Used to prepare a 2-thia-1,5-disilacyclopentane, which transfers sulfur.[3]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 50-51.
2. Guggenheim, T. L. *Tetrahedron Lett.* **1984,** *25*, 1253; *F&F*: 12, 476.
3. Guggenheim, T. L. *Tetrahedron Lett.* **1987**, *28*, 6139.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[91166-50-6] HMIS: 3-3-1-X 10g ¥17,800 50g ¥60,700



SIB1074.0
BIS(DIMETHYLAMINO)DIPHENYLSILANE
$C_{16}H_{22}N_2Si$ 270.45 139-40° / 2
Flashpoint: 95°C (203°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1027-62-9] TSCA EC 213-838-9 HMIS: 3-2-1-X 10g ¥16,200



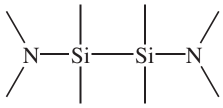
SIB1075.0
BIS(DIMETHYLAMINO)METHYLSILANE, 96%
$C_5H_{16}N_2Si$ 132.28 112-3° 0.798 1.414
Flashpoint: -3°C (27°F)
Autoignition temperature: 300˚C

Crosslinking agent for deep UV and EB resist applications.[1]
Component in self-sealing refrigerant systems.[2]
1. Irmscher, M. et al. *J. Photopolym. Sci. Technol.* **1996,** *9*, 497.
2. Packo, J. J.; Bailey, D. L. U.S. Patent 4,379,067, 1983.
HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required
[22705-33-5] (既) 2-3198 TSCA EC 245-163-0 HMIS: 4-4-2-X 25g ¥27,800 100g ¥82,500

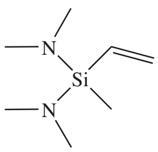
BIS(DIMETHYLAMINO)PHENYLCHLOROSILANE - see SIP6724.6 PHENYLBIS(DIMETHYLAMINO)CHLOROSILANE

BIS(DIMETHYLAMINO)PHENYLMETHYLSILANE - see SIP6736.8 PHENYLMETHYLBIS(DIMETHYLAMINO)SILANE

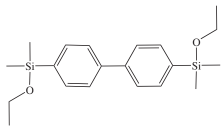
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



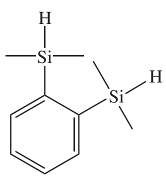
SIB1077.0
1,2-BIS(DIMETHYLAMINO)TETRAMETHYLDISILANE
$C_8H_{24}N_2Si_2$ — 204.46 — 90-3° / 20 — 0.830^{25} — 1.4553^{25}
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[26798-99-2] HMIS: 3-3-1-X 10g ¥34,700



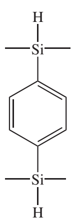
SIB1080.0
BIS(DIMETHYLAMINO)VINYLMETHYLSILANE
$C_7H_{18}N_2Si$ — 158.32 — 146-7° — 0.820 — 1.4332
Flashpoint: -4°C (25°F)
Chain extender for silicone fluids that introduces Pt and peroxide cure sites
Undergoes BuLi-catalyzed anionic polymerization.[1]
1. Stober, M. et al. *J. Org. Chem.* **1967,** *32*, 2740.
See also SIV9081.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13368-45-1] TSCA EC 236-437-0 HMIS: 3-4-2-X 10g ¥17,800



SIB1082.0
4,4'-BIS(DIMETHYLETHOXYSILYL)BIPHENYL
$C_{20}H_{30}O_2Si_2$ — 358.63 — 168-9° / 0.1 — 0.980 — 1.5380
Intermediate for thermally stable polymers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[201603-69-2] HMIS: 2-2-0-X 1.0g ¥22,500

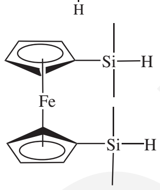


SIB1084.0
1,2-BIS(DIMETHYLSILYL)BENZENE
$C_{10}H_{18}Si_2$ — 194.42 — 129° / 50 — 0.893 — 1.511
Flashpoint: 71°C (160°F)
Acetylenes undergo dehydrogenative double silylation to yield cyclics.[1]
Aldehydes undergo dehydrogenative double silylation to yield disila-2-oxacyclohexanes.[2]
Reacts with ω-hydroxycarboxylates with Rh to form lactones.[3]
Employed in the high-yield reduction of amides to amines in the presence of other reducible groups.[4]
1. Tanaka, M. et al. *Bull. Soc. Chim. Fr.* **1993,** *129*, 667.
2. Uchimaru, Y. et al. *Organometallics* **1992,** *11*, 2639.
3. Mukaiyama, T. et al. *Chem. Lett.* **1997,** *2*, 18.
4. Hanada, S. et al. *J. Am. Chem. Soc.* **2009**, *131*, 15032.
F&F: Vol. 20, p 40.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[17985-72-7] HMIS: 2-2-1-X 2.5g ¥41,100

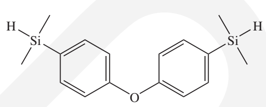


SIB1086.0
1,4-BIS(DIMETHYLSILYL)BENZENE
$C_{10}H_{18}Si_2$ — 194.42 — 118° / 35 — 0.872 — 1.5000
Flashpoint: 77°C (171°F)
TOXICITY: oral mouse, LD50: 1,535 mg/kg
Building block for silphenylene polymers
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[2488-01-9] TSCA EC 219-638-8 HMIS: 2-2-1-X 10g ¥17,800 50g ¥60,700

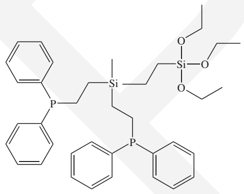
1,2-BIS(DIMETHYLSILYL)ETHANE - see SIT7537.0 1,1,4,4-TETRAMETHYLDISILABUTANE



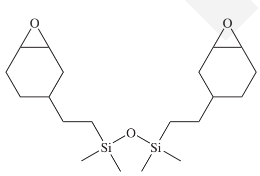
SIB1088.0
1,1'-BIS(DIMETHYLSILYL)FERROCENE
$C_{14}H_{22}FeSi_2$ — 302.35 — 294-5° — 1.007 — 1.5640
Flashpoint: 50°C (122°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[1295-15-4] HMIS: 3-2-1-X 1.0g ¥31,000



SIB1090.0
BIS[(p-DIMETHYLSILYL)PHENYL]ETHER, 96%
$C_{16}H_{22}OSi_2$ — 286.52 — 138-40° / 0.2 — 0.976 — 1.5478
Building block for silphenylene polymers
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[13315-17-8] HMIS: 2-2-1-X 25g ¥37,400



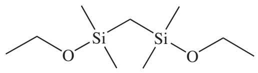
SIB1091.0
BIS(2-DIPHENYLPHOSPHINOETHYL)METHYLSILYLETHYLTRIETHOXYSILANE, mixed isomers
$C_{37}H_{50}O_3P_2Si_2$ — 660.92 — 1.07 — 1.5746
Analogous structures form ruthenium(II) complexes with high selectivity for hydrogenation and non-leachable binding to solid supports.[1]
1. Wu, D. et al. *Chem. Mater.* **2005,** *17*, 3951.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-2-1-X 1.0g ¥60,700



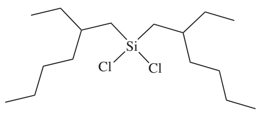
SIB1092.0
1,3-BIS[2-(3,4-EPOXYCYCLOHEXYL)ETHYL]TETRAMETHYLDISILOXANE, 90%
$C_{20}H_{38}O_3Si_2$ — 382.69 — (-40°) — 0.997 — 1.476
Viscosity: 40 cSt
Flashpoint: 200°C (392°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
UV-initiated polymerization with weak acid donors
Contributes to high diffraction efficiency in holographic media.[1]
1. Cho, Y. et al. *Sci. Tech. Adv. Mater.* **2005,** *6*, 435.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18724-32-8] TSCA-L HMIS: 2-1-1-X 25g ¥13,500 100g ¥36,300

Gelest

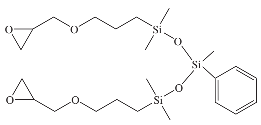
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



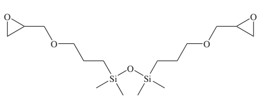
SIB1094.0
BIS(ETHOXYDIMETHYLSILYL)METHANE
4,4,6,6-TETRAMETHYL-3,7-DIOXA-4,6-DISILANONANE
$C_9H_{24}O_2Si_2$ — Mw 220.46 — bp 82° / 25 — D_4^{20} 0.849 — n_D^{20} 1.4160
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17887-25-1] HMIS: 2-3-1-X 5g ¥22,500



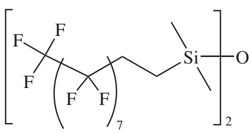
SIB1097.0
BIS(2-ETHYLHEXYL)DICHLOROSILANE
$C_{16}H_{34}Cl_2Si$ — Mw 325.40 — bp 132-8° / 1.5 — D_4^{20} 0.949
Intermediate for soluble polysilanes
Used to make silicon-bridged cyclopentadithiophene-based polymers that exhibit a high degree of luminescence quenching and low band gap silole-containing polythiophenes.[1,2]
1. Huang, J.-H. et al. *J. Phys. Chem. C.* **2011**, *115*, 2398.
2. Hou, J. et al. *J. Am. Chem. Soc.* **2008**, *130*, 16144.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1089687-03-5] HMIS: 3-1-1-X 10g ¥53,800



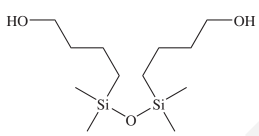
SIB1110.0
1,5-BIS(GLYCIDOXYPROPYL)-3-PHENYL-1,1,3,5,5-PENTAMETHYLTRISILOXANE
$C_{23}H_{42}O_6Si_3$ — Mw 498.84 — D_4^{20} 1.106 — n_D^{20} 1.4763
Monomer for silicone modified epoxy resins
See also SIT8715.6
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[865811-59-2] HMIS: 2-1-0-X 25g ¥23,100



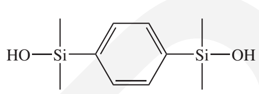
SIB1115.0
1,3-BIS(GLYCIDOXYPROPYL)TETRAMETHYLDISILOXANE
$C_{16}H_{34}O_5Si_2$ — Mw 362.61 — bp 184-7° / 2 — mp (-48 to -50°) — D_4^{20} 0.996 — n_D^{20} 1.452
Viscosity: 8-12 cSt — Flashpoint: 110°C (230°F)
Monomer for silicone modified epoxy resins
End-capper for epoxy terminated silicones
See also SIB1110.0, SIT8715.6
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[126-80-7] (既) 7-1546 TSCA EC 204-803-9 HMIS: 3-1-0-X 25g ¥8,800 100g ¥20,700 2kg ¥204,000
COMMERCIAL



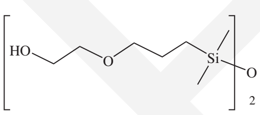
SIB1120.0
1,3-BIS(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TETRAMETHYLDISILOXANE
$C_{24}H_{20}F_{34}OSi_2$ — Mw 1026.51 — bp 90° / 5 — mp (0 to -5°) — D_4^{20} 1.557 — n_D^{20} 1.335
Employed in NIMS direct desorption MALDI analysis.[1]
1. Woo, H. et al. *Nature Protocols* **2008**,*3*, 1341; doi:10.1038/nprot.2008.110.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[129498-18-6] HMIS: 3-0-0-X 10g ¥53,800



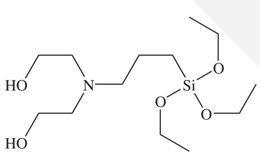
SIB1130.0
1,3-BIS(4-HYDROXYBUTYL)TETRAMETHYLDISILOXANE, 95%
5,5,7,7-TETRAMETHYL-6-OXA-5,7-DISILAUNDECAN-1,11-DIOL
$C_{12}H_{30}O_3Si_2$ — Mw 278.54 — bp 148-50° / 2 — D_4^{20} 0.93 — n_D^{20} 1.4526
Flashpoint: 110°C (230°F)
End-capper for carbinol-terminated silicones used in contact lenses.[1]
1. Deichert, W. et al. U.S. Patent 4,153,641, 1979; 4,189,546, 1980.
See also SIB1144.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[5931-17-9] HMIS: 2-1-0-X 10g ¥15,600 50g ¥52,200



SIB1135.0
1,4-BIS(HYDROXYDIMETHYLSILYL)BENZENE, tech-95
$C_{10}H_{18}O_2Si_2$ — Mw 226.42 — mp (135°)
Contains bis(hydroxydimethylsilylphenyl)tetramethyldisiloxane
Intermediate for silphenylene polymers.[1]
1. Dvornic, P.; Lenz, R. *High Temperature Siloxane Elastomers;* Huthig & Wepf: Heidelberg, Germany, 1990.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2754-32-7] TSCA EC 220-405-8 HMIS: 2-1-0-X 10g ¥21,500 50g ¥75,600

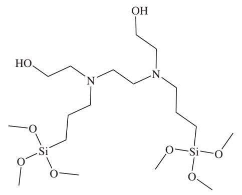


SIB1138.0
1,3-BIS(3-(2-HYDROXYETHOXY)PROPYL)TETRAMETHYLDISILOXANE, 95%
$C_{14}H_{34}O_5Si_2$ — Mw 338.59 — D_4^{20} 0.90^{25} — n_D^{20} 1.449^{25}
Viscosity: 41 cSt — Flashpoint: 186°C (366°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[441307-02-4] HMIS: 2-2-1-X 25g ¥28,900

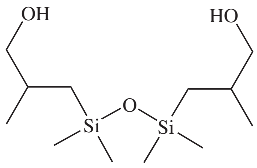


SIB1140.0
N,N-BIS(2-HYDROXYETHYL)-3-AMINOPROPYLTRIETHOXYSILANE, 62% in ethanol
$C_{13}H_{31}NO_5Si$ — Mw 309.48 — D_4^{20} 0.92 — n_D^{20} 1.4090^{25}
Contains 2-3% hydroxyethylaminopropyltriethoxysilane — Flashpoint: 24°C (75°F)
Specific wetting surface: 252 m^2/g
Urethane polymer coupling agent
Employed in surface modification for preparation of oligonucleotide arrays.[1]
1. McGall, G. et al. *Proc. Natl. Acad. Sci.* **1996,** *93*, 1355.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[7538-44-5] TSCA EC 231-408-9 HMIS: 3-4-0-X 25g ¥11,400 100g ¥29,400

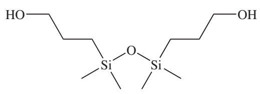
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



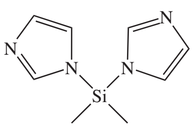
SIB1142.0
N,N'-BIS(2-HYDROXYETHYL)-N,N'-BIS(TRIMETHOXYSILYLPROPYL)ETHYLENEDIAMINE, 66-68% in methanol
$C_{18}H_{44}N_2O_8Si_2$ — Mw 472.73 — D_4^{20} 0.98
Flashpoint: 13°C (55°F)
Dipodal silane forming hydrophilic surfaces
See also SIH6171.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[214362-07-9] HMIS: 3-4-1-X 25g ¥21,000



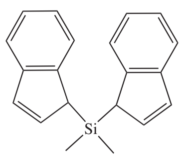
SIB1144.0
1,3-BIS(3-HYDROXYISOBUTYL)TETRAMETHYLDISILOXANE
1,3-BIS(3-HYDROXY-2-METHYLPROPYL)TETRAMETHYLDISILOXANE
$C_{12}H_{30}O_3Si_2$ — Mw 278.54 — bp 100-110° / 2
Flashpoint: >110°C (>230°F)
Endcapper for carbinol terminated polysiloxanes
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[29706-30-7] HMIS: 2-1-0-X 50g ¥42,200



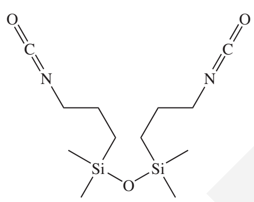
SIB1145.0
1,3-BIS(HYDROXYPROPYL)TETRAMETHYLDISILOXANE, 95%
3,3'-(1,1,3,3-TETRAMETHYL-1,3-DISILOXANEDIYL)BIS(1-PROPANOL)
$C_{10}H_{26}O_3Si_2$ — Mw 250.48 — bp 75° / 20 — D 0.9531^{25} — n_D 1.4472^{25}
Flashpoint: 45°C (113°F)
Hydroxypropyl group undergoes rearrangements.[1]
1. Speier, J. et al. *J. Org. Chem.* **1960,** *25*, 1637.
See also SIB1144.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18001-97-3] EC 241-916-2 HMIS: 2-2-0-X 25g ¥32,600 100g ¥98,400



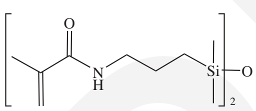
SIB1185.0
BIS(1-IMIDAZOLYL)DIMETHYLSILANE, tech-95
$C_8H_{12}N_4Si$ — Mw 192.29 — mp (52-5°)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[179611-74-6] HMIS: 2-1-1-X 5g ¥21,500



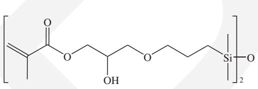
SIB1205.0
BIS(INDENYL)DIMETHYLSILANE
$C_{20}H_{20}Si$ — Mw 288.46 — bp 155° / 4 — mp (6-9°) — D_4^{20} 1.060 — n_D^{20} 1.612
Viscous yellow oil
Intermediate for zirconocene copolymerization catalyst.[1]
1. Lehtinen, C. et al. *Eur. Polym. J.* **1997,** *33*, 115.
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[136946-83-3] HMIS: 2-2-0-X 5g ¥32,600



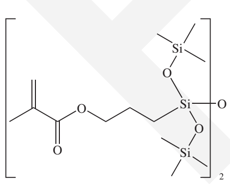
SIB1250.0
BIS(3-ISOCYANATOPROPYL)TETRAMETHYLDISILOXANE, 96%
$C_{12}H_{24}N_2O_3Si_2$ — Mw 300.50 — bp 131-2° / 1.5 — D_4^{20} 0.9980 — n_D^{20} 1.4489
Intermediate for silicone-urethanes
Forms permselective membranes.[1]
1. Jpn. Kokai Tokkyo Koho, 1984, JP 59209610 A 19841128
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[20160-69-4] HMIS: 3-2-1-X 25g ¥72,400



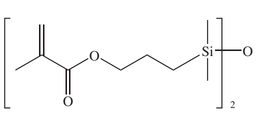
SIB1380.0
1,3-BIS(3-METHACRYLAMIDOPROPYL)TETRAMETHYLDISILOXANE
$C_{18}H_{36}N_2O_3Si_2$ — Mw 384.67
Contains isomers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-2-0-X store <5°C 5g ¥59,100



SIB1390.0
1,3-BIS(3-METHACRYLOXY-2-HYDROXYPROPOXYPROPYL)TETRAMETHYLDISILOXANE, tech-95
$C_{24}H_{46}O_9Si_2$ — Mw 534.79 — D_4^{20} 1.044 — n_D^{20} 1.4660
Hydrophilic cross-linking monomer
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[71223-24-0] HMIS: 2-1-0-X store <5°C 25g ¥61,800

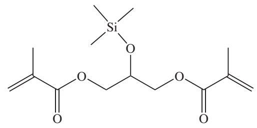


SIB1400.0
1,3-BIS(3-METHACRYLOXYPROPYL)TETRAKIS(TRIMETHYLSILOXY)DISILOXANE, tech-95
$C_{26}H_{58}O_9Si_6$ — Mw 683.25 — D_4^{20} 0.989 — n_D^{20} 1.432
Viscosity: 15 cSt
Flashpoint: >100°C (>212°F)
Oxygen permeable cross-linker
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[80722-63-0] HMIS: 3-1-0-X store <5°C 25g ¥16,400 100g ¥44,800

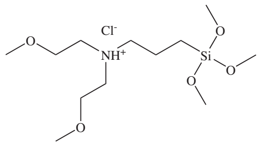


SIB1402.0
1,3-BIS(3-METHACRYLOXYPROPYL)TETRAMETHYLDISILOXANE
$C_{18}H_{34}O_5Si_2$ — Mw 386.64 — bp 127° / 3 — D 0.966^{25} — n_D 1.4488^{25}
Viscosity: 5 cSt
Flashpoint: >100°C (>212°F)
Functional endcapper for silicone polymerization
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18547-93-8] TSCA EC 242-419-3 HMIS: 3-1-0-X store <5°C 25g ¥21,000 100g ¥60,200

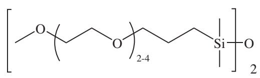
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



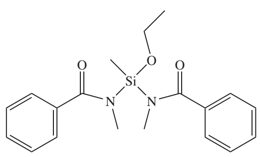
SIB1403.0
1,3-BIS(METHACRYLOXY)-2-TRIMETHYLSILOXYPROPANE, 95%
$C_{14}H_{24}O_5Si$ — Mw 300.42 — bp 125-30° / 1
Inhibited with MEHQ
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[247244-66-2] HMIS: 3-1-1-X store <5°C 25g ¥28,900



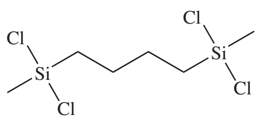
SIB1500.0
BIS(METHOXYETHYL)-3-TRIMETHOXYSILYLPROPYLAMMONIUM CHLORIDE, 60% in methanol
$C_{12}H_{29}NO_5Si{\cdot}HCl$ — Mw 331.91 — D_4^{20} 0.997 — n_D^{20} 1.419
Flashpoint: 11°C (52°F)
Hydrophilic ammonium salt; forms anti-fog surface films
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-4-1-X 25g ¥16,200



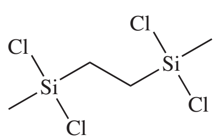
SIB1550.0
BIS(METHOXYTRIETHYLENEOXYPROPYL)TETRAMETHYLDISILOXANE
$C_{24}H_{54}O_9Si_2$ — Mw 542.86
Contains PEG 2-4 homologs
Employed in battery electrolyte applications
See also SIB1765.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
HMIS: 2-1-0-X 25g ¥17,800



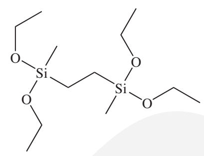
SIB1610.0
BIS(N-METHYLBENZAMIDO)ETHOXYMETHYLSILANE, tech-90
$C_{19}H_{24}N_2O_3Si$ — Mw 356.50 — bp 210° / 1 — mp (-13°) — D_4^{20} 1.13
Flashpoint: 150°C (302°F)
TOXICITY: oral rat, LD50: 2,840 mg/kg
Autoignition temperature: 410˚C
Neutral cross-linker for silicone RTVs.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[16230-35-6] TSCA EC 240-354-5 HMIS: 2-1-1-X 25g ¥10,600 100g ¥26,800



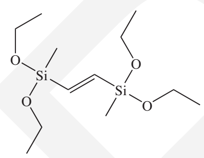
SIB1612.0
1,4-BIS(METHYLDICHLOROSILYL)BUTANE, 95%
$C_6H_{14}Cl_4Si_2$ — Mw 284.17 — bp 95-7° / 5 — D_4^{20} 1.165
Intermediate for carbosilazane polymers.[1]
1. Huggins, J. Ger. Offen. DE 114219A1, 1992.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[38958-24-6] HMIS: 3-2-1-X 10g ¥19,400



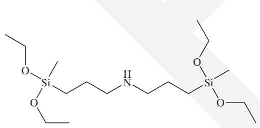
SIB1614.0
1,2-BIS(METHYLDICHLOROSILYL)ETHANE
2,2,5,5-TETRACHLORO-2,5-DISILAHEXANE
$C_4H_{10}Cl_4Si_2$ — Mw 256.11 — bp 208-210° — mp (31-3°) — D_4^{20} 1.2628 — n_D^{20} 1.4760
Contains 1-5% 1,1-isomer
Flashpoint: 94°C (201°F)
Dipodal coupling agent
See also SIB1612.0, SIB1615.0, SIB1632.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[3353-69-3] (既) 2-2065 TSCA EC 222-123-0 HMIS: 3-2-1-X 25g ¥13,500 100g ¥36,300



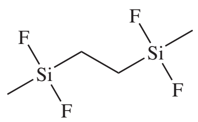
SIB1615.0
1,2-BIS(METHYLDIETHOXYSILYL)ETHANE
$C_{12}H_{30}O_4Si_2$ — Mw 294.54 — bp 80° / 1.5 — D_4^{20} 0.92 — n_D^{20} 1.417
Flashpoint: >65°C (>150°F)
See also SIB1630.0, SIB1632.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18043-74-8] EC 241-953-4 HMIS: 2-2-1-X 25g ¥21,000



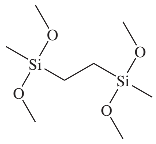
SIB1618.0
1,2-BIS(METHYLDIETHOXYSILYL)ETHYLENE
$C_{12}H_{28}O_4Si_2$ — Mw 292.52 — bp 80° / 2 — D_4^{20} 0.918 — n_D^{20} 1.4214
Mixed cis/trans isomers - primarily trans
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[124279-15-8] HMIS: 2-3-1-X 25g ¥25,200



SIB1620.0
BIS(METHYLDIETHOXYSILYLPROPYL)AMINE, 95%
$C_{16}H_{39}NO_4Si_2$ — Mw 365.66 — bp 155° / 0.6 — D_4^{20} 0.937 — n_D^{20} 1.4385
Dipodal coupling agent
See also SIB1822.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[31020-47-0] HMIS: 2-1-1-X 25g ¥14,600 100g ¥39,500



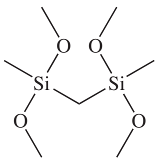
SIB1630.0
1,2-BIS(METHYLDIFLUOROSILYL)ETHANE
$C_4H_{10}F_4Si_2$ — Mw 190.29 — bp 114° — D_4^{20} 1.118
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[170381-99-4] HMIS: 3-3-1-X 10g ¥25,700



SIB1632.0
1,2-BIS(METHYLDIMETHOXYSILYL)ETHANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_8H_{22}O_4Si_2$	238.43	130-5° / 35		0.9679	1.4135

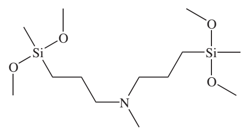
See also SIB1615.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[98789-40-3] HMIS: 3-2-1-X 10g ¥28,900



SIB1635.0
BIS(METHYLDIMETHOXYSILYL)METHANE
2,2,4,4-TETRAMETHOXY-1,3-DISILAPENTANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_7H_{20}O_4Si_2$	224.40	184°		0.968	1.4121

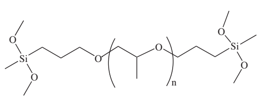
Forms thermally stable coatings
See also SIB1094.0, SIB1632.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18297-79-5] HMIS: 4-3-1-X 5g ¥30,000



SIB1645.0
BIS(METHYLDIMETHOXYSILYLPROPYL)-N-METHYLAMINE, 95%

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{13}H_{33}NO_4Si_2$	323.58	140° / 2		0.951	1.4368

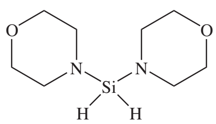
Viscosity: 6 - 7 cSt
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 25g ¥16,200



SIB1660.0
BIS[(3-METHYLDIMETHOXYSILYL)PROPYL]POLYPROPYLENE OXIDE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
	600 - 800			1.00	1.452^{25}

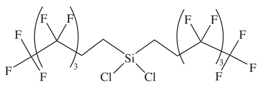
COMMERCIAL
Viscosity: 6,000-10,000 cSt. Flashpoint: >110°C (>230°F)
Hydrophilic dipodal silane
W/tin catalyst forms moisture-cross-linkable resins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[75009-88-0] TSCA HMIS: 3-1-1-X 100g ¥8,500 2kg ¥69,100 18kg ¥295,000



SIB1680.0
BIS(MORPHOLINO)SILANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_8H_{18}N_2O_2Si$	202.33	85° / 1		1.048	

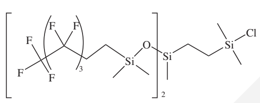
Employed in CVD
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-3-1-X 5g ¥27,800



SIB1705.0
BIS(NONAFLUOROHEXYL)DICHLOROSILANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{12}H_8Cl_2F_{18}Si$	593.16				

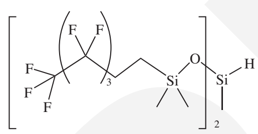
Forms release coatings, polymers
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[156323-66-9] HMIS: 3-2-1-X 10g ¥51,200



SIB1706.0
[BIS(NONAFLUOROHEXYLDIMETHYLSILOXY)METHYL]SILYLETHYLDIMETHYLCHLOROSILANE, 95%

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{21}H_{33}ClF_{18}O_2Si_4$	807.26	128° / 0.2		1.244^{25}	1.3705^{25}

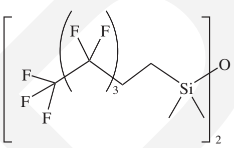
Forms self-cleaning surfaces
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-1-1-X 5g ¥35,300



SIB1708.0
BIS(NONAFLUOROHEXYLDIMETHYLSILOXY)METHYLSILANE, 95%

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{17}H_{24}F_{18}O_2Si_3$	686.60	104° / 1.5		1.302^{25}	1.348^{25}

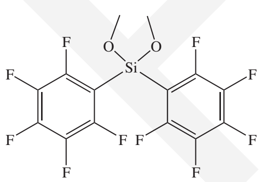
Fluorous phase reducing agent
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[147986-73-0] HMIS: 2-1-1-X 5g ¥24,700



SIB1709.0
BIS(NONAFLUOROHEXYL)TETRAMETHYLDISILOXANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{16}H_{20}F_{18}OSi_2$	626.47	150° / 45		1.33^{25}	1.3401^{25}

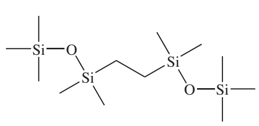
Viscosity: 3.6 cSt
Low refractive index fluid
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[122179-35-5] TSCA-L HMIS: 2-2-0-X 25g ¥22,500



SIB1710.0
BIS(PENTAFLUOROPHENYL)DIMETHOXYSILANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{14}H_6O_2F_{10}Si$	424.27	90° / 13		1.373	1.4181

Unit for hydrogen-free resins, useful in optical fiber applications
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[223668-68-6] HMIS: 3-3-1-X 5g ¥37,700

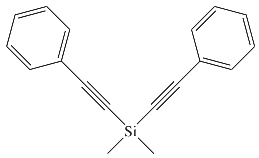


SIB1735.0
1,2-BIS(PENTAMETHYLDISILOXANYL)ETHANE
2,2,4,4,7,7,9,9-OCTAMETHYL-3,8-DIOXA-2,4,7,9-TETRASILADECANE

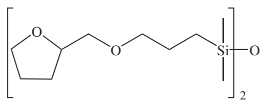
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{12}H_{34}O_2Si_4$	322.74	254-5°	(-52°)	0.820	1.410

Viscosity, 25°: 3 cSt Flashpoint: 92°C (198°F)
Vapor pressure, 100°: 4 mm
Vehicle for cosmetics and perfumes
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[6231-68-1] HMIS: 2-2-1-X 25g ¥13,000 100g ¥34,500

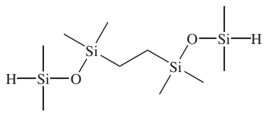
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



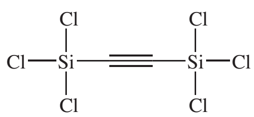
SIB1760.0
BIS(PHENYLETHYNYL)DIMETHYLSILANE
$C_{18}H_{16}Si$ 260.41 180° / 4 (78-81°)
Reductive cyclization yields siloles, oligosiloles.[1]
Useful in silicon-mediated Sonogashira cross-coupling reactions.[2]
1. Tamao, K. *J. Am. Chem. Soc.* **1994,** *116*, 11715.
2. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2170-08-3] HMIS: 2-2-1-X 5g ¥36,300



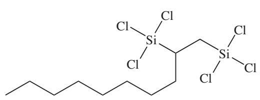
SIB1765.0
1,3-BIS(TETRAHYDROFURFURYLOXYPROPYL)TETRAMETHYLDISILOXANE
$C_{20}H_{42}O_5Si_2$ 418.72 165° / 10 0.979[25] 1.4545[25]
Viscosity: 13 cSt
Surface tension (neat): 23.6 mN/m
Surface tension, 0.1% in water: 24 mN/m
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
HMIS: 1-2-0-X 25g ¥32,600



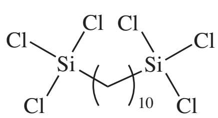
SIB1770.0
1,2-BIS(TETRAMETHYLDISILOXANYL)ETHANE, 95%
$C_{10}H_{30}O_2Si_4$ 294.69 90-5° / 20 0.845 1.41
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[229621-70-9] HMIS: 2-2-1-X 25g ¥34,200



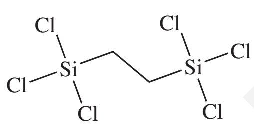
SIB1805.0
BIS(TRICHLOROSILYL)ACETYLENE
$C_2Cl_6Si_2$ 292.91 173-4° (23-4°) 1.469 1.4730
Flashpoint: 82°C (180°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18038-55-6] HMIS: 3-2-1-X 10g ¥44,300



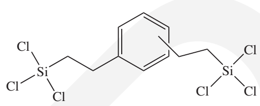
SIB1808.0
1,2-BIS(TRICHLOROSILYL)DECANE
$C_{10}H_{20}Cl_6Si_2$ 409.16 114° / 1 1.2496 1.4754
Bonded phase for HPLC stable over wide range of pH
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[620987-03-3] TSCA-L HMIS: 3-2-1-X 25g ¥19,400



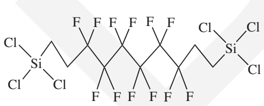
SIB1809.0
1,10-BIS(TRICHLOROSILYL)DECANE, tech-95
$C_{10}H_{20}Cl_6Si_2$ 409.16 120° / 0.5 1.232
See also SIB1815.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[52217-62-6] HMIS: 3-2-1-X 10g ¥16,400



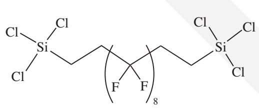
SIB1810.0
1,2-BIS(TRICHLOROSILYL)ETHANE, 95%
$C_2H_4Cl_6Si_2$ 296.94 201° (24-5°) 1.4829 1.4770
Contains 1,1-isomer
Flashpoint: 65°C (149°F)
Forms mesoporous sol-gel structures
Forms 6-arm stars with anionic polystyrene.[1]
1. Frater, D. et al. *J. Polym. Sci., Part B: Polym. Phys.* **1997,** *35*, 587.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2504-64-5] TSCA EC 219-710-9 HMIS: 3-2-1-X 25g ¥16,200 100g ¥37,900



SIB1811.0
BIS(TRICHLOROSILYLETHYL)BENZENE, tech-95
$C_{10}H_{12}Cl_6Si_2$ 401.09 210° / 0.5 1.29 1.5284
Mixed isomers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[107602-27-7] HMIS: 3-2-1-X 25g ¥28,900

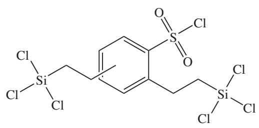


SIB1809.5
1,6-BIS(TRICHLOROSILYLETHYL)DODECAFLUOROHEXANE
$C_{10}H_8Cl_6F_{12}Si_2$ 625.04 110-2° / 0.1 (118-122°)
Forms hydrolysis-resistant oleophobic coatings
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[35192-54-2] HMIS: 3-1-1-X 5g ¥35,300

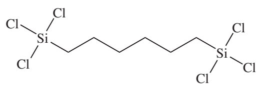


SIB1811.5
1,8-BIS(TRICHLOROSILYLETHYL)HEXADECAFLUOROOCTANE
$C_{12}H_8Cl_6F_{16}Si_2$ 725.06 142-4° / 0.6 (69-70°)
Forms hydrolysis-resistant oleophobic coatings
See also SIB1809.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[445303-83-3] HMIS: 3-1-1-X 1.0g ¥40,600

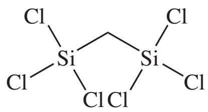
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



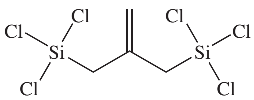
SIB1811.7
BIS(TRICHLOROSILYLETHYL)PHENYLSULFONYL CHLORIDE, mixed isomers, 40% in toluene
$C_{10}H_{11}Cl_7O_2SSi_2$ — Mw 499.60 — D_4^{20} 1.03
Flashpoint: 4°C (39°F)
Forms bonded phases with increased resistance to hydrolysis
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-4-1-X 10g ¥44,800



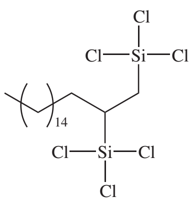
SIB1812.0
1,6-BIS(TRICHLOROSILYL)HEXANE
$C_6H_{12}Cl_6Si_2$ — Mw 353.05 — bp 148-50° / 10 — D_4^{20} 1.327 — n_D^{20} 1.4759
Flashpoint: 75°C (167°F)
Forms mesoporous sol-gel structures
See also SIB1809.5, SIB1814.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13083-94-8] TSCA EC 235-994-7 HMIS: 3-2-1-X 10g ¥14,300 50g ¥46,900



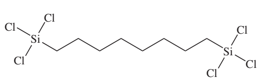
SIB1813.0
BIS(TRICHLOROSILYL)METHANE
$CH_2Cl_6Si_2$ — Mw 282.90 — bp 183° — D_4^{20} 1.5567 — n_D^{20} 1.4740
Nucleus for star polymers and dendrimers
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4142-85-2] TSCA-L HMIS: 3-2-1-X 5g ¥13,000 25g ¥41,600



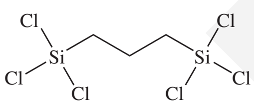
SIB1813.5
1,1-BIS(TRICHLOROSILYLMETHYL)ETHYLENE
$C_4H_6Cl_6Si_2$ — Mw 322.98 — bp 240-2° — D_4^{20} 1.4052 — n_D^{20} 1.4931
Allylic silane
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[78948-04-6] HMIS: 3-2-1-X 10g ¥40,600



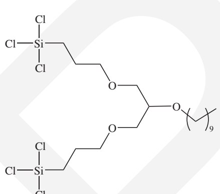
SIB1813.7
1,2-BIS(TRICHLOROSILYL)OCTADECANE
$C_{18}H_{36}Cl_6Si_2$ — Mw 521.37 — bp 186-9° / 0.2 — D_4^{20} 1.103
Hydrolysis resistant dipodal bonded phase for high acidity aqueous HPLC
See also SIB1815.1
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-1-1-X 10g ¥36,300



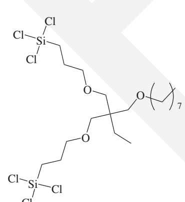
SIB1814.0
1,8-BIS(TRICHLOROSILYL)OCTANE
$C_8H_{16}Cl_6Si_2$ — Mw 381.10 — bp 140° / 1 — D_4^{20} 1.22 — n_D^{20} 1.4757
Flashpoint: 115°C (239°F)
Forms mesoporous sol-gel structures
See also SIB1824.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[52217-53-5] EC 257-748-8 HMIS: 3-1-1-X 25g ¥13,000 100g ¥34,200



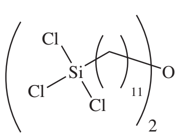
SIB1815.0
1,3-BIS(TRICHLOROSILYL)PROPANE
$C_3H_6Cl_6Si_2$ — Mw 310.97 — bp 115-7° / 4 — mp (29-30°) — D_4^{20} 1.4394 — n_D^{20} 1.4732
Forms mesoporous sol-gel structures
Intermediate for “dumbbell” POSS structures.[1]
1. Araki, H. et al. *Polym. J.* **2012**, *44*, 340.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18171-50-1] HMIS: 3-2-1-X 10g ¥26,000



SIB1815.1
1,3-BIS(3-TRICHLOROSILYLPROPOXY)-2-DECYLOXYPROPANE
$C_{19}H_{38}Cl_6O_3Si_2$ — Mw 583.40 — bp 190-200° / 0.4 — D_4^{20} 1.158
Dipodal C_{18} analog with embedded hydrophilicity
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[862912-02-5] HMIS: 3-1-1-X 10g ¥36,300

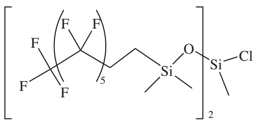


SIB1815.3
3,3-BIS(TRICHLOROSILYLPROPOXYMETHYL)-5-OXA-TRIDECANE, 95%
$C_{20}H_{40}Cl_6O_3Si_2$ — Mw 597.42 — bp 220-2° / 0.9 — D_4^{20} 1.135
Dipodal hydrophobic surface treatment with embedded hydrophobicity for chromatography
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[862911-99-7] HMIS: 3-1-1-X 10g ¥25,700

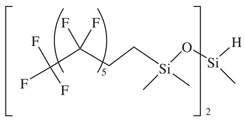


SIB1815.4
BIS(TRICHLOROSILYLUNDECYL) ETHER
$C_{22}H_{44}Cl_6OSi_2$ — Mw 593.48
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-1-1-X 1.0g ¥52,800

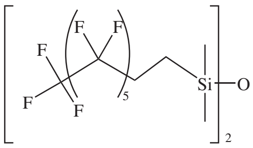
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



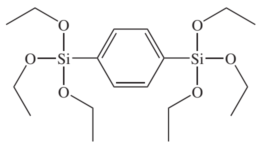
SIB1815.5
BIS((TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)DIMETHYLSILOXY)METHYLCHLOROSILANE
$C_{21}H_{23}ClF_{26}O_2Si_3$ 921.06 122-4° / 1.6 1.437
Blocking agent for fluorous phase chemistry
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[521069-01-2] HMIS: 3-2-1-X 5g ¥49,900



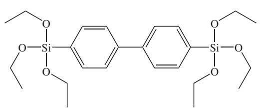
SIB1815.7
BIS((TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)DIMETHYLSILOXY)METHYLSILANE
$C_{21}H_{24}F_{26}O_2Si_3$ 886.64 136° / 3 1.414 1.3425
Reducing agent for fluorous phase synthesis
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[521069-00-1] HMIS: 3-2-1-X 5g ¥40,600



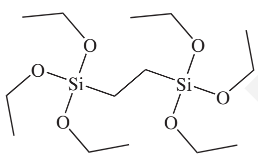
SIB1816.0
1,3-BIS(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)TETRAMETHYLDISILOXANE
$C_{20}H_{20}F_{26}OSi_2$ 826.49 81-2° / 11 (-40 to -45°) 1.460 1.3369[22]
Viscosity: 6-7 cSt.
Low refractive index fluid
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[71363-70-7] HMIS: 2-1-0-X 25g ¥30,800 100g ¥92,600



SIB1816.6
1,4-BIS(TRIETHOXYSILYL)BENZENE
$C_{18}H_{34}O_6Si_2$ 402.64 130-2° / 0.4 1.015 1.4549
Forms phenylene-bridged silica with ordered pore walls.[1,2]
1. Inagaki, S. et al. *Nature* **2002,** *416*, 304.
2. Wang, W. et al. *Chem. Mater.* **2003,** *15*, 4886.
See also SIB1811.0, SIB1831.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2615-18-1] HMIS: 2-2-1-X 5g ¥19,400 25g ¥67,100

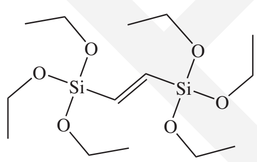


SIB1816.8
4,4'-BIS(TRIETHOXYSILYL)BIPHENYL
$C_{24}H_{38}O_6Si_2$ 478.73 203-6° / 0.3 1.047 1.5039
Flashpoint: >110°C (>230°F)
Reagent for mesoporous silicas
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[123640-93-7] HMIS: 2-2-1-X 5g ¥53,800

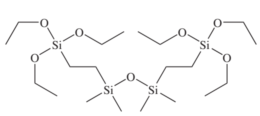


SIB1817.0
1,2-BIS(TRIETHOXYSILYL)ETHANE
HEXAETHOXYDISILETHYLENE, BSE
$C_{14}H_{34}O_6Si_2$ 354.59 96° / 0.3 (-33°) 0.957 1.4052
ΔHvap: 101.5 kJ/mole
Flashpoint: 107°C (225°F)
TOXICITY: oral rat, LD50: 161 mg/kg
Vapor pressure, 150°: 10mm
Additive to silane coupling agents formulations that enhances hydrolytic stability
Employed in corrosion resistant coatings/primers for steel and aluminum.[1,2]
Sol-gels of α,ω-bis(trimethoxysilyl)alkanes reported.[3]
Component in evaporation-induced self-assembly of mesoporous structures.[4]
Forms mesoporous, derivatizeable molecular sieves.[5,6]
Hydrolysis kinetics studied.[7]
1. Van Ooij, W. et al. *J. Adhes. Sci. Technol.* **1997,** *11*, 29.
2. Van Ooij, W. et al. *Chemtech* **1999,** *28*, 3302.
3. Loy, D. A. et al. *J. Am. Chem. Soc.* **1999,** *121*, 5413.
4. Lu, Y. et al. *J. Am. Chem. Soc.* **2000,** *122*, 5258.
5. Molde, B. et al. *Chem. Mater.* **1999,** *11*, 3302.
6. Cho, E. et al. *Chem. Mater.* **2004,** *16*, 270.
7. Diaz-Benito, B. *Colloids and Surfaces A: Physicochemical Aspects* **2010**, *369*, 53.
See also SIB1821.0, SIT8185.8
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[16068-37-4] TSCA EC 240-212-2 HMIS: 3-1-1-X 25g ¥7,400 100g ¥16,400 2kg ¥104,100

COMMERCIAL

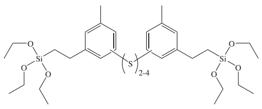


SIB1820.0
1,2-BIS(TRIETHOXYSILYL)ETHYLENE, 95%
4,4,7,7-TETRAETHOXY-3,8-DIOXA-4,7-DISILADEC-5-ENE
$C_{14}H_{32}O_6Si_2$ 352.57 122-5° / 4 0.958 1.4168
~80% trans isomer
Forms ethylene-bridged mesoporous silicas.[1]
1. Vercaemst, C. et al. *Chem. Mater.* **2009**, *21*, 5792.
See also SIB1618.0, SIB1832.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[87061-56-1] HMIS: 2-2-1-X 5g ¥14,600 25g ¥48,000

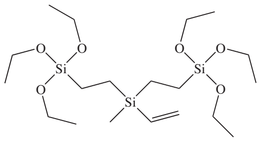


SIB1820.2
1,3-BIS(TRIETHOXYSILYLETHYL)TETRAMETHYLDISILOXANE
$C_{20}H_{50}O_7Si_4$ 514.95 125-135° / 0.1 0.945 1.421
Contains isomers
Flashpoint: >110°C (>230°F)
Dipodal hydrophobic surface treatment
See also SIB1824.0, SIB1829.7, DMS-XT11
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[117680-21-4] HMIS: 2-2-1-X 25g ¥22,500

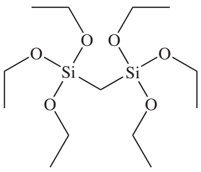
Name | Mw | bp °C/mm | (mp °C) | D_4^{20} | n_D^{20}



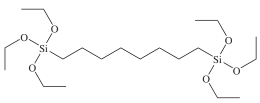
SIB1820.5
BIS[*m*-(2-TRIETHOXYSILYLETHYL)TOLYL]POLYSULFIDE, tech-90
$C_{30}H_{50}O_6S_{(2-4)}Si_2$ 627 - 691 1.10 1.533
Dark, viscous liquid Flashpoint: 55°C (131°F)
Coupling agent for SBR rubber
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[198087-81-9]/[85912-75-0]/[67873-85-2] TSCA HMIS: 2-2-1-X 25g ¥11,900 2kg ¥182,600



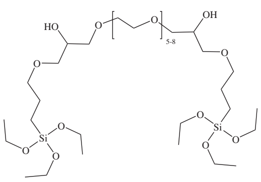
SIB1818.0
BIS(TRIETHOXYSILYLETHYL)VINYLMETHYLSILANE
$C_{19}H_{44}O_6Si_3$ 452.82 141° / 0.15 0.943
See also SIB1824.9
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-1-1-X 5g ¥38,500



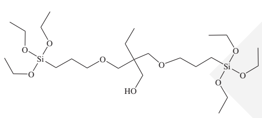
SIB1821.0
BIS(TRIETHOXYSILYL)METHANE
4,4,6,6-TETRAETHOXY-3,7-DIOXA-4,6-DISILANONANE
$C_{13}H_{32}O_6Si_2$ 340.56 114-5° / 3.5 0.9741 1.4098
Intermediate for sol-gel coatings, hybrid inorganic-organic polymers
Forms methylene-bridged mesoporous structures.[1]
Forms modified silica membranes that separate propylene/propane mixtures.[2]
1. Zhang, W. et al. *Chem. Mater.* **2005,** *17*, 6407.
2. Kanezashi, M. et al. *J. Membr. Sci.* **2012**, *415-416*, 478.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18418-72-9] TSCA-L HMIS: 3-2-1-X 25g ¥22,500 100g ¥65,500



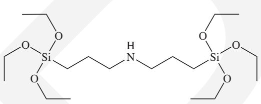
SIB1824.0
1,8-BIS(TRIETHOXYSILYL)OCTANE
$C_{20}H_{46}O_6Si_2$ 438.76 172-5° / 0.75 0.926 1.4240
Employed in sol-gel synthesis of mesoporous structures
Crosslinker for moisture-cure silicone RTVs with improved environmental resistance
Sol-gels of α,ω-bis(trialkoxysilyl)alkanes reported.[1]
1. Loy, D.A. et al. *J. Am. Chem. Soc.* **1999,** *121*, 5413.
See also SIB1820.2
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[52217-60-4] TSCA HMIS: 2-1-1-X 25g ¥11,400 100g ¥29,400



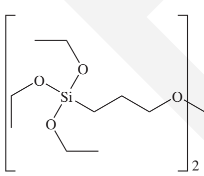
SIB1824.2
BIS-[3-(TRIETHOXYSILYLPROPOXY)-2-HYDROXYPROPOXY]POLYETHYLENE OXIDE, 65% in ethanol
$C_{24}H_{54}O_{11}Si_2(C_2H_4O)_{5-8}$ 800 - 900 0.959 1.421
Flashpoint: 21°C (70°F)
Hydrophilic dipodal silane
See also SIB1824.82
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-4-1-X 25g ¥24,100



SIB1824.4
2,2-BIS(3-TRIETHOXYSILYLPROPOXYMETHYL)BUTANOL, 50% in ethanol
$C_{24}H_{54}O_9Si_2$ 542.86 0.899
Flashpoint: 15°C (59°F)
For solid-state synthesis of oligonucleotides
See also SIH6171.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[862911-98-6] HMIS: 2-4-1-X 10g ¥48,000

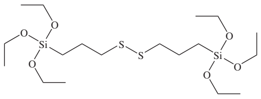


SIB1824.5
BIS(3-TRIETHOXYSILYLPROPYL)AMINE, 95%
$C_{18}H_{43}NO_6Si_2$ 425.71 160° / 0.6 0.97 1.4265
Viscosity: 5.5 cSt Flashpoint: 162°C (324°F)
Coupling agent for polyamides with improved hydrolytic stability
Adhesion promoter, crosslinking agent for hot melt adhesives
Adhesion promoter for aluminum-polyester multilayer laminates
Adhesion promoter, crosslinker for 2-part condensation cure silicones
See also SIB1833.0, SIT8187.2
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13497-18-2] TSCA EC 236-818-1 HMIS: 3-1-1-X 25g ¥7,200 100g ¥15,400 2kg ¥105,000
COMMERCIAL



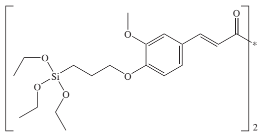
SIB1824.56
BIS(3-TRIETHOXYSILYLPROPYL)CARBONATE
$C_{19}H_{42}O_9Si_2$ 470.71 150° / 10 1.020
Forms thermally labile bridged silsesquioxanes.[1]
1. Loy, D.A. et al. *Chem. Mater*. **1999,** *11*, 3333.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[88321-11-3] HMIS: 2-2-1-X 10g ¥33,200

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

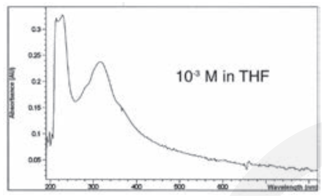


SIB1824.6
BIS[3-(TRIETHOXYSILYL)PROPYL]DISULFIDE, 90%
BIS(TRIETHOXYSILYL)-4,5-DITHIOOCTANE
$C_{18}H_{42}O_6S_2Si_2$ 474.82 1.025 1.457
Contains sulfide and tetrasulfide — Flashpoint: 75°C (167°F)
dipodal coupling agent/vulcanizing agent for rubbers
Intermediate for mesoporous silicas with acidic pores.[1]
1. Alauzun, J. et al. *J. Am. Chem. Soc.* **2006**, *128*, 8718.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[56706-10-6] TSCA EC 260-350-7 HMIS: 2-2-1-X 25g ¥9,800 100g ¥24,100 2kg ¥94,000

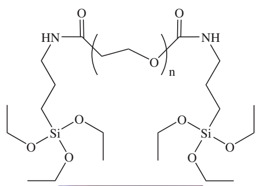
COMMERCIAL



SIB1824.8
1,7-BIS(4-TRIETHOXYSILYLPROPOXY-3-METHOXYPHENYL)-1,6-HEPTADIENE-3,5-DIONE, tech-90
$C_{39}H_{60}O_{12}Si_2$ 777.07
UV max: 220, 232(vs), 354(broad)
Metal chelating chromophore

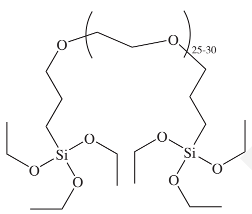


HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[947329-82-0] HMIS: 2-1-1-X 0.5g ¥51,200

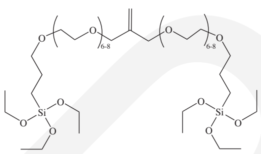


SIB1824.82
N,N'-BIS-[(3-TRIETHOXYSILYLPROPYL)AMINOCARBONYL]POLYETHYLENE OXIDE (10-15 EO)
UREASIL
1,000 - 1,200 1.088 1.4583^{25}
Viscosity: 300-350 cSt
Dipodal hydrophilic silane
In combination with sulfolane forms gel electrolyte for solar cells.[1]
Forms proton conducting hybrid organic-inorganic polymer electrode membranes.[2]
1. Stathatos, E. et al. *Adv. Funct. Mater.* **2004**, *14*, 45.
2. Honma, I. et al. *J. Membr. Sci.* **2001**, *185*, 83.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[178884-91-8] TSCA HMIS: 1-1-1-X 25g ¥18,300 100g ¥51,700

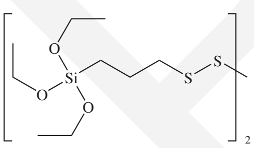
Antifog coatings can be formed from combinations of polyalkylene oxide functional silanes and film-forming hydrophilic silanes



SIB1824.84
BIS(3-TRIETHOXYSILYLPROPYL)POLYETHYLENE OXIDE (25-30 EO)
1,400 - 1,600 (38-42°)
Hydrolytically stable hydrophilic silane
Proton conducting polymer electrolyte.[1]
1. Ghosh, B. et al. *Chem. Mater.*, **2010**, *22*, 1483.
See also SIB1860.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[666829-33-0] HMIS: 2-1-1-X 25g ¥25,700



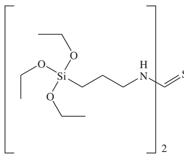
SIB1824.9
1,3-[BIS(3-TRIETHOXYSILYLPROPYL)POLYETHYLENOXY]-2-METHYLENEPROPANE
$C_{50}H_{104}O_{20}Si_2$ (av) 1113.50
Vinyl functional hydrophilic dipodal coupling agent for protein immobilization
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-2-1-X 1.0g ¥80,900



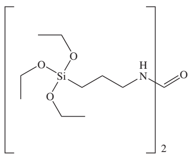
SIB1825.0
BIS[3-(TRIETHOXYSILYL)PROPYL]TETRASULFIDE, tech-95
TESPT
$C_{18}H_{42}O_6S_4Si_2$ 538.94 250° dec. 1.095 1.49
Contains distribution of S_2 - S_{10} species; average 3.8 — Flashpoint: 91°C (196°F)
Viscosity: 11 cSt — TOXICITY: oral rat, LD50: 16,400 mg/kg
Adhesion promoter for precious metals
Coupling agent / vulcanizing agent for “green” tires
Adhesion promoter for PVD copper on parylene.[1]
1. Pimanpang, S. et al. *J. Vac. Sci. Technol. A* **2006**, *24*, 1884.
See also SIB1820.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[40372-72-3] (既) 2-3124 TSCA EC 254-896-5 HMIS: 2-2-1-X 100g ¥13,000 2kg ¥50,000 18kg ¥214,000

COMMERCIAL

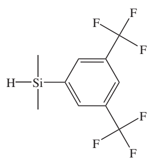
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



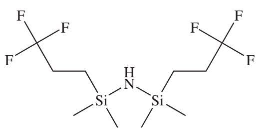
SIB1827.0
N,N'-BIS[3-(TRIETHOXYSILYL)PROPYL]THIOUREA, 90%
$C_{19}H_{44}N_2O_6SSi_2$ 484.73 — D: 1.047 — n: 1.4696
Viscous yellow liquid — Flashpoint: >110°C (>230°F)
Pour point: -60˚
Forms films on electrodes for determination of mercury.[1]
1. Guo, Y. et al. *J. Pharm. Biol. Anal.* **1999**, *19* 175.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[69952-89-2] HMIS: 2-1-1-X 25g ¥39,000



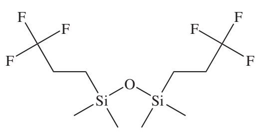
SIB1828.0
N,N'-BIS[3-(TRIETHOXYSILYL)PROPYL]UREA, 60% in ethanol
$C_{19}H_{44}N_2O_7Si_2$ 468.73 — D: 0.923
Flashpoint: 17°C (63°F)
See also SIB1835.5, SIU9055.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[69465-84-5] HMIS: 2-1-1-X 25g ¥12,500 100g ¥32,600



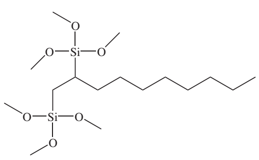
SIB1828.2
3,5-BIS(TRIFLUOROMETHYL)PHENYLDIMETHYLSILANE, 95%
$C_{10}H_{10}F_6Si$ 272.26 — bp: 54-6° / 3 — D: 1.23 — n: 1.4125
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[33558-36-0] HMIS: 2-2-1-X 2.5g ¥61,800



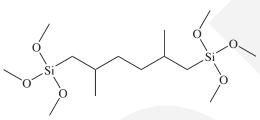
SIB1828.4
1,3-BIS(TRIFLUOROPROPYL)-1,1,3,3-TETRAMETHYLDISILAZANE, 95%
$C_{10}H_{21}F_6NSi_2$ 325.45 — bp: 76-9° / 10 — D: 1.11 — n: 1.386
Flashpoint: 78°C (172°F)
Fluorinated blocking agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[39482-87-6] TSCA EC 254-470-9 HMIS: 2-2-1-X 50g ¥42,700



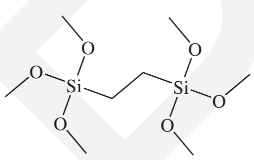
SIB1828.5
1,3-BIS(TRIFLUOROPROPYL)TETRAMETHYLDISILOXANE
$C_{10}H_{20}F_6OSi_2$ 326.44 — bp: 75° / 10 — mp: (-88 to -90°) — D: 1.085 — n: 1.3651
Viscosity: 2 cSt
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[690-56-2] HMIS: 2-1-0-X 25g ¥21,500 100g ¥75,100



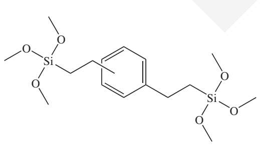
SIB1829.0
1,2-BIS(TRIMETHOXYSILYL)DECANE
$C_{16}H_{38}O_6Si_2$ 382.65 — bp: 130-2° / 0.4 — D: 0.984 — n: 1.4303
Pendant dipodal silane; employed in high pH HPLC
Employed in the fabrication of luminescent molecular thermometers.[1]
1. Brites, C. et al. *New J. Chem.* **2011**, *35*, 1173.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[832079-33-1] TSCA-L HMIS: 3-2-1-X 25g ¥16,200 100g ¥44,800



SIB1829.7
1,6-BIS(TRIMETHOXYSILYL)-2,5-DIMETHYLHEXANE
$C_{14}H_{34}O_6Si_2$ 354.59 — bp: 125-8° / 0.2
Forms hydrolytically stable hydrophobic coatings
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 25g ¥33,200



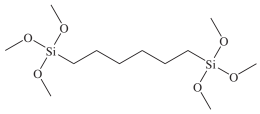
SIB1830.0
1,2-BIS(TRIMETHOXYSILYL)ETHANE
$C_8H_{22}O_6Si_2$ 270.43 — bp: 103-4° / 5 — D: 1.068 — n: 1.4091
CAUTION: INHALATION HAZARD
AIR TRANSPORT FORBIDDEN
Flashpoint: 65°C (149°F)
TOXICITY: inh rat, LC50: 2.4 ppm
Vapor pressure, 20˚: 0.08 mm
Employed in fabrication of multilayer printed circuit boards.[1]
1. Palladino, J. U.S. Patent 5,073,456, 1991.
See also SIB1817.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18406-41-2] TSCA EC 242-285-6 HMIS: 4-2-1-X 25g inquire 100g inquire



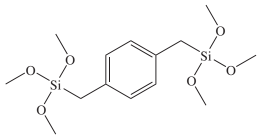
SIB1831.0
BIS(TRIMETHOXYSILYLETHYL)BENZENE, tech-95
$C_{16}H_{30}O_6Si_2$ 374.58 — bp: 148-50° / 0.1 — D: 1.08 — n: 1.4734
Mixed isomers — Flashpoint: 193°C (379°F)
Forms high refractive index coatings
Forms resins that absorb organics from aqueous media.[1]
1. Edmiston, P. et al. *Sep. Purif. Technol.* **2009**, *66*, 532.
See also SIB1832.2, SIB1833.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[58298-01-4] TSCA HMIS: 2-1-0-X 10g ¥12,200 50g ¥38,500

SILICON COMPOUNDS

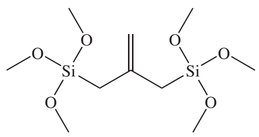
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



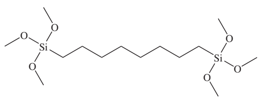
SIB1832.0
1,6-BIS(TRIMETHOXYSILYL)HEXANE
$C_{12}H_{30}O_6Si_2$ | 326.54 | 161° / 2 | | 1.014 | 1.4213
Flashpoint: 95°C (203°F)
Sol-Gels of α,ω-bis(trimethoxysilyl)alkanes reported.[1]
1. Loy, D.A. et al. *J. Am. Chem. Soc.* **1999,** *121*, 5413.
See also SIB1824.0, SIB1829.7
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[87135-01-1] (既) 2-3732 HMIS: 3-2-1-X 10g ¥17,100 50g ¥48,000



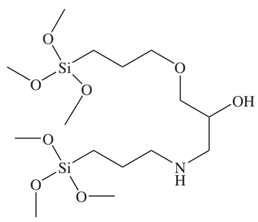
SIB1832.2
1,4-BIS(TRIMETHOXYSILYLMETHYL)BENZENE
$C_{14}H_{26}O_6Si_2$ | 346.53 | 124-5° / 0.05 | | 1.097 | 1.47^{25}
Forms adherent films on metal substrates
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[193358-40-6] HMIS: 3-1-1-X 10g ¥51,200



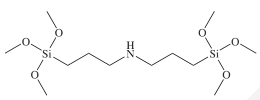
SIB1832.5
1,1-BIS(TRIMETHOXYSILYLMETHYL)ETHYLENE, tech-95
$C_{10}H_{24}O_6Si_2$ | 296.47 | 230-3° | | 1.05 | 1.429^{25}
Contains ~ 10% cyclic siloxane condensation products
Dipodal coupling agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[143727-20-2] HMIS: 3-3-1-X 5g ¥52,200



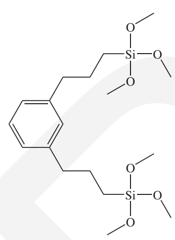
SIB1832.7
1,8-BIS(TRIMETHOXYSILYL)OCTANE
$C_{14}H_{34}O_6Si_2$ | 354.59 | 138° / 0.2 | | 0.981 | 1.424
See also SIB1824.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[105566-68-5] HMIS: 3-2-1-X 25g ¥26,800



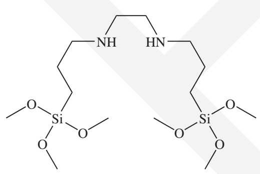
SIB1832.8
1,11-BIS(TRIMETHOXYSILYL)-4-OXA-8-AZAUNDECAN-6-OL, 50% in methanol
3,3,15,15-TETRAMETHOXY-2,7,16-TRIOXA-11-AZA-3,15-DISILAHEPTADECAN-9-OL
$C_{15}H_{37}NO_8Si_2$ | 415.63 | | | 0.922 | 1.384^{25}
Flashpoint: 11°C (52°F)
Provides strong glass-to-glass bonds
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[126552-46-3] HMIS: 3-4-1-X 25g ¥9,800 100g ¥24,700



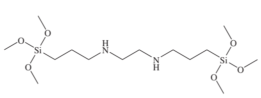
SIB1833.0
BIS(3-TRIMETHOXYSILYLPROPYL)AMINE, 96%
$C_{12}H_{31}NO_6Si_2$ | 341.56 | 152° / 4 | | 1.040 | 1.4320
Flashpoint: 113°C (235°F)
Dipodal coupling agent
Secondary amine allows more control of reactivity with isocyanates
Low level incorporation with acryloxypropyltrimethoxysilane, SIA0200, increases strength and hydrolytic stability of dental composites.[1]
1. Matinlinna, J. et al. *Acta Odontol. Scand.* **2012**, *70*, 405.
See also SIB1824.5, SID1834.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[82985-35-1] TSCA EC 280-084-5 HMIS: 3-1-1-X 25g ¥3,700 2kg ¥82,900 18kg ¥336,000
COMMERCIAL



SIB1833.4
1,3-BIS(TRIMETHOXYSILYLPROPYL)BENZENE
$C_{18}H_{34}O_6Si_2$ | 402.64
Forms mesoporous silicas
See also SIB1831.0, SIB1832.2
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 5g ¥41,900

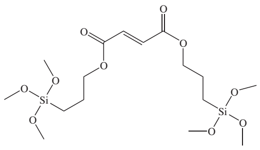


SIB1834.0
N,N'-BIS[(3-TRIMETHOXYSILYL)PROPYL]ETHYLENEDIAMINE, 62% in methanol
$C_{14}H_{36}N_2O_6Si_2$ | 384.62 | | | 0.89
Flashpoint: 20°C (68°F)
Contains N,N-isomer
Coupling agent for polyamides with enhanced hydrolytic stability
Provides improved solder resistance for printed circuit boards
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[68845-16-9] (既) 2-3620 TSCA EC 272-453-4 HMIS: 3-4-1-X 25g ¥8,500 100g ¥19,900 2kg ¥110,000
COMMERCIAL

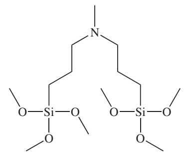


SIB1834.1
N,N'-BIS[(3-TRIMETHOXYSILYL)PROPYL]ETHYLENEDIAMINE, 95%
$C_{14}H_{36}N_2O_6Si_2$ | 384.62 | | | 1.050 | 1.4428
Flashpoint: >110°C (>230°F)
Contains N,N-isomer
Coupling agents for polyamides with enhanced hydrolytic stability
Forms thin film environments for metal ions.[1]
1. He, J. et al. *RIKEN Review* **2002,** *45*, 27.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[68845-16-9] TSCA EC 272-453-4 HMIS: 3-1-1-X 10g ¥13,000 50g ¥41,600

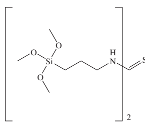
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



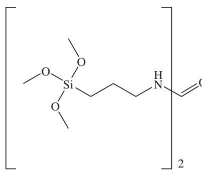
SIB1834.5
BIS(3-TRIMETHOXYSILYLPROPYL) FUMARATE, 96%
$C_{16}H_{32}O_{10}Si_2$ 440.59 1.118 1.443
Flashpoint: >110°C (>230°F)
Dipodal silane
Adhesion promoter for Pt-cure silicone RTVs
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3371-62-8] TSCA HMIS: 3-1-1-X 25g ¥20,400



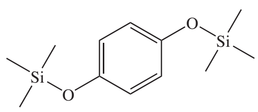
SIB1835.0
BIS(3-TRIMETHOXYSILYLPROPYL)-N-METHYLAMINE
$C_{13}H_{33}NO_6Si_2$ 355.58 175° / 10 1.023 1.430
Flashpoint: 106°C (223°F)
See also SIB1828.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[31024-70-1] HMIS: 2-1-0-X 25g ¥21,500 100g ¥62,100



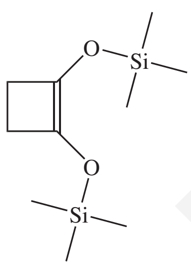
SIB1835.2
N,N'-BIS(3-TRIMETHOXYSILYLPROPYL)THIOUREA, tech-90
$C_{13}H_{32}N_2O_6SSi_2$ 400.66 1.13 1.485
Viscosity: 160-200 cSt
Forms mesoporous silicas that chelate metals
See also SIB1827.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 10g ¥22,500



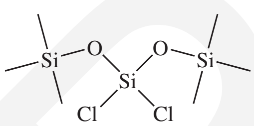
SIB1835.5
N,N'-BIS(3-TRIMETHOXYSILYLPROPYL)UREA, 95%
$C_{13}H_{32}N_2O_7Si_2$ 384.58 1.004 1.4488
Amber liquid
Flashpoint: >110°C (>230°F)
Viscosity: 100 - 250 cSt
Adhesion promoter for 2-part condensation cure silicone RTVs
See also SIB1828.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18418-53-6] TSCA HMIS: 3-2-1-X 25g ¥8,500 100g ¥19,900 2kg ¥102,000
COMMERCIAL



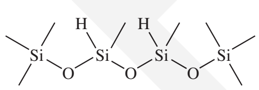
SIB1835.8
1,4-BIS(TRIMETHYLSILOXY)BENZENE
$C_{12}H_{22}O_2Si_2$ 254.48 246° (46°)
Reacts w/p-difluorobenzene in presence of 0.1% CsF at 260° in chlorobenzene forming polyethers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[90162-40-6] HMIS: 2-2-1-X 25g ¥42,700



SIB1836.0
1,2-BIS(TRIMETHYLSILOXY)CYCLOBUTENE, 95%
$C_{10}H_{22}O_2Si_2$ 230.46 82-6° / 10 0.897 1.4349
Flashpoint: 61°C (142°F)
Precursor to cyclobutanedione.[1]
Undergoes Aldol condensations with carbonyls.[2]
Undergoes photocycloadditions.[3]
1. Dennis, J. et al. In *Organic Synthesis;* Wiley & Sons: New York, 1990; Collect. Vol. 7, 112.
2. Shimada, J. et al. *J. Am. Chem. Soc.* **1984,** *106*, 1759.
3. Hijfte, L. et al. *Tetrahedron* **1984,** *40*, 4371.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17082-61-0] HMIS: 3-2-1-X 5g ¥22,500

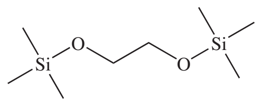


SIB1837.0
BIS(TRIMETHYLSILOXY)DICHLOROSILANE
3,3-DICHLOROHEXAMETHYLTRISILOXANE
$C_6H_{18}Cl_2O_2Si_3$ 277.37 173° (-53°) 1.0017 1.3983
Flashpoint: 54°C (129°F)
Vapor pressure, 57°: 12 mm
Sterically hindered protecting group for diols
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2750-44-9] HMIS: 3-2-1-X 25g ¥34,200



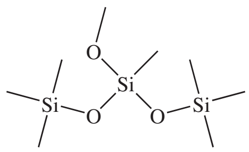
SIB1838.0
1,3-BIS(TRIMETHYLSILOXY)-1,3-DIMETHYLDISILOXANE, 95%
3H,5H-OCTAMETHYLTETRASILOXANE
$C_8H_{26}O_3Si_4$ 282.63 92-4° / 50 0.858 1.386
Flashpoint: 63°C (145°F)
Undergoes hydrosilylation reactions
See also SIH6116.6
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[16066-09-4] (既) 7-477 TSCA EC 240-209-6 HMIS: 3-2-1-X 10g ¥11,900 50g ¥37,400

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

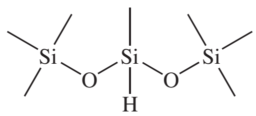


SIB1840.0
1,2-BIS(TRIMETHYLSILOXY)ETHANE
ETHYLENE GLYCOL BIS(TRIMETHYLSILYL ETHER)
$C_8H_{22}O_2Si_2$ 206.43 165-6° 0.842 1.4036
ΔHvap: 48.5 kJ/mole
Flashpoint: 46°C (115°F)
Vapor pressure, 70°: 25 mm

Converts α,β-unsaturated aldehydes to acetals.[1,2]
1. Hwu, J. et al. *J. Org. Chem.* **1987,** *52*, 188.
2. Tsunoda, T. *Tetrahedron Lett.* **1980,** *21*, 1357.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[7381-30-8] EC 230-950-3 HMIS: 3-2-1-X 50g ¥26,300

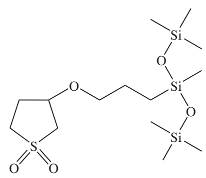


SIB1843.0
BIS(TRIMETHYLSILOXY)METHYLMETHOXYSILANE
METHOXYHEPTAMETHYLTRISILOXANE
$C_8H_{24}O_3Si_3$ 252.53 82° / 47 0.862 1.3883^{25}
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[7671-19-4] HMIS: 3-2-1-X 25g ¥24,100



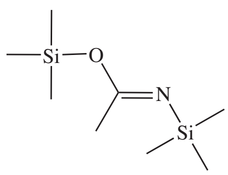
SIB1844.0
BIS(TRIMETHYLSILOXY)METHYLSILANE
1,1,1,3,5,5,5-HEPTAMETHYLTRISILOXANE
$C_7H_{22}O_2Si_3$ 222.51 141-2° 0.8136 1.3815
Flashpoint: 27°C (81°F)
Critical temperature: 280.2˚C
Critical pressure: 14.81 bar
COMMERCIAL

See also SIB1838.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[1873-88-7] (既) 7-477 TSCA EC 217-496-1 HMIS: 2-3-1-X 50g ¥6,200 250g ¥20,900 2kg ¥139,000



SIB1845.0
3-[BIS(TRIMETHYLSILOXY)METHYLSILYLPROPOXY]SULFOLANE, 95%
$C_{14}H_{34}O_5SSi_3$ 398.74 152-4° / 0.4 1.034 1.445^{25}
Surfactant
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[502925-36-2] HMIS: 2-1-0-X 25g ¥20,400

BIS(TRIMETHYLSILOXY)VINYLMETHYLSILANE - see SIV9082.0 VINYLMETHYLBIS(TRIMETHYLSILOXY)SILANE

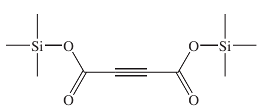


SIB1846.0
N,O-BIS(TRIMETHYLSILYL)ACETAMIDE
BSA
$C_8H_{21}NOSi_2$ 203.43 71-3° / 35 (-24°) 0.832 1.418
Flashpoint: 42°C (108°F)
TOXICITY: oral rat, LD50: 1,580 mg/kg
COMMERCIAL

Versatile blocking agent
Review of synthetic utility.[1]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 58-72.
F&F: Vol. 13, p 34; Vol. 16, p 285; Vol. 20, p 50; Vol. 21, p 62.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[10416-59-8] (既) 2-3273 TSCA EC 233-892-7 HMIS: 3-2-1-X 25g ¥8,200 100g ¥18,800 2kg ¥156,000

SIB1850.0
BIS(TRIMETHYLSILYL)ACETYLENE
$C_8H_{18}Si_2$ 170.40 133-5° (22°) 0.770 1.413
Flashpoint: 2°C (36°F)

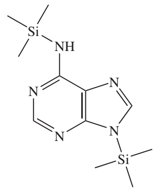
Versatile reagent for introducing unsaturation
Key reviews.[1,2,3]
Used to prepare 1,2-bis(aryl)acetylenes.[3]
Reacts with internal acetylenes to form 1,2,4,5-tetrasubstituted benzenes.[4]
Useful in silicon-mediated Sonogashira cross-coupling reactions.[5]
Used to prepare 4-alkynylthiazoles.[6]
1. Weber, W. In *Silicon Reagents for Organic Synthesis;* Springer-Verlag: 1983, p129.
2. Vollhardt, P. *Acc. Chem. Res.* **1977**, *10*, 1.
3. Nishihara, Y. et al. *J. Org. Chem.* **2000**, *65*, 1780.
4. Li, S. et al. *Org. Lett.* **2009**, *11*, 3318.
5. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
6. Arunkukmar, K. et al. *Tetrahedron Lett.* **2012**, *53*, 3885.
F&F: Vol. 4, p 42; Vol. 5, p 44; Vol. 8, p 146; Vol.9, p 142; Vol. 10, p 126; Vol. 10, p 126; Vol. 13, p 97, p 309; Vol. 14, p 116.
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[14630-40-1] TSCA EC 238-671-9 HMIS: 2-4-1-X 10g ¥13,500 50g ¥43,800



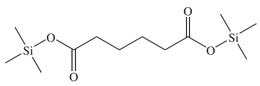
SIB1852.0
BIS(TRIMETHYLSILYL)ACETYLENEDICARBOXYLATE
$C_{10}H_{18}O_4Si_2$ 258.42 78-80° / 0.05 0.988 1.4390
Flashpoint: 67°C (153°F)

Synthetic intermediate with readily cleavable silyl groups.[1]
1. Verboom, W. et al. *Synthesis* **1981**, 807.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[76734-92-4] HMIS: 3-2-1-X 10g ¥42,700

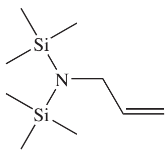
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIB1852.3
N-6,9-BIS(TRIMETHYLSILYL)ADENINE
$C_{11}H_{21}N_5Si_2$ — 279.49 — 124° / 0.25 — (87°)
Flashpoint: 110°C (230°F)
See also SIB1857.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17995-04-9] TSCA EC 241-911-5 HMIS: 1-1-0-X 5g ¥39,500

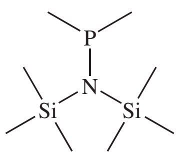


SIB1852.6
BIS(TRIMETHYLSILYL) ADIPATE
$C_{12}H_{26}O_4Si_2$ — 290.51 — 134-6° / 12 — 0.948 — 1.4275
Flashpoint: 75°C (167°F)
Intermediate for polyamide synthesis
See also SIB1862.0, SIB1870.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18105-31-2] TSCA EC 242-002-6 HMIS: 2-2-0-X 100g ¥27,100

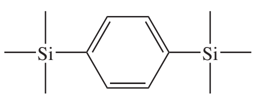


SIB1852.7
N,N-BIS(TRIMETHYLSILYL)ALLYLAMINE
$C_9H_{23}NSi_2$ — 201.46 — 72° / 15 — 0.817 — 1.440
Flashpoint: 43°C (109°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7688-51-9] EC 231-699-2 HMIS: 4-3-1-X 25g ¥51,200

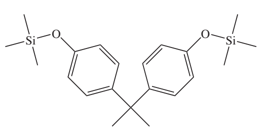
BIS(TRIMETHYLSILYLAMINE - see SIH6110.0 HEXAMETHYLDISILAZANE



SIB1852.8
BIS(TRIMETHYLSILYL)AMINODIMETHYLPHOSPHINE
$C_8H_{24}NPSi_2$ — 221.43 — 55-60° / 0.4
Intermediate for polydimethylphosphazenes.[1]
1. Neilson, R. et al. *Inorg. Chem.* **1982,** *21*, 3568.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[63744-11-6] HMIS: 3-2-1-X 10g ¥46,900

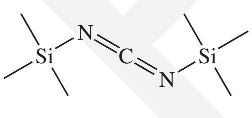


SIB1853.0
1,4-BIS(TRIMETHYLSILYL)BENZENE
$C_{12}H_{22}Si_2$ — 222.48 — 194-5° — (92-4°)
Flashpoint: 175°C (347°F)
Undergoes electrophilic substitutions of the aryl-Si bond
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[13183-70-5] HMIS: 2-1-0-X 50g ¥36,300



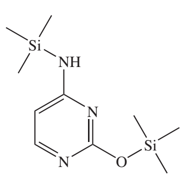
SIB1853.5
BIS(TRIMETHYLSILYL)BISPHENOL A
4,4'-ISOPROPYLIDENEBIS(TRIMETHYLSILOXYPHENOL)
$C_{21}H_{32}O_2Si_2$ — 372.65 — 179° / 1.5 — 1.004 — 1.5178
Monomer for substitution polymerization with fluoroaromatics (byproduct Me_3SiF).[1,2,3]
1. Kricheldorf, H. et al. *J. Polym. Sci., Polym. Chem. Ed.* **1983,** *21*, 2283.
2. Takekoshi, T. et al. *J. Polym. Sci., Part A: Polym. Chem.* **1997,** *35*, 759.
3. Herbert, C. et al. *Macromolecules* **1996,** *29*, 7709.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4387-16-0] HMIS: 2-2-1-X 100g ¥34,500

SIB1854.0
BIS(TRIMETHYLSILYL)BUTADIYNE
$C_{10}H_{18}Si_2$ — 194.42 — (107-9°)
Stable crystalline form of butadiyne; synthon for heterocycles.[1]
Used to prepare multidentate 1,2,3-triazole chelate ligands.[2]
Undergoes 6+2 cycloaddition with cycloheptatriene.[3]
1. Jacobs, P. M. et al. *Heterocycl. Chem.* **1977,** *14*, 1115.
2. Fuller, T. J. et al. *Organometallics* **2008**, *27*, 5430.
3. Hilt, G. et al. *Synthesis* **2009**, 3305.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[4526-07-2] HMIS: 2-3-1-X 10g ¥33,700



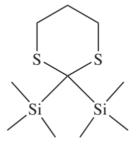
SIB1856.0
BIS(TRIMETHYLSILYL)CARBODIIMIDE
$C_7H_{18}N_2Si_2$ — 186.40 — 164° — (-23°) — 0.821 — 1.4351
Dipole moment: 1.48 debye
Flashpoint: 42°C (108°F)
Highly reactive equivalent of cyanamide; converts quinones to dicyanoquinodiimines.[1]
Trans-silylation reaction with methyltrichlorosilane yields Si-C-N ceramic intermediate.[2]
1. Aumüller, A. et al. *Angew. Chem.* **1984,** *96*, 437.
2. Gabriel, A. et al. *Chem. Mater.* **1999,** *11*, 412.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[1000-70-0] TSCA EC 213-673-2 HMIS: 3-2-1-X 25g ¥34,200

BIS(TRIMETHYLSILY)CHLOROMETHANE - see SIB1864.0 BIS(TRIMETHYLSILYL)METHYL CHLORIDE



SIB1857.0
BIS(TRIMETHYLSILYL)CYTOSINE
$C_{10}H_{21}N_3OSi_2$ — 255.47 — 123° / 18 — (122°)
UV max, Bu_2O: 306, 275, 236.5 nm
Flashpoint: 65°C (149°F)
See also SIB1858.6, SIB1873.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18037-10-0] TSCA EC 241-945-0 HMIS: 2-2-0-X 5g ¥35,300

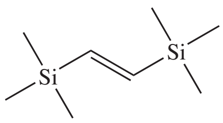
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIB1857.7
2,2-BIS(TRIMETHYLSILYL)-1,3-DITHIANE

$C_{10}H_{24}S_2Si_2$	264.60	97-9° / 0.5	(29-31°)		

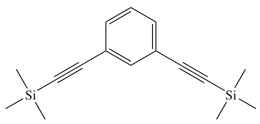
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13411-46-6] HMIS: 3-2-1-X 5g ¥20,400



SIB1857.9
1,2-BIS(TRIMETHYLSILYL)ETHYLENE, 90%

$C_8H_{20}Si_2$	172.42	156-8°	(-18°)	0.759	1.4374

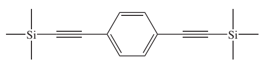
Primarily trans isomer
Reacts w/aryl iodides to form (E)-β-trimethylsilylstyrenes.[1]
1. Karabelas, K.; Hallberg, A. *J. Org. Chem.* **1989**, *54*, 1773.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[1473-61-6]/[18178-60-4] HMIS: 2-4-0-X 10g ¥50,100



SIB1858.0
1,3-BIS[(TRIMETHYLSILYL)ETHYNYL]BENZENE

$C_{16}H_{22}Si_2$	270.52		(57-9°)		

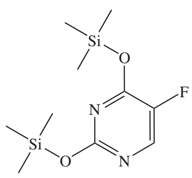
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[38170-80-8] HMIS: 3-3-0-X store <5°C 5g ¥25,200



SIB1858.2
1,4-BIS[(TRIMETHYLSILYL)ETHYNYL]BENZENE

$C_{16}H_{22}Si_2$	270.52		(119-121°)		

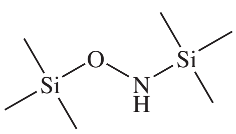
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[19938-13-5] HMIS: 3-3-0-X 5g ¥28,900



SIB1858.6
BIS(TRIMETHYLSILYL)-5-FLUOROURACIL
2,4-BIS(TRIMETHYLSILOXY)-5-FLUOROURACIL

$C_{10}H_{19}FN_2O_2Si_2$	274.44	114° / 14 Flashpoint: 43°C (109°F)		1.050	1.4590

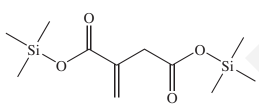
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17242-85-2] HMIS: 3-3-1-X 2.5g ¥36,300



SIB1859.0
N,O-BIS(TRIMETHYLSILYL)HYDROXYLAMINE

$C_6H_{19}NOSi_2$	177.40	78-9° / 100 Flashpoint: 28°C (82°F)		0.830	1.4110

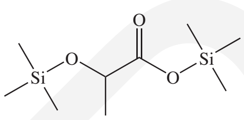
Review of synthetic utility.[1]
Lithiated derivative reacts w/ aldehydes and ketones to give hydroxyimines.[2,3]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 75-76.
2. King, F. D. et al. *J. Chem. Soc., Chem. Commun.* **1978**, 351.
3. Hoffmann, R. V.; Buntain, G. A. *Synthesis*, **1987**, 831.
F&F: Vol. 6, p 58.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[22737-37-7] EC 245-188-7 HMIS: 2-3-1-X 10g ¥38,500



SIB1860.0
BIS(TRIMETHYLSILYL) ITACONATE
BIS(TRIMETHYLSILYL)-2-METHYLENEBUTANEDIONATE

$C_{11}H_{22}O_4Si_2$	274.46	70° / 0.025		0.964	1.4339

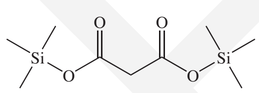
Hydrocarbon soluble
Copolymerizes with styrene and acrylates
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[55494-04-7] HMIS: 2-2-1-X 25g ¥16,400 100g ¥45,900



SIB1861.0
O,O-BIS(TRIMETHYLSILYL) LACTATE

$C_9H_{22}O_3Si_2$	234.45	200°		0.9	1.4053

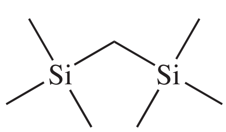
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17596-96-2] HMIS: 2-2-1-X 10g ¥26,800



SIB1862.0
BIS(TRIMETHYLSILYL) MALONATE

$C_9H_{20}O_4Si_2$	248.43	63-6° / 1 Flashpoint: 28°C (82°F)		0.9702	1.4160

Reagent for the preparation of β-ketoacids.[1]
1. Schmidt, V. et al. *Monatsh. Chem.* **1967**, *98*, 1492.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18457-04-0] EC 242-342-5 HMIS: 2-3-1-X 10g ¥19,400

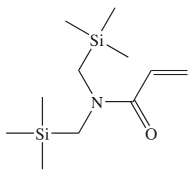


SIB1863.0
BIS(TRIMETHYLSILYL)METHANE

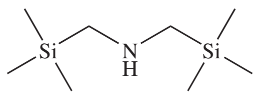
$C_7H_{20}Si_2$	160.41	132-3° Flashpoint: 12°C (54°F) Critical temperature: 301˚C Critical pressure: 1.99 mPa	(-71°)	0.752	1.4170

ΔHvap: 38.5 kJ/mole
Surface tension: 18.9 mN/m
Exhibits very high excess electron mobility: 63 cm²/V s.[1]
For synthesis of silylated olefins by Peterson olefination of aldehydes and ketones.[2]
1. Holroyd, R. et al. *Nucl. Instrum. Methods Phys. Res., Sect. A* **1997,** *390*, 233.
2. Carter, M. et al. *J. Chem. Soc., Chem. Commun.* **1976,** 679.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[2117-28-4] TSCA EC 218-322-7 HMIS: 2-4-0-X 10g ¥20,400 50g ¥71,300

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

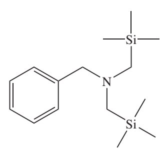


SIB1863.2
N,N-BIS(TRIMETHYLSILYLMETHYL)ACRYLAMIDE
$C_{11}H_{25}NOSi_2$ — Mw 243.50
Inhibited with MEHQ
Analog of N-ISOPROPYLACRYLAMIDE, monomer for hydrogels
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
HMIS: 3-2-0-X store <5°C — 5g ¥69,200

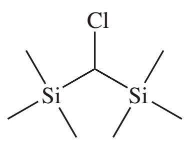


SIB1863.3
BIS(TRIMETHYLSILYLMETHYL)AMINE
2,2,6,6-TETRAMETHYL-4-AZA-2,6-DISILAHEPTANE
$C_8H_{23}NSi_2$ — Mw 189.45 — bp 171° — D_4^{20} 0.7864 — n_D^{20} 1.4267
Opens epoxides with high regioselectivity.[1]
Forms imine with formaldehyde that does not readily trimerize.[2] This aldimine can be used to form β-lactams.[3,4]
Reacts with ketones for form imines with (E)-isomer selectivity.[5]
1. Constantieux, T. et al. *Synlett* **1998,** 510.
2. Capperucci, A. et al. *J. Organomet. Chem.* **1993,** *458*, C1.
3. Palomo, C. et al. *Ang. Chem., Int. Ed. Engl.* **1996,** *35*, 1239.
4. Palomo, C. et al. *J. Chem. Soc., Chem. Commun.* **1997,** 233.
5. Palomo, C. et al. *J. Org. Chem.* **1997,** *62*, 2070.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[17882-91-6] — HMIS: 2-3-0-X — 5g ¥27,800

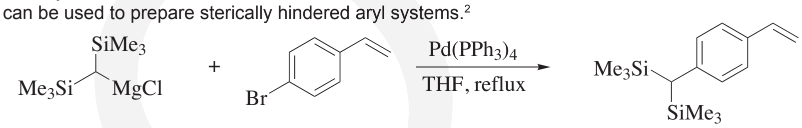
BIS(TRIMETHYLSILYL)METHYLAMINE - see SIH5843.0 HEPTAMETHYLTRISILAZANE



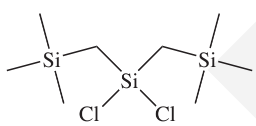
SIB1863.7
BIS(TRIMETHYLSILYLMETHYL)BENZYLAMINE
$C_{15}H_{29}NSi_2$ — Mw 279.57 — bp 120-5° / 7 — D_4^{20} 0.877
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[144964-17-0] — HMIS: 2-2-0-X — 10g ¥19,400



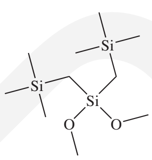
SIB1864.0
BIS(TRIMETHYLSILYL)METHYL CHLORIDE
2,2,4,4-TETRAMETHYL-3-CHLORO-2,4-DISILAPENTANE
$C_7H_{19}ClSi_2$ — Mw 194.86 — bp 72-3° / 22 — D_4^{20} 0.892 — n_D^{20} 1.4490
Flashpoint: 48°C (118°F)
Review of synthetic utility.[1]
Grignard reagent can be used to prepare sterically hindered aryl systems.[2]



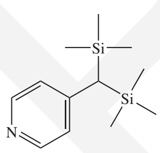
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 461-463.
2. Fukukawa, K.-A. et al. *Macromolecules,* **2005**, *38*, 263.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[5926-35-2] — HMIS: 2-2-0-X — 5g ¥21,500



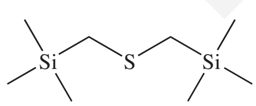
SIB1865.0
BIS(TRIMETHYLSILYLMETHYL)DICHLOROSILANE
$C_8H_{22}Cl_2Si_3$ — Mw 274.43 — bp 112-5° / 9 — D_4^{20} 0.96
Polycarbosilane intermediate
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18420-19-4] — HMIS: 3-2-1-X — 5g ¥26,000



SIB1866.0
BIS(TRIMETHYLSILYLMETHYL)DIMETHOXYSILANE
$C_{10}H_{28}O_2Si_3$ — Mw 264.59 — bp 67-8° / 1.5
Polycarbosilane intermediate
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[133941-26-1] — HMIS: 3-1-1-X — 5g ¥30,000



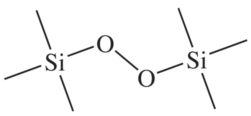
SIB1866.6
4-[BIS(TRIMETHYLSILYL)METHYL]PYRIDINE
$C_{12}H_{23}NSi_2$ — Mw 237.49
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[138761-45-2] — HMIS: 2-2-0-X — 5g ¥68,700



SIB1867.0
BIS(TRIMETHYLSILYLMETHYL)SULFIDE
$C_8H_{22}SSi_2$ — Mw 206.50 — bp 88° / 21 — D_4^{20} 0.844 — n_D^{20} 1.457
Flashpoint: 65°C (149°F)
Intermediate for synthesis of 3,4-bis(trimethylsilyl)thiophene.[1]
Synthetic equivalent of (methylthio)methyl anion in fluoride-promoted reactions.[2]
1. Ye, X. et al. *J. Org. Chem.* **1997,** *62*, 1940.
2. Hosomi, A. et al. *Synlett* **1991**, 557.
See also SIB1872.0, SIH6116.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[4712-51-0] — HMIS: 3-2-1-X — 5g ¥36,300

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

SIB1868.0
BIS(TRIMETHYLSILYL)PEROXIDE
HEXAMETHYLDISILPEROXANE



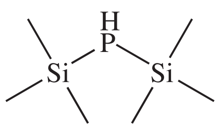
$C_6H_{18}O_2Si_2$ 178.38 35° / 35 (>135° dec.) 0.829

TRANSFER ONLY WITH PLASTIC ORGANIC-BASED PIPETTES - DECOMPOSES >135°
Detonations reported during transfers w/ metal hypodermic needles.
Activation energy for homolytic cleavage: 134 kJ/mole Flashpoint: >100°C (>212°F)
Key reviews.[1,2]
Reagent for Bayer-Villiger oxidation of ketones.[4]
Epoxidizes olefins with methyltrioxorhenium.[5]
With NaH converts benzylic nitro compounds to corresponding carbonyls.[6]
Oxidizes pyridines to pyridine-n-oxides in presence of Rhenium catalyst.[7]

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 79-81.
2. Ricci, A. et al. in *Advances in Silicon Chemistry;* Larson, G., Ed.; JAI Press: Greenwich, Co,1996; 3, p 63.
3. Davies, A. G. *Tetrahedron* **2007**, *63*, 10385.
4. Suzuki, M. et al. *J. Org. Chem.* **1982,** *47*, 902.
5. Fenelli, S. U.S. Patent 5,633,391, 1997.
6. Snaki, S. et al. *Synth. Commun.* **1999,** *29*, 4321.
7. Copéret, C. et al. *Tetrahedron Lett.* **1998,** *39*, 761.

F&F: Vol. 15, p 41; Vol. 16, p 43; Vol. 20, p 51; Vol. 21, p 63, p 166.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5796-98-5] HMIS: 3-3-2-X store <5°C 10g ¥26,300

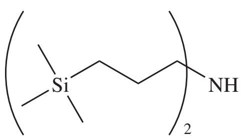
SIB1868.6
BIS(TRIMETHYLSILYL)PHOSPHINE



$C_6H_{19}PSi_2$ 178.36 60° / 16 (-38°) 0.819

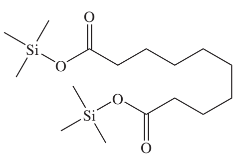
AIR TRANSPORT FORBIDDEN
Flashpoint: 17°C (63°F)
HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required
[15573-39-4] HMIS: 4-4-1-X 10g inquire
** includes zCYL-G-0025 mini-cylinder*

SIB1869.5
BIS(3-TRIMETHYLSILYLPROPYL)AMINE



$C_{12}H_{31}NSi_2$ 245.56 0.805 1.4431
Forms cationic surfactants
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[31024-65-4] HMIS: 3-2-0-X 5g ¥42,700

SIB1870.0
BIS(TRIMETHYLSILYL) SEBACATE

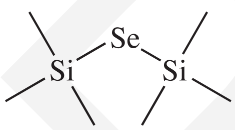


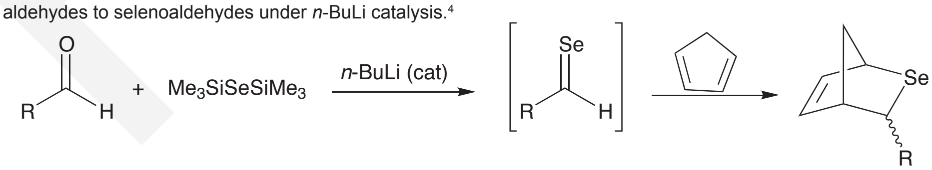
$C_{16}H_{34}O_4Si_2$ 346.61 143° / 1 0.925 1.4342
Flashpoint: 105°C (221°F)
Reacts with bis(acyl chlorides) to form polyanhydrides.[1]

1. Kricheldorf, H. et al. *Makromol. Chem., Rapid Commun.* **1990,** *11*, 83.

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18408-42-9] HMIS: 2-1-1-X 25g ¥14,600 100g ¥35,300

SIB1871.0
BIS(TRIMETHYLSILYL)SELENIDE
$C_6H_{18}SeSi_2$ 毒物 225.34 58-9° / 11 (-7°) 0.90 1.481
Review of synthetic utility.[1]
Intermediate for preparation of CdSe quantum dots.[2]
Forms luminescent red I-III-IV quantum dots.[3]
Converts aldehydes to selenoaldehydes under *n*-BuLi catalysis.[4]



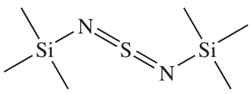


1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 82-83.
2. Murray, C. et al. *J. Am. Chem. Soc.* **1993**, *115*, 8706.
3. Allen, P. et al. *J. Am. Chem. Soc.* **2008**, *139*, 9240.
4. Segi, M. et al. *J. Am. Chem. Soc.* **1988**, *110*, 1976.

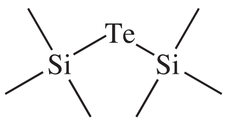
See also SIH6116.0, SIB1873.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4099-46-1] HMIS: 4-3-1-X 1.0g ¥86,700* 5g ¥167,000*
** includes zCYL-HPS-0010 cylinder*

BIS(TRIMETHYLSILYL)SULFIDE - see SIH6116.0 HEXAMETHYLDISILTHIANE

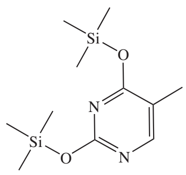
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



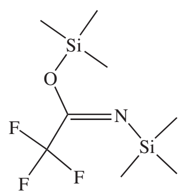
SIB1872.0
BIS(TRIMETHYLSILYL)SULFUR DIIMIDE, 95%
$C_6H_{18}N_2SSi_2$ — Mw 206.46 — bp 59-61° / 12 — D_4^{20} 0.877 — n_D^{20} 1.4540
Flashpoint: 45°C (113°F)
Useful for the preparation of "molecular wire" - acyclic azathienes.[1]
1. Zibarev, A. et al. *Heteroat. Chem.* **1990,** *1*, 443.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18156-25-7] HMIS: 2-2-1-X 5g ¥26,300



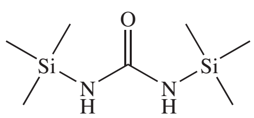
SIB1873.0
BIS(TRIMETHYLSILYL)TELLURIDE
HEXAMETHYLDISILATELLURANE
$C_6H_{18}Si_2Te$ — Mw 273.98 — bp 74° / 11 — mp (13-4°) — D_4^{20} 0.97
Intermediate for CdTe quantum dots
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4551-16-0] HMIS: 4-2-1-X 2.5g ¥88,300



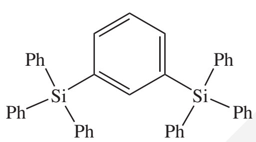
SIB1873.4
O,O'-BIS(TRIMETHYLSILYL)THYMINE
$C_{11}H_{22}N_2O_2Si_2$ — Mw 270.48 — bp 125-9° / 15 — mp (73-5°)
Intermediate for preparation of nucleosides
See also SIB1857.0, SIB1858.6
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[7288-28-0] TSCA HMIS: 2-2-1-X 1.0g ¥16,400



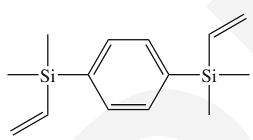
SIB1876.0 *COMMERCIAL*
N,O-BIS(TRIMETHYLSILYL)TRIFLUOROACETAMIDE
BSTFA
$C_8H_{18}F_3NOSi_2$ — Mw 257.40 — bp 45-50° / 15 — mp (-10°) — D_4^{20} 0.969 — n_D^{20} 1.3840
Flashpoint: 24°C (75°F)
Silylation reagent for preparing derivatives of amino acids.[1]
1. Stalling, D. et al. *Biochem. Biophys., Res. Comm.* **1968,** *31*, 616.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[25561-30-2] (既) 2-3613 TSCA EC 247-103-9 HMIS: 3-3-1-X 25g ¥18,800 100g ¥53,300 2kg ¥275,000



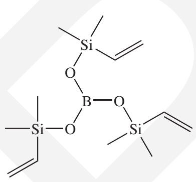
SIB1878.0 *COMMERCIAL*
N,N'-BIS(TRIMETHYLSILYL)UREA
BSU
$C_7H_{20}N_2OSi_2$ — Mw 204.42 — mp (222-4°)
Silylation reagent with solid byproduct
F&F: Vol. 16, p 82.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18297-63-7] (既) 2-3250 TSCA EC 242-177-9 HMIS: 2-2-1-X 50g ¥4,500 250g ¥19,800 10kg ¥245,000



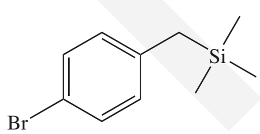
SIB1878.2
m-BIS(TRIPHENYLSILYL)BENZENE
$C_{42}H_{34}Si_2$ — Mw 594.90 — mp (237-240°)
Fluorescence max: 350-375; phosphorescence max: 450
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[18920-16-6] HMIS: 1-1-0-X 1.0g ¥72,400



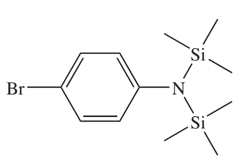
SIB1878.4
1,4-BIS(VINYLDIMETHYLSILYL)BENZENE
$C_{14}H_{22}Si_2$ — Mw 246.50 — bp 92° / 3 — D_4^{20} 0.912 — n_D^{20} 1.5120
Forms polycarbosilane polymers by reaction with dihydride functional silanes in presence of Pt
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[4519-17-9] HMIS: 2-2-1-X 25g ¥51,200



AKB159.5
BORON VINYLDIMETHYLSILOXIDE
TRIS(VINYLDIMETHYLSILYL)BORATE
$C_{12}H_{27}BO_3Si_3$ — Mw 314.41 — bp 78° / 15 — D_4^{20} 0.872 — n_D^{20} 1.4163
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[383189-04-6] HMIS: 2-2-1-X 10g ¥22,300

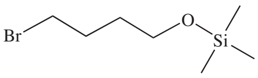


SIB1878.6
(4-BROMOBENZYL)TRIMETHYLSILANE
$C_{10}H_{15}BrSi$ — Mw 243.22 — D_4^{20} 1.190 — n_D^{20} 1.531
Flashpoint: 114°C (237°F)
Reagent for preparing polymer-bound, fluoride-labile benzydryl crosslinkers.[1]
1. Routledge, A. et al. *Tetrahedron Lett.* **1998**, *38*, 8287.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[17095-20-4] HMIS: 2-2-0-X 5g ¥61,800

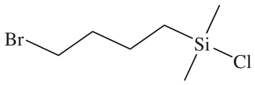


SIB1879.0
4-BROMO-N,N-BIS(TRIMETHYLSILYL)ANILINE
$C_{12}H_{22}BrNSi_2$ — Mw 316.40 — bp 141-2° / 12 — D_4^{20} 1.121 — n_D^{20} 1.514
Flashpoint: >110°C (>230°F)
See also SIC2264.8
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[5089-33-8] HMIS: 3-1-1-X 25g ¥42,700

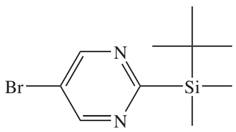
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



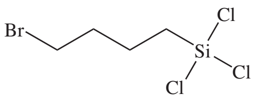
SIB1879.1
4-BROMOBUTOXYTRIMETHYLSILANE
$C_7H_{17}BrOSi$ 225.20 82-4° / 12 1.175 1.4590
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18292-36-9] HMIS: 3-3-1-X 5g ¥26,800



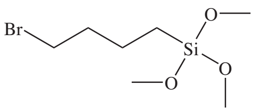
SIB1879.2
4-BROMOBUTYLDIMETHYLCHLOROSILANE
$C_6H_{14}BrClSi$ 229.62 90-5° / 7.5 1.242
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[52112-26-2] HMIS: 3-2-1-X 10g ¥48,000



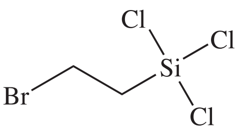
SIB1879.5
5-BROMO-2-(t-BUTYLDIMETHYLSILYL)PYRIMIDINE
$C_{10}H_{17}BrN_2Si$ 273.25 1.232 1.509
HYDROLYTIC SENSITIVITY: 6: forms irreversible hydrate
[121519-00-4] HMIS: 2-1-1-X 1.0g ¥32,400



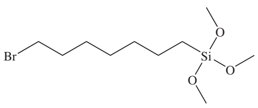
SIB1879.6
4-BROMOBUTYLTRICHLOROSILANE
$C_4H_8BrCl_3Si$ 270.45 51-2° / 0.5 1.524
See also SIB1906.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[69858-29-3] HMIS: 3-1-1-X 10g ¥28,900



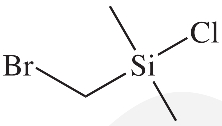
SIB1879.7
4-BROMOBUTYLTRIMETHOXYSILANE
$C_7H_{17}BrO_3Si$ 257.20 68-9° / 1 1.259 1.4437
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[226558-82-3] HMIS: 3-2-1-X 10g ¥32,600



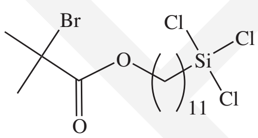
SIB1880.0
2-BROMOETHYLTRICHLOROSILANE, 95%
$C_2H_4BrCl_3Si$ 242.40 171-2° 1.669 1.4901
Flashpoint: 40°C (104°F)
Undergoes β-elimination at elevated temperature to form bromotrichlorosilane
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[63802-82-4] HMIS: 3-2-1-X 10g ¥14,600 50g ¥48,000



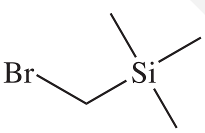
SIB1886.0
7-BROMOHEPTYLTRIMETHOXYSILANE
$C_{10}H_{23}BrO_3Si$ 299.28 83-5° / 1 1.1695^{25} 1.4493^{25}
See also SIB1909.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 10g ¥26,300



SIB1890.0
BROMOMETHYLDIMETHYLCHLOROSILANE
$C_3H_8BrClSi$ 187.54 130-1° 1.375 1.4650
Flashpoint: 41°C (106°F)
Precursor to various bromomethylsilanes and their Grignard or Li derivatives
Review of synthetic utility.[1]
Modifies ITO electrodes allowing bonding of polyvinylpyridine.[2]
Forms oxasilacycles via a silylation/free-radical addition sequence. The resulting oxasilacycles can be oxidized and desilylated to diols.[3]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 85-92.
2. Privman, M. et al. *J. Am. Chem. Soc.* **2009**, *131*, 1314.
3. Newlander, K. A. et al. *J. Org. Chem.* **1997**, *62*, 6726.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[16532-02-8] TSCA EC 240-601-7 HMIS: 3-2-1-X 25g ¥20,400 100g ¥58,600

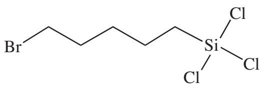


SIB1891.6
[11-(2-BROMO-2-METHYL)PROPIONYLOXY]UNDECYLTRICHLOROSILANE
$C_{15}H_{28}BrCl_3O_2Si$ 454.75 168-9° / 0.3 1.221
Tethered initiator for ATRP on silicon surfaces.[1]
1. Matyjaszewski, K. et al. *Macromolecules* **1999**, *32*, 8716.
See also SIT8397.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[255727-67-4] HMIS: 3-1-1-X 1.0g ¥26,300

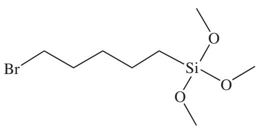


SIB1892.0
BROMOMETHYLTRIMETHYLSILANE
$C_4H_{11}BrSi$ 167.12 116-7° 1.170 1.4460
Flashpoint: 16°C (61°F)
Intermediate for trimethylsilylmethanethiol.[1]
1. Noller, D. et al. *J. Org. Chem.* **1952**, *17*, 1393.; F&F: Vol. 11, p 576.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18243-41-9] TSCA HMIS: 3-4-0-X 10g ¥30,500

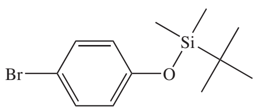
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



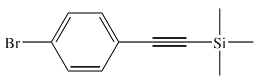
SIB1894.0
5-BROMOPENTYLTRICHLOROSILANE
$C_5H_{10}BrCl_3Si$ — Mw 284.48 — bp 81-4° / 5
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[174094-37-2] HMIS: 3-2-1-X 10g ¥32,600



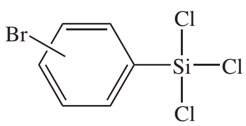
SIB1894.2
5-BROMOPENTYLTRIMETHOXYSILANE
$C_8H_{19}BrO_3Si$ — Mw 271.22 — bp 110° / 1 — D 1.222^{25} — n_D 1.446
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[773893-02-0] HMIS: 3-2-1-X 10g ¥28,900



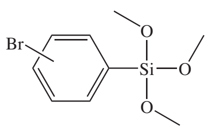
SIB1895.0
p-BROMOPHENOXY(t-BUTYL)DIMETHYLSILANE
$C_{12}H_{19}BrOSi$ — Mw 287.27 — bp 137° / 25 — D 1.175 — n_D 1.511
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[67963-68-2] HMIS: 3-2-1-X 5g ¥19,400



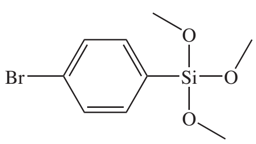
SIB1899.0
(4-BROMOPHENYLETHYNYL)TRIMETHYLSILANE
$C_{11}H_{13}BrSi$ — Mw 253.22 — bp 60-80° / 0.2 — mp (61-3°) — D 1.192
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[16116-78-2] HMIS: 2-2-0-X 10g ¥40,600



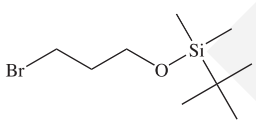
SIB1903.0
BROMOPHENYLTRICHLOROSILANE
$C_6H_4BrCl_3Si$ — Mw 290.45 — bp 106-8° / 6 — D 1.68 — n_D 1.567
Mixed isomers
Flashpoint: >110°C (>230°F)
Forms high refractive index resins
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[27752-77-8] HMIS: 3-1-1-X 25g ¥14,600



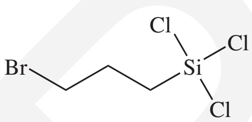
SIB1904.0
BROMOPHENYLTRIMETHOXYSILANE
$C_9H_{13}BrO_3Si$ — Mw 277.19 — bp 136° / 13.5 — D 1.632^{25} — n_D 1.539^{25}
Mixed isomers
Flashpoint: 105°C (221°F)
γc of treated surface: 43.5 mN/m
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17043-05-9] HMIS: 3-1-1-X 10g ¥14,600 50g ¥48,000



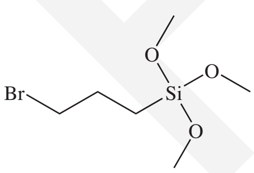
SIB1904.3
p-BROMOPHENYLTRIMETHOXYSILANE
$C_9H_{13}BrO_3Si$ — Mw 277.19 — bp 136° / 13.5 — D 1.632^{25} — n_D 1.539^{25}
Flashpoint: 105°C (221°F)
See also SIB1904.0, SIC2332.3
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17043-05-9] HMIS: 3-1-1-X 10g ¥24,100 50g ¥86,200



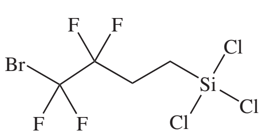
SIB1904.5
3-BROMOPROPOXY-t-BUTYLDIMETHYLSILANE
$C_9H_{21}BrOSi$ — Mw 253.25 — bp 182° — D 1.094 — n_D 1.451
Flashpoint: 85°C (185°F)
See also SIB1939.52, SIC2335.0, SII6400.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[89031-84-5] HMIS: 2-2-1-X 5g ¥24,700



SIB1905.0
3-BROMOPROPYLTRICHLOROSILANE
$C_3H_6BrCl_3Si$ — Mw 256.43 — bp 85-6° / 16 — D 1.618 — n_D 1.491
Flashpoint: 88°C (190°F)
Used in electrode modification
See also SIB1879.6, SIC2405.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13883-39-1] TSCA EC 237-650-1 HMIS: 3-2-1-X 25g ¥20,400 100g ¥58,600

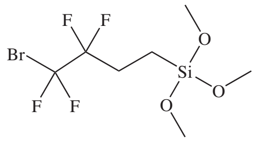


SIB1906.0
3-BROMOPROPYLTRIMETHOXYSILANE
$C_6H_{15}BrO_3Si$ — Mw 243.17 — bp 130° / 45 — D 1.293 — n_D 1.4400
Flashpoint: 82°C (180°F)
Forms self-assembled monolayers which can be modified with pyridine ligands.[1]
1. Paulson, S. et al. *J. Chem. Soc., Chem. Commun.* **1992,** *21*, 1615.
See also SIB1879.7
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[51826-90-5] (既) 2-2079 EC 257-453-4 HMIS: 2-2-1-X 10g ¥23,100



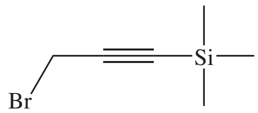
SIB1906.5
4-BROMO-3,3,4,4-TETRAFLUOROBUTYLTRICHLOROSILANE
$C_4H_4BrCl_3F_4Si$ — Mw 342.42
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X 5g ¥29,400

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

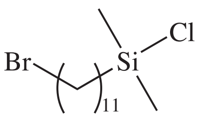


SIB1906.7
4-BROMO-3,3,4,4-TETRAFLUOROBUTYLTRIMETHOXYSILANE
$C_7H_{13}BrF_4O_3Si$ 329.17
Building block for functional silanes with fluorinated spacer
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 5g ¥28,900

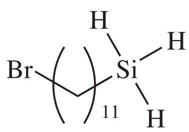
BROMOTRIMETHYLSILANE - see SIT8430.0 TRIMETHYLBROMOSILANE



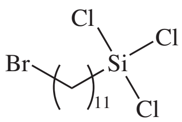
SIB1907.0
3-BROMO-1-(TRIMETHYLSILYL)-1-PROPYNE, 95%
$C_6H_{11}BrSi$ 191.15 44-5° / 2 1.351 1.4950
Flashpoint: 62°C (144°F)
Reagent for preparation of terminal conjugated enynes.[1]
Used to prepare homopropargylic and allenyl alcohols.[2]
1. Gibson, A. et al. *Synthesis* **1991,** *5*, 414.
2. Liu, M.-J.; Loh, T.-P. *J. Am. Chem. Soc.* **2003**, *125*, 13042.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[38002-45-8] HMIS: 3-2-1-X 5g ¥29,400



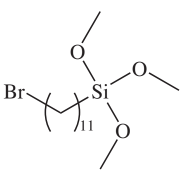
SIB1907.6
11-BROMOUNDECYLDIMETHYLCHLOROSILANE, 95%
$C_{13}H_{28}BrClSi$ 327.80 170° / 1 1.03
Contains undecyldimethylchlorosilane
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[330457-42-6] HMIS: 3-1-1-X 10g ¥24,100



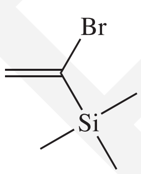
SIB1907.8
11-BROMOUNDECYLSILANE
$C_{11}H_{25}BrSi$ 265.31 100-2° / 0.5 1.02
Forms SAMs on titanium, gold and silicon surfaces.[1]
1. Arkles, B. et al. *J. Adhes. Sci. Technol.* **2012***, 26*, 41.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[469904-33-4] HMIS: 2-3-1-X 5g ¥42,200



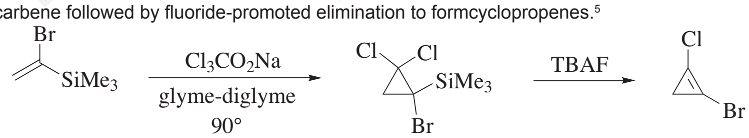
SIB1908.0
11-BROMOUNDECYLTRICHLOROSILANE, 95%
$C_{11}H_{22}BrCl_3Si$ 368.64 172° / 1 1.26
Contains undecyltrichlorosilane
Treated surface contact angle, water: 91°
Self-assembled monolayers attach/orient polymer films.[1]
1. Menzel, H. et al. *Gummi. Fasern. Kunstst.* **1997,** *50*, 288.
See also SIB1909.0, SIC2427.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[79769-48-5] HMIS: 3-1-1-X 10g ¥22,500



SIB1909.0
11-BROMOUNDECYLTRIMETHOXYSILANE, 95%
$C_{14}H_{31}BrO_3Si$ 355.39 158° / 0.8 1.119 1.4559
Contains undecyltrimethoxysilane
See also SIB1886.0, SIC2429.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17947-99-8] HMIS: 2-1-0-X 10g ¥24,700

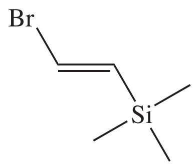


SIB1910.0
1-BROMOVINYLTRIMETHYLSILANE
$C_5H_{11}BrSi$ 179.13 55-7° / 80 1.163 1.458
Flashpoint: 15°C (59°F)
Employed in cyclopentene annulations
Review of synthetic utility.[1]
Starting material for preparation of α-trimethylsilylvinylketone.[2]
Starting material for preparation of trisubstituted olefins.[3]
Potential for cross-coupling protocols to yield α-substituted vinylsilanes.[4]
Reacts with dichlorocarbene followed by fluoride-promoted elimination to formcyclopropenes.[5]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 109-110.
2. Stork, G. et al. *J. Am. Chem. Soc.* **1973,** *95*, 6152.
3. Miller, R. et al. *J. Org. Chem.* **1979,** *44*, 4623.
4. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
5. Billups, W. E. et al. *Tetrahedron Lett.* **1984***, 25*, 3935.
F&F: Vol. 7, p 193; Vol. 8, p 56, p 515; Vol. 9, p 56; Vol. 10, p 442; Vol. 11, p 286.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[13683-41-5] EC 237-195-9 HMIS: 2-4-1-X 5g ¥36,900

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

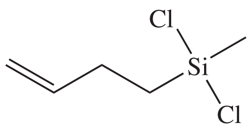


SIB1910.1
2-BROMOVINYLTRIMETHYLSILANE
2-(TRIMETHYLSILYL)VINYLBROMIDE

$C_5H_{11}BrSi$	179.13	50-1° / 52		1.167	1.467

Contains 10-15% cis-isomer — Flashpoint: 29°C (84°F)
Slowly decomposes above 60° yielding ethylene
Potential for cross-coupling protocols to yield β-substituted vinylsilanes.[1]
1. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
F&F: Vol. 11, p 82.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[41309-43-7] HMIS: 2-3-1-X 5g ¥26,800

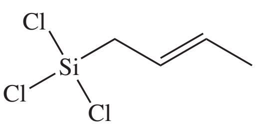
BSA - see SIB1846.0 N,O-BIS(TRIMETHYLSILYL)ACETAMIDE



SIB1926.0
3-BUTENYLMETHYLDICHLOROSILANE

$C_5H_{10}Cl_2Si$	169.13	143-5°		1.05	1.4495

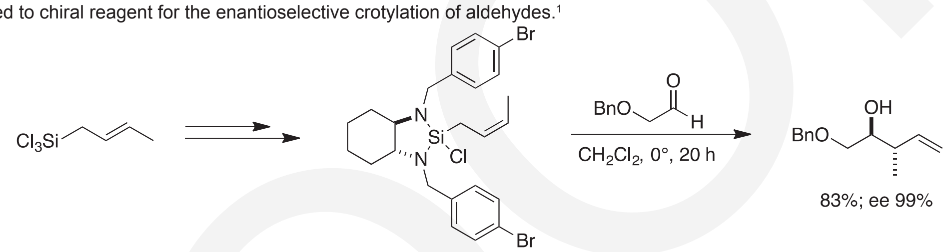
Mixed isomers - primarily internal cis/trans
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[15983-86-5] HMIS: 3-3-1-X 10g ¥19,400



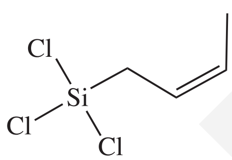
SIB1927.2
(E)-2-BUTENYLTRICHLOROSILANE
(E)-CROTYLTRICHLOROSILANE

$C_4H_7Cl_3Si$	189.54	142°		1.20	1.455

Converted to chiral reagent for the enantioselective crotylation of aldehydes.[1]



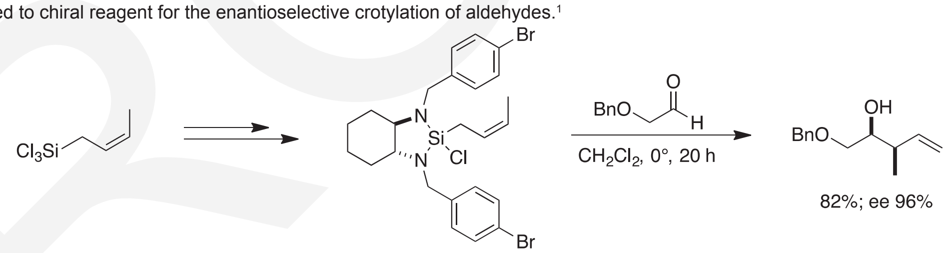
1. Kim, H.; Ho, S.; Leighton, J. L. *J. Am. Chem. Soc.* **2011**, *133*, 6517.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[52885-13-9] HMIS: 3-3-1-X 2.5g ¥78,800



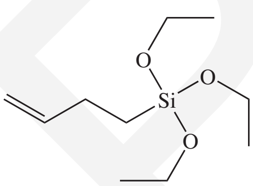
SIB1927.4
(Z)-2-BUTENYLTRICHLOROSILANE
(Z)-CROTYLTRICHLOROSILANE

$C_4H_7Cl_3Si$	189.54	142°		1.20	1.455

Converted to chiral reagent for the enantioselective crotylation of aldehydes.[1]



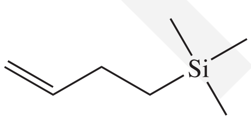
1. Kim, H.; Ho, S.; Leighton, J. L. *J. Am. Chem. Soc.* **2011**, *133*, 6517.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[49749-84-0] HMIS: 3-3-1-X 2.5g ¥78,800



SIB1928.0
3-BUTENYLTRIETHOXYSILANE, 95%

$C_{10}H_{22}O_3Si$	218.37	64° / 6	(-80°)	0.90	

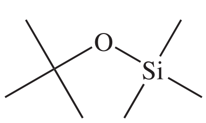
Mixed isomers (mainly 3-butenyl) — Flashpoint: 73°C (163°F)
TOXICITY: oral rat, LD50: >5,000 mg/kg
See also SIA0525.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[57813-67-9] HMIS: 2-2-1-X 25g ¥36,300



SIB1930.0
3-BUTENYLTRIMETHYLSILANE

$C_7H_{16}Si$	128.29	112-3°		0.73	1.4102^{27}

Homoallylic silane
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[763-13-3] HMIS: 2-4-0-X 10g ¥25,700 50g ¥92,600

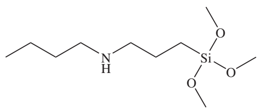


SIB1932.0
t-BUTOXYTRIMETHYLSILANE

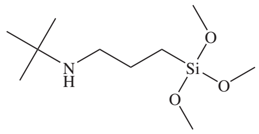
$C_7H_{18}OSi$	146.30	104°		0.761	1.3913

Flashpoint: 14°C (57°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13058-24-7] (既) 2-2052 HMIS: 2-4-1-X 25g ¥14,600

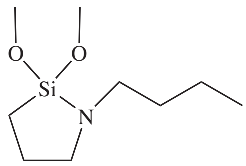
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



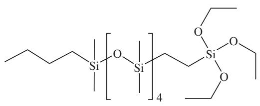
SIB1932.2
n-BUTYLAMINOPROPYLTRIMETHOXYSILANE
$C_{10}H_{25}NO_3Si$ 235.40 102° / 3.5 0.947 1.4246^{25}
Flashpoint: 110°C (230°F)
Reacts with isocyanate resins (urethanes) to form moisture cureable systems
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[31024-56-3] TSCA EC 250-437-8 HMIS: 2-1-1-X 25g ¥6,600 2kg ¥72,300 17kg ¥318,000
COMMERCIAL



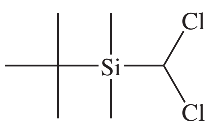
SIB1932.3
t-BUTYLAMINOPROPYLTRIMETHOXYSILANE
$C_{10}H_{25}NO_3Si$ 235.40 98-9° / 3 0.924 1.4208
See also SIC2464.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[174219-86-4] HMIS: 2-2-1-X 5g ¥29,400



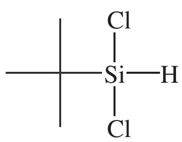
SIB1932.4
N-n-BUTYL-AZA-2,2-DIMETHOXYSILACYCLOPENTANE
$C_9H_{21}NO_2Si$ 203.36 63-71° / 3 0.941 1.438
Flashpoint: 85°C (185°F)
Coupling agent for nanoparticles.[1]
Interlayer bonding agent for anti-reflective lenses.[2]
1. Arkles, B. et al. In *Silanes and Other Coupling Agents;* Mittal, K., Ed.; 2004; Vol. 3, p.179.
2. Su, K. et al. U.S. Patent Appl. 2012 2672,790, 2012.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[618914-44-6] TSCA HMIS: 3-2-1-X 25g ¥22,500



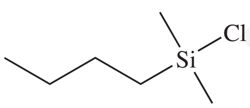
SIB1932.5
[2-(9-BUTYLDECAMETHYLPENTASILOXANYL)ETHYL]TRIETHOXYSILANE
$C_{22}H_{58}O_7Si_6$ 603.21 140-2° / 1 0.921 1.4157
Contains isomers
Phase collapse resistant bonded phase
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-2-1-X 10g ¥28,900



SIB1932.8
t-BUTYL(DICHLOROMETHYL)DIMETHYLSILANE
$C_7H_{16}Cl_2Si$ 199.20 70° / 20 (42-5°)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[138983-08-1] HMIS: 3-3-0-X store <5°C 2.5g ¥48,000

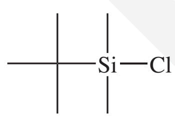


SIB1933.0
t-BUTYLDICHLOROSILANE
$C_4H_{10}Cl_2Si$ 157.11 108-9°
Flashpoint: 5°C (41°F)
Sterically hindered hydrosilylation reagent
See also SII6452.3, SIP6725.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[85121-42-2] HMIS: 3-4-1-X 5g ¥28,600

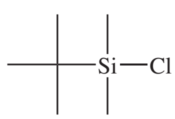


SIB1934.0
n-BUTYLDIMETHYLCHLOROSILANE
$C_6H_{15}ClSi$ 150.72 138° 0.8751 1.4205
Flashpoint: 39°C (102°F)
Forms bonded phases for HPLC
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1000-50-6] (既) 2-2041 TSCA HMIS: 3-2-1-X 25g ¥16,200 100g ¥44,800

SIB1935.0
t-BUTYLDIMETHYLCHLOROSILANE
$C_6H_{15}ClSi$ 150.72 124-6° (87-90°) 0.830
Vapor pressure, 100°: 476 mm
Flashpoint: 22°C (72°F)
Autoignition temperature: 405˚C
Silylation reagent - derivatives resistant to Grignards, alkyl lithium compounds, etc.
Blocking agent widely used in prostaglandin synthesis
F&F: Vol. 4, p 57, p 176; Vol. 5, p 74; Vol. 6, p 78; Vol. 8, p 58; Vol. 9, p 77; Vol. 10, p 62; Vol. 11, p 88; Vol. 12, p 83.
See also SIB1967.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18162-48-6] (既) 2-2041 TSCA EC 242-042-4 HMIS: 3-4-1-X 25g ¥8,300 100g ¥20,300 2kg ¥191,400
COMMERCIAL

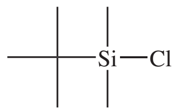


SIB1935.2
t-BUTYLDIMETHYLCHLOROSILANE, 1.0M in methylene chloride, 12.2-12.4% solution
$C_6H_{15}ClSi$ 150.72 124-6° 1.225
Flashpoint: 57°C (136°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18162-48-6] (既) 2-2041 TSCA EC 242-042-4 HMIS: 3-2-1-X 100g ¥17,800 2.5kg ¥116,100
COMMERCIAL

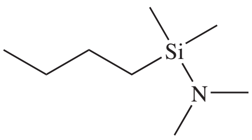


SIB1935.4
t-BUTYLDIMETHYLCHLOROSILANE, 3M in tetrahydrofuran, 51-52% solution
$C_6H_{15}ClSi$ 150.72 0.872
Flashpoint: -14°C (7°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18162-48-6] (既) 2-2041 TSCA EC 242-042-4 HMIS: 3-4-1-X 100g ¥18,600 2kg ¥99,900
COMMERCIAL

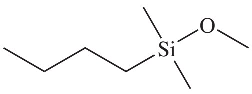
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



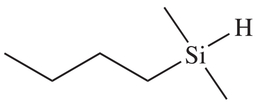
SIB1935.5 COMMERCIAL
t-BUTYLDIMETHYLCHLOROSILANE, 2.85M in toluene, 48-52% solution
$C_6H_{15}ClSi$ | 150.72 | | | 0.866 | 1.460
Flashpoint: 4°C (39°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18162-48-6] (既) 2-2041 TSCA EC 242-042-4 HMIS: 3-4-1-X | 100g ¥19,400 | 2kg ¥99,900



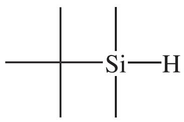
SIB1937.0
n-BUTYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_8H_{21}NSi$ | 159.35 | 47-9° / 12 | | 0.772 | 1.422
Flashpoint: 26°C (79°F)
Highly reactive reagent for bonded phases without acidic byproduct
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[181231-67-4] TSCA HMIS: 3-3-1-X | 10g ¥15,400 | 50g ¥53,800



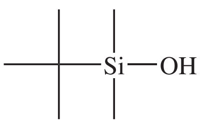
SIB1937.3
n-BUTYLDIMETHYLMETHOXYSILANE
$C_7H_{18}OSi$ | 146.30 | 135° | | 0.79 | 1.401
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[64712-50-1] HMIS: 3-3-1-X | 10g ¥15,400



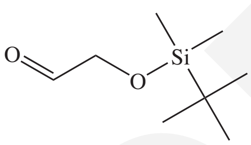
SIB1937.5
n-BUTYLDIMETHYLSILANE
$C_6H_{16}Si$ | 116.28 | 101-2° | | 0.71 | 1.4026^{25}
Flashpoint: -6°C (21°F)
Silane reducing agent
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[1001-52-1] HMIS: 2-4-1-X | 25g ¥20,700



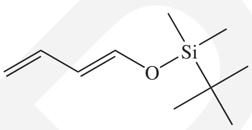
SIB1938.0
t-BUTYLDIMETHYLSILANE
$C_6H_{16}Si$ | 116.28 | 81-3° | (13°) | 0.701 | 1.4005
Flashpoint: -11°C (12°F)
Autoignition temperature: 290°C
Silane reducing agent
Silylates phenols in presence of tris(pentafluorophenyl)borane.[1]
Precursor for SiC thin films by supersonic jet epitaxy.[2]
1. Blackwell, J. M. et al. *J. Org. Chem.* **1999,** *64*, 4887.
2. Boo, J. et al. *Thin Solid Films* **1998,** *324*, 124.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[29681-57-0] HMIS: 2-4-1-X | 5g ¥13,500 | 25g ¥43,800



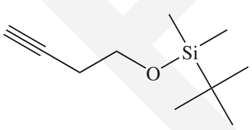
SIB1939.0
t-BUTYLDIMETHYLSILANOL
$C_6H_{16}OSi$ | 132.28 | 140° | | 0.840 | 1.4240
Flashpoint: 45°C (113°F)
Stable silanol
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18173-64-3] HMIS: 2-2-0-X | 5g ¥19,400 | 25g ¥67,100



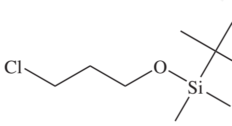
SIB1939.3
t-BUTYLDIMETHYLSILOXYACETALDEHYDE, 90%
$C_8H_{18}O_2Si$ | 174.31 | 156-7° | | 0.915 | 1.432
Stabilized
Flashpoint: 60°C (140°F)
Employed in high ee synthetic reactions.[1]
1. Colbert, F. *Eur. J. Org. Chem.* **2006**, *8*, 1117
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[102191-92-4] HMIS: 3-3-1-X | 1.0g ¥17,800 | 5g ¥60,700



SIB1939.35
1-(t-BUTYLDIMETHYLSILOXY)-1,3-BUTADIENE, 95%
$C_{10}H_{20}OSi$ | 184.36 | 76-9° / 12
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[88346-87-6] HMIS: 2-2-1-X | 5g ¥67,100



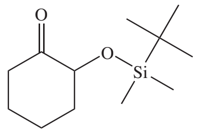
SIB1939.5
4-(t-BUTYLDIMETHYLSILOXY)BUTYNE
$C_{10}H_{20}OSi$ | 184.35 | 70-4° / 10 | | 0.893 | 1.4300
Flashpoint: 58°C (136°F)
Protected butynol
Potential for the synthesis of silyl-protected butynol derivatives.[1]
1. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[78592-82-2] HMIS: 2-3-1-X | 10g ¥22,000



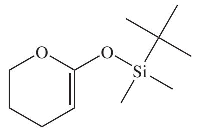
SIB1939.52
1-(t-BUTYLDIMETHYLSILOXY)-3-CHLOROPROPANE
$C_9H_{21}ClOSi$ | 208.80 | 70-2° / 8 | | 0.899^{25} | 1.4313^{25}
See also SIC2335.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[89031-82-3] HMIS: 2-2-1-X | 10g ¥26,300

SILICON COMPOUNDS

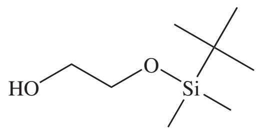
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



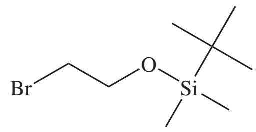
SIB1939.55
2-(t-BUTYLDIMETHYLSILOXY)CYCLOHEXANONE
$C_{12}H_{24}O_2Si$ — Mw 228.40 — bp 55-9° / 0.05 — D_4^{20} 0.969 — n_D^{20} 1.454
Flashpoint: 93°C (199°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[74173-08-3] HMIS: 2-2-1-X 5g ¥13,800



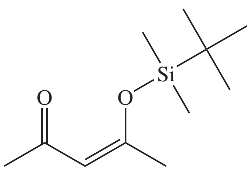
SIB1939.57
6-(t-BUTYLDIMETHYLSILOXY)-3,4-DIHYDRO-2H-PYRAN
$C_{11}H_{22}O_2Si$ — Mw 214.38 — bp 130-5° / 30 — D_4^{20} 0.935 — n_D^{20} 1.455
Flashpoint: 80°C (177°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[130650-09-8] HMIS: 2-2-1-X 1.0g ¥25,200



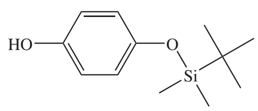
SIB1939.58
2-(t-BUTYLDIMETHYLSILOXY)ETHANOL
ETHYLENEGLYCOL, MONO-t-BUTYLDIMETHYLSILYL ETHER
$C_8H_{20}O_2Si$ — Mw 176.33 — bp 72-4° / 10 — D_4^{20} 0.8908 — n_D^{20} 1.430
Decomposes >80˚C
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[102229-10-7] HMIS: 3-2-1-X 10g ¥23,100



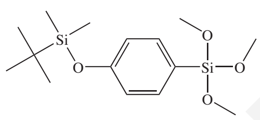
SIB1939.59
2-(t-BUTYLDIMETHYLSILOXY)ETHYLBROMIDE
(2-BROMOETHOXY)-t-BUTYLDIMETHYLSILANE
$C_8H_{19}BrOSi$ — Mw 239.23 — bp 40-45° / 0.05
Flashpoint: 55°C (131°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[86864-60-0] HMIS: 2-3-0-X 10g ¥34,200



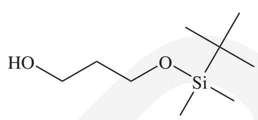
SIB1940.0
2-(t-BUTYLDIMETHYLSILOXY)PENT-2-EN-4-ONE
$C_{11}H_{22}O_2Si$ — Mw 214.38 — bp 59-63° / 0.06 — D_4^{20} 0.898 — n_D^{20} 1.4634
Flashpoint: 73°C (163°F)
Silylation reagent for alcohols under neutral or acidic conditions.[1]
Employed in preparative silylation of nucleotides.[2]
1. Veysoglu, T. et al. *Tetrahedron Lett.* **1981,** *22*, 1299.
2. Bigge, C. et al. *J. Org. Chem.* **1981,** *46*, 1994.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[69404-97-3] HMIS: 3-2-1-X 5g ¥20,400



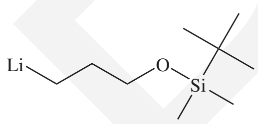
SIB1939.6
4-(t-BUTYLDIMETHYLSILOXY)PHENOL
$C_{12}H_{20}O_2Si$ — Mw 224.37 — (mp 60-4°)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[108534-47-0] HMIS: 3-2-1-X 5g ¥33,700



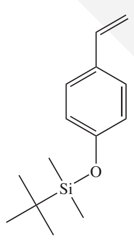
SIB1939.65
4-(t-BUTYLDIMETHYLSILOXY)PHENYLTRIMETHOXYSILANE
$C_{15}H_{28}O_4Si_2$ — Mw 328.55 — bp 130° / 0.6 — D_4^{20} 1.001 — n_D^{20} 1.4729
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 2.5g ¥51,200



SIB1939.7
3-(t-BUTYLDIMETHYLSILOXY)PROPAN-1-OL
$C_9H_{22}O_2Si$ — Mw 190.36 — bp 110° / 6 — D_4^{20} 0.892 — n_D^{20} 1.4350
Flashpoint: 92°C (198°F)
Allows selective one-sided reaction chemistry of propanediol
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[73842-99-6] HMIS: 2-2-1-X 5g ¥35,500



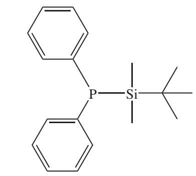
SIB1940.6
3-(t-BUTYLDIMETHYLSILOXY)-1-PROPYLLITHIUM, 1M in cyclohexane - 20-23 wgt%
$C_9H_{21}LiOSi$ — Mw 180.29 — D_4^{20} 0.800
Flashpoint: -18°C (0°F)
Initiates "living" polymerizations
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[97057-70-0] HMIS: 3-4-1-X store <5°C 50g ¥130,700



SIB1941.0
p-(t-BUTYLDIMETHYLSILOXY)STYRENE
$C_{14}H_{22}OSi$ — Mw 234.41 — bp 80° / 0.075 — D_4^{20} 0.922 — n_D^{20} 1.5091
Undergoes radical[1,2] and anionic polymerization.[3,4,5]
1. Packirisamy, S. et al. *J. Polym. Sci., Part A: Polym. Chem.* **1989,** *27*, 2811.
2. Xu, Y. et al. *Polymer* **1991,** *32*, 3103.
3. Hirao, A. et al. *Makromol. Chem., Rapid Commun.* **1982,** *3*, 941.
4. Hirao, A. et al. *Makromol. Chem.* **1985,** *186*, 1157.
5. Ito, H. et al. *Polym. Mater. Sci. Eng. Preprints* **1993,** *68*, 12.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[84494-81-5] HMIS: 2-2-0-X 10g ¥46,900

t-BUTYLDIMETHYLSILYLCHLORIDE - see SIB1935.0 t-BUTYLDIMETHYLCHLOROSILANE

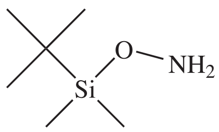
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIB1955.0
(t-BUTYLDIMETHYLSILYL)DIPHENYLPHOSPHINE, 95%

$C_{18}H_{25}PSi$	300.45	138° / 0.4		1.103	

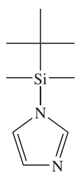
Phosphinates olefins in presence of Bu_4NF.[1]
1. Hayashi, M. et al. *Tetrahedron Lett.* **2004**, *45*, 9167.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[67187-53-6] HMIS: 3-3-1-X store <5°C 2.5g ¥51,200



SIB1963.0
O-(t-BUTYLDIMETHYLSILYL)HYDROXYLAMINE, 95%

$C_6H_{17}NOSi$	147.29	154-7° Flashpoint: 54°C (129°F)	(63-4°)		

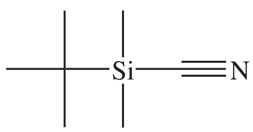
Review of synthetic utility.[1]
Reacts with aldehydes and ketones to form protected oximes.[2]
Can be used to generate nitrosoalkenes in the absence of nucleophiles.[3]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 124-125.
2. Denmark, S. E. et al. *J. Org. Chem.* **1984,** *49*, 4741.
3. Denmark, S. E.; Dappen, M. S. *J. Org. Chem.* **1984**, *49*, 798.
F&F: Vol. 2, p 85.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[41879-39-4] HMIS: 3-2-1-X 10g ¥62,900



SIB1964.0
1-(t-BUTYLDIMETHYLSILYL)IMIDAZOLE

$C_9H_{18}N_2Si$	182.34	53° / 0.2 Flashpoint: 99°C (210°F)		0.939	1.4800

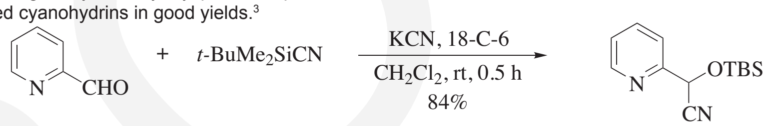
Silylating agent
See also SIB1966.5, SIT8590.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[54925-64-3] EC 259-398-1 HMIS: 2-1-1-X 1.0g ¥20,400



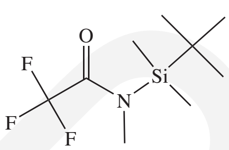
SIB1965.0
t-BUTYLDIMETHYLSILYLNITRILE
t-BUTYLDIMETHYLSILYLCYANIDE

$C_7H_{15}NSi$ 劇物	141.29	163-5° Flashpoint: 45°C (113°F)	(76-8°)		

Review of synthetic utility.[1]
Opens epoxides yielding t-butyldimethylsilyl protected β-isonitrile alcohols.[2]
Forms TBS-protected cyanohydrins in good yields.[3]



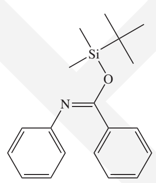
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 120.
2. Gassman, P. et al. *J. Org. Chem.* **1986,** *51*, 5010.
3. Golinski, M. et al. *J. Org. Chem.* **1993**, *58*, 159.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[56522-24-8] HMIS: 4-2-1-X 10g ¥32,600



SIB1966.0
N-(t-BUTYLDIMETHYLSILYL)-N-METHYLTRIFLUOROACETAMIDE

$C_9H_{18}F_3NOSi$	241.33	168-70° Flashpoint: 52°C (126°F)		1.023	1.4020

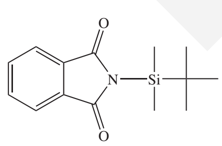
Silyl protecting agent
Review of synthetic utility.[1]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 125-127.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[77377-52-7] HMIS: 3-3-1-X 5g ¥26,800



SIB1966.3
t-BUTYLDIMETHYLSILYL-N-PHENYLBENZIMIDATE

$C_{19}H_{25}NOSi$	311.49		(71°)		

Silylation reagent.[1]
1. Tanabe, Y. et al. *J. Chem. Soc., Chem. Commun.* **2002**, 1628
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[404392-70-7] HMIS: 2-2-1-X 5g ¥46,900



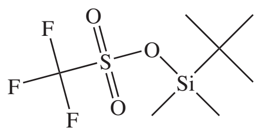
SIB1966.5
N-(t-BUTYLDIMETHYLSILYL)PHTHALIMIDE

$C_{14}H_{19}NO_2Si$	261.39		(115-9°)		

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[79293-84-8] HMIS: 2-2-1-X 5g ¥36,300

SILICON COMPOUNDS

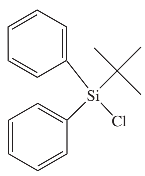
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIB1967.0
t-BUTYLDIMETHYLSILYLTRIFLUOROMETHANESULFONATE
$C_7H_{15}F_3O_3SSi$ 264.33 65° / 10 1.151 1.3848
Flashpoint: 36°C (97°F)

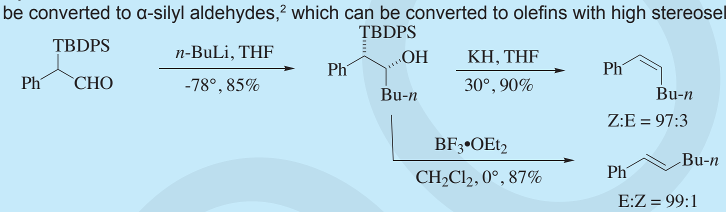
Review of synthetic utility.[1]
Powerful silylation reagent and Lewis acid.[2]
Excellent promoter for gylcosidations, especially for trichloroacetimidates.[3]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 127-135.
2. Review: Simchen, G. *Advances in Silicon Chemistry;* JAI Press: Greenwich, Co, 1991; Larson, G. L. Ed., Vol. 1, 189.
3. Roush, W. R. et al. *Org. Lett.* **1999,** *1*, 891; and Roush, W. R.; Narayan, S. *Org. Lett.* **1999,** *1*, 899.
F&F: Vol. 10, p 63; Vol. 12, p 86; Vol. 13, p 50, p 329; Vol. 15, p 54; Vol. 17, p 55.
See also SIT8335.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[69739-34-0] EC 274-102-0 HMIS: 3-3-1-X 10g ¥18,800 50g ¥65,000

t-BUTYLDIMETHYLVINYLSILANE - See SIV9063.0 VINYL-t-BUTYLDIMETHYLSILANE



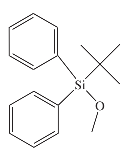
SIB1968.0
t-BUTYLDIPHENYLCHLOROSILANE
$C_{16}H_{19}ClSi$ 274.87 90° / 0.015 1.074 1.5680
Flashpoint: 112°C (234°F)
Vapor pressure, 100°: 0.02 mm

Blocking agent
Review of synthetic utility.[1]
Due to steric bulk can be converted to α-silyl aldehydes,[2] which can be converted to olefins with high stereoselectivity.[3]

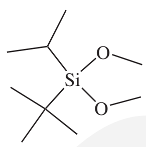


1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 135-138.
2. Barbero, A. et al. *J. Chem. Soc., Perkin Trans 1* **1995**, 1525.
3. Barbero, A. et al. *Synthesis* **2000**, 1223.
F&F: Vol. 6, p 81; Vol. 12, p 81.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[58479-61-1] TSCA EC 261-282-0 HMIS: 3-1-0-X 10g ¥5,000 50g ¥15,600 2kg ¥295,000

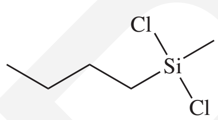
COMMERCIAL



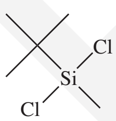
SIB1969.0
t-BUTYLDIPHENYLMETHOXYSILANE
$C_{17}H_{22}OSi$ 270.45 84-6° / 0.1 (48-50°)
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[76358-47-9] HMIS: 3-1-1-X 10g ¥13,000 50g ¥41,600



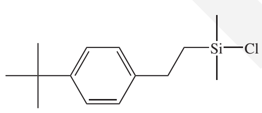
SIB1971.0
t-BUTYLISOPROPYLDIMETHOXYSILANE
$C_9H_{22}O_2Si$ 190.36 75° / 20 0.871 1.4189
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[109144-59-4] HMIS: 3-2-1-X 1.0g ¥45,900



SIB1972.0
n-BUTYLMETHYLDICHLOROSILANE
$C_5H_{12}Cl_2Si$ 171.14 148° 1.0424 1.4312
Flashpoint: 30°C (86°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18147-23-4] (既) 2-2041 TSCA EC 242-035-6 HMIS: 3-3-1-X 10g ¥15,600

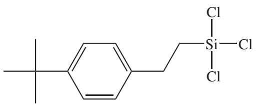


SIB1972.2
t-BUTYLMETHYLDICHLOROSILANE
$C_5H_{12}Cl_2Si$ 171.14 130-2° (88-90°)
Flashpoint: 26°C (79°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18147-18-7] TSCA EC 242-034-0 HMIS: 3-3-1-X 5g ¥27,100

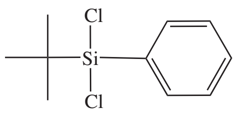


SIB1972.5
p-(t-BUTYL)PHENETHYLDIMETHYLCHLOROSILANE
$C_{14}H_{23}ClSi$ 254.87 122-3° / 2 0.95
Contains ~5% meta isomer, mixed α, β isomers
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[93502-75-1] HMIS: 3-2-1-X 25g ¥25,200

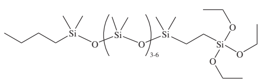
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



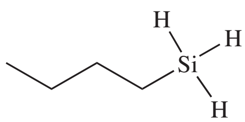
SIB1973.0
p-(t-BUTYL)PHENETHYLTRICHLOROSILANE
$C_{12}H_{17}Cl_3Si$ — Mw 295.71 — bp 124-9° / 2.5 — D_4^{20} 1.16
Contains ~5% meta isomer, mixed α, β isomers — Flashpoint: 108°C (226°F)
For bonded phase HPLC
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[211925-40-5] HMIS: 3-2-1-X 25g ¥24,100



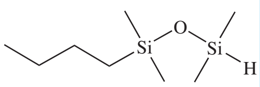
SIB1974.0
t-BUTYLPHENYLDICHLOROSILANE
$C_{10}H_{14}Cl_2Si$ — Mw 233.21 — bp 126° / 25 — D_4^{20} 1.106 — n_D^{20} 1.515
Flashpoint: 83°C (181°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17887-41-1] TSCA EC 241-835-2 HMIS: 3-2-1-X 5g ¥28,400



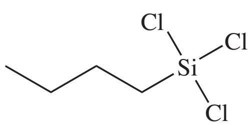
SIB1974.2
ω-BUTYLPOLY(DIMETHYLSILOXANYL)ETHYLTRIETHOXYSILANE, tech-95
Mw 600 - 850 — D_4^{20} 0.925 — n_D^{20} 1.4124
5-8 (Me_2SiO)
Hydrophobic surface treatment
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-2-1-X 25g ¥25,700



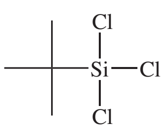
SIB1974.5
n-BUTYLSILANE
$C_4H_{12}Si$ — Mw 88.22 — bp 56-7° — mp (-138°) — D_4^{20} 0.678 — n_D^{20} 1.3922
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1600-29-9] HMIS: 2-4-1-X 25g ¥52,200



SIB1977.0
n-BUTYL-1,1,3,3-TETRAMETHYLDISILOXANE
$C_8H_{22}OSi_2$ — Mw 190.43 — bp 153° — D_4^{20} 0.782 — n_D^{25} 1.398
Reducing agent
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[12163-51-2] TSCA HMIS: 2-3-1-X 25g ¥10,300 2kg ¥164,200
COMMERCIAL

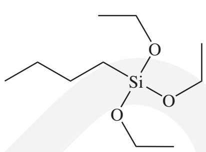


SIB1982.0
n-BUTYLTRICHLOROSILANE
$C_4H_9Cl_3Si$ — Mw 191.56 — bp 142-3° — D_4^{20} 1.1608 — n_D^{20} 1.4364
Vapor pressure, 31°: 10 mm — Flashpoint: 45°C (113°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7521-80-4] (既) 2-2041 TSCA EC 231-381-3 HMIS: 3-2-1-X 25g ¥14,600 100g ¥39,500

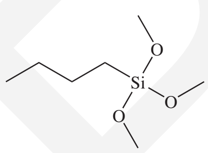


SIB1985.0
t-BUTYLTRICHLOROSILANE
$C_4H_9Cl_3Si$ — Mw 191.56 — bp 142-3° — mp (97-100°) — D_4^{20} 1.1608 — n_D^{20} 1.436
Flashpoint: 40°C (104°F)
Forms silanetriol
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18171-74-9] (既) 2-2041 TSCA EC 242-059-7 HMIS: 3-2-1-X 10g ¥16,200

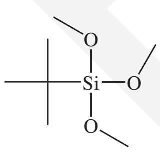
iso-BUTYLTRICHLOROSILANE - see SII6453.0 ISOBUTYLTRICHLOROSILANE
iso-BUTYLTRIETHOXYSILANE - see SII6453.5 ISOBUTYLTRIETHOXYSILANE
iso-BUTYLTRIMETHOXYSILANE - see SII6453.7 ISOBUTYLTRIMETHOXYSILANE



SIB1986.0
n-BUTYLTRIETHOXYSILANE
$C_{10}H_{24}O_3Si$ — Mw 220.38 — bp 192-3° — D_4^{20} 0.8883 — n_D^{20} 1.4011
Flashpoint: 63°C (145°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4781-99-1] HMIS: 2-2-1-X 25g ¥19,900



SIB1988.0
n-BUTYLTRIMETHOXYSILANE
$C_7H_{18}O_3Si$ — Mw 178.30 — bp 164-5° — D_4^{20} 0.9312 — n_D^{20} 1.3979
Flashpoint: 49°C (120°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1067-57-8] (既) 2-2052 TSCA EC 213-936-1 HMIS: 3-2-1-X 25g ¥14,600 100g ¥39,500

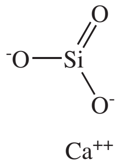


SIB1989.0
t-BUTYLTRIMETHOXYSILANE
$C_7H_{18}O_3Si$ — Mw 178.30 — bp 140-1° — D_4^{20} 0.903 — n_D^{20} 1.3941
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18395-29-4] HMIS: 3-2-1-X 10g ¥41,400

BUTYNEDIOIC ACID derivatives - see SIB1852.0 BIS(TRIMETHYLSILYL)ACETYLENEDICARBOXYLATE
CALCIUM BOROSILICATE - see SID2605.0 DATOLITE

SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



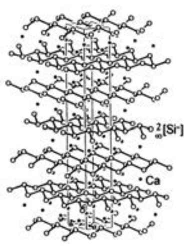
SIC2050.0
CALCIUM METASILICATE
WOLLASTONITE
CaO_3Si — Mw 116.16 — (mp 1,540°) — D_4^{20} 2.69 — n_D^{20} 1.62-1.64

Median particle size: 5-6 µm
Typical bulk density, not compacted: 0.14 g/cm³
ΔHform: -1,585 kJ/mole
Coefficient of thermal expansion: 6.5 x 10^{-6}
Mohs hardness: 4.5-5
Surface area: 2 m²/g
Aspect ratio: ~12:1
Solubility, water: 0.95 g/l

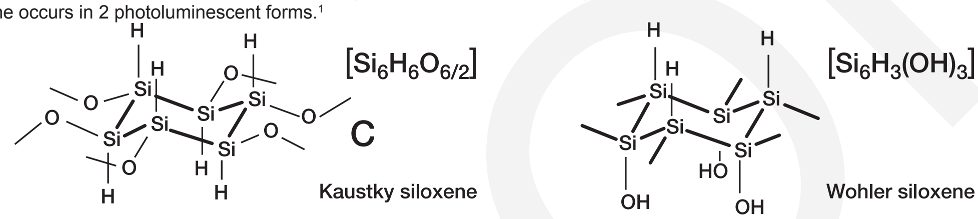
Single chain silicate
Reinforcing filler for thermoplastics
Undergoes transition to pseudowollastonite at 1,200˚
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[13983-17-0] TSCA EC 237-772-5 HMIS: 1-0-0-X 500g ¥7,400 2.5kg ¥17,400

SIC2054.0
CALCIUM SILICIDE, tech-95, powder
$CaSi_2$ — Mw 96.25 — D_4^{20} 2.5

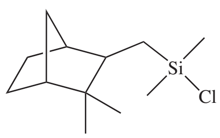
Contains 3-5% Fe
Typical bulk density, not compacted: 0.87 g/cm³



Hydrolytic deposition of calcium silicide followed by extraction of calcium ions yields siloxene
Siloxene occurs in 2 photoluminescent forms.[1]

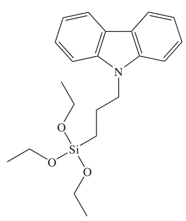


1. Harle, W. et al. In "Tailor-made Silicon-Oxygen Compounds"; Corriu, R. et al. Ed.; Vieweg: 1995; p99.
F&F: Vol. 6, p 510.
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[12013-56-8] (既) 1-1044 TSCA EC 234-588-7 HMIS: 1-1-1-X 250g ¥11,900



SIC2056.2
(-)-CAMPHANYLDIMETHYLCHLOROSILANE
2,2-DIMETHYL-3-(CHLORODIMETHYLSILYLMETHYL)BICYCLOHEPTANE
$C_{12}H_{23}ClSi$ — Mw 230.85

Optically active blocking agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[684284-12-6] HMIS: 3-2-1-X 10g ¥26,800



SIC2058.2
3-CARBAZOLYLPROPYLTRIETHOXYSILANE
$C_{21}H_{29}NO_3Si$ — Mw 371.55 — bp 185-195° / 0.3 — D_4^{20} 1.072 — n_D^{20} 1.5527[25]

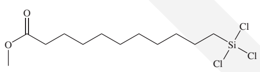
For non-linear optic materials
Employed in OLED fabrication.[1]
1. DeMais, T. et al. *SPIE Proc.* **1998**, *3476*, 338
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[221105-38-0] HMIS: 2-2-1-X 2.5g ¥67,100

SIC2065.0
10-(CARBOMETHOXY)DECYLDIMETHYLCHLOROSILANE
$C_{14}H_{29}ClO_2Si$ — Mw 292.92 — bp 133° / 0.3 — D_4^{20} 0.950 — n_D^{20} 1.4483[25]
Flashpoint: 105°C (221°F)

Long chain organofunctional silane
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[53749-38-5] HMIS: 3-1-1-X 10g ¥15,600 50g ¥52,200

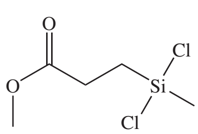
SIC2067.0
10-(CARBOMETHOXY)DECYLDIMETHYLMETHOXYSILANE
$C_{15}H_{32}O_3Si$ — Mw 288.50 — bp 130° / 0.3 — D_4^{20} 0.903 — n_D^{20} 1.4399

Long chain organofunctional silane
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1211488-83-3] HMIS: 2-1-1-X 10g ¥17,000 50g ¥57,500



SIC2067.6
10-(CARBOMETHOXY)DECYLTRICHLOROSILANE
$C_{12}H_{23}Cl_3O_2Si$ — Mw 333.75 — bp 133-6° / 0.3 — D_4^{20} 1.1

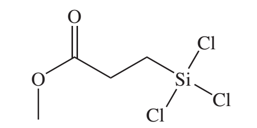
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4211-29-4] HMIS: 3-2-1-X 10g ¥25,200



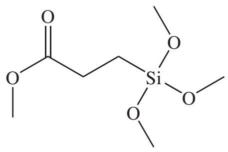
SIC2068.0
2-(CARBOMETHOXY)ETHYLMETHYLDICHLOROSILANE, tech-95
$C_5H_{10}Cl_2O_2Si$ — Mw 201.12 — bp 98-9° / 25 — D_4^{20} 1.187[25] — n_D^{20} 1.4439[25]

Contains ~ 20% 1-(carbomethoxy)ethylmethyldichlorosilane isomer
Flashpoint: 52°C (126°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18163-42-3] TSCA HMIS: 3-2-1-X 25g ¥26,300

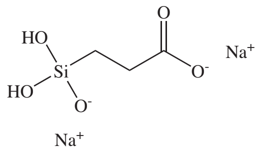
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



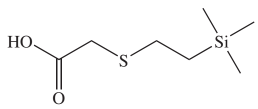
SIC2070.0
2-(CARBOMETHOXY)ETHYLTRICHLOROSILANE, tech 95
METHYL (3-TRICHLOROSILYLPROPIONATE)
$C_4H_7Cl_3O_2Si$ — Mw 221.54 — bp 90-2° / 25 — D_4^{20} 1.325 — n_D^{20} 1.448
Contains ~ 20% 1-(carbomethoxy)ethyltrichlorosilane isomer — Flashpoint: >43°C (>110°F)
See also SIC2067.6
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18147-81-4] TSCA EC 242-036-1 HMIS: 3-3-1-X 25g ¥16,200 100g ¥44,800



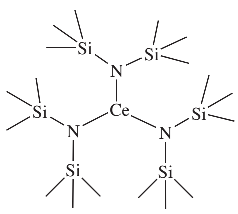
SIC2072.0
2-(CARBOMETHOXY)ETHYLTRIMETHOXYSILANE
METHYL (3-TRIMETHOXYSILYLPROPIONATE)
$C_7H_{16}O_5Si$ — Mw 208.29 — bp 75° / 1.5 — D_4^{20} 1.069 — n_D^{20} 1.410
Contains ~ 20% 1-(carbomethoxy)ethyltrimethoxysilane isomer — Flashpoint: >43°C (>110°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[76301-00-3] HMIS: 3-3-1-X 10g ¥26,800



SIC2263.0
CARBOXYETHYLSILANETRIOL, DISODIUM SALT, 25% in water
$C_3H_6Na_2O_5Si$ — Mw 196.14 — D_4^{20} 1.170^{25}
pH: 12 - 12.5
In combination with aminofunctional silanes forms amphoteric silicas.[1]
1. Han, L. et al. *Chem. Mater.* **2007**, *19*, 2860.
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[18191-40-7] HMIS: 2-0-0-X 25g ¥15,400 100g ¥42,100



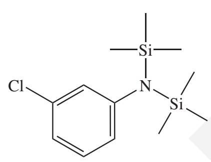
SIC2264.0
2-(CARBOXYMETHYLTHIO)ETHYLTRIMETHYLSILANE, 95%
(TRIMETHYLSILYLETHYL)THIOACETIC ACID
$C_7H_{16}O_2SSi$ — Mw 192.35 — bp 143-4° / 7 — D_4^{20} 1.013 — n_D^{20} 1.4811
Contains 1-(carboxymethylthio)ethyltrimethylsilane
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18269-42-6] HMIS: 2-1-0-X 10g ¥14,600



SIC2264.6
CERIUM(III) TRIS[BIS(TRIMETHYLSILYL)AMIDE]
CERIUM(III) TRIS(HEXAMETHYLDISILAZIDE)
$C_{18}H_{54}CeN_3Si_6$ — Mw 621.28 — bp 95-9° / 10^{-4} sub. — mp (132-9°)
Precursor for SrS:Ce thin film blue phosphors by CVD.[1]
1. Rees, W. et al. *Chemical Aspects of Electronic Ceramic Processing, MRS Proc.* **1998,** *495*, 83.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[41836-21-9] HMIS: 3-2-1-X 5g ¥77,700

CHIRAL SILANES - see SIC2056.2, SID4074.0, SIM6472.7, SIP6731.5, SIT6731.6, SIT8190.0, SIT8192.4

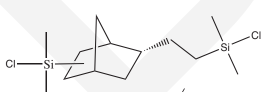
4-[CHLOROBIS(1-METHYLETHYL)SILYL]BUTANENITRILE - see SIC2450.0 3-CYANOPROPYLDIISOPROPYLCHLOROSILANE



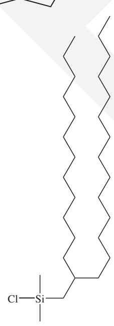
SIC2264.8
3-CHLORO-N,N-BIS(TRIMETHYLSILYL)ANILINE
$C_{12}H_{22}ClNSi_2$ — Mw 271.93 — bp 157-157.5° / 25 — D_4^{20} 1.103^{25}
See also SIB1879.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
7522-27-2 HMIS: 2-2-1-X 5g ¥26,300

SIC2265.0
4-CHLOROBUTYLDIMETHYLCHLOROSILANE
$C_6H_{14}Cl_2Si$ — Mw 185.17 — bp 100-2° / 30 — D_4^{20} 1.0296^{25} — n_D^{20} 1.4503^{25}
Flashpoint: 45°C (113°F)
See also SIC2277.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18145-84-1] HMIS: 3-2-1-X 25g ¥21,500 100g ¥62,000

CHLORODIMETHYLOCTADECYLSILANE - see SIO6615.0 n-OCTADECYLDIMETHYLCHLOROSILANE

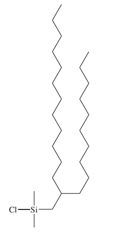


SIC2265.5
(CHLORODIMETHYLSILYL)-5-[2-(CHLORODIMETHYLSILYL)ETHYL]BICYCLOHEPTANE
$C_{13}H_{26}Cl_2Si_2$ — Mw 309.43 — D_4^{20} 1.03 — n_D^{20} 1.4863
Mixture of isomers
Forms polymers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[220527-24-2] HMIS: 3-2-1-X 25g ¥16,200

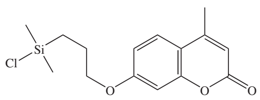


SIC2266.0
13-(CHLORODIMETHYLSILYLMETHYL)HEPTACOSANE, 95%
$C_{30}H_{63}ClSi$ — Mw 487.37 — bp 200-10° / 0.01 — D_4^{20} 0.848^{25} — n_D^{20} 1.4542^{30}
Forms hydrophobic bonded phases
See also SIC2266.5
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[194243-00-0] TSCA HMIS: 3-1-1-X 10g ¥34,500

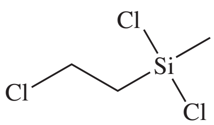
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



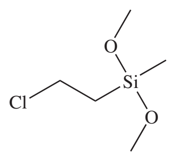
SIC2266.5
11-(CHLORODIMETHYLSILYL)METHYLTRICOSANE, tech-95
$C_{26}H_{55}ClSi$ 431.27 170° / 0.075 0.887 1.4575^{22}
Contains ~5% isomers
Forms self-assembled oleophilic monolayers
Employed as bonded phase in HPLC
See also SID4401.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-1-1-X 10g ¥30,200



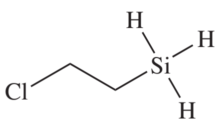
SIC2266.8
7-[3-(CHLORODIMETHYLSILYL)PROPOXY]-4-METHYLCOUMARIN, 10% in acetonitrile
$C_{15}H_{19}ClO_3Si$ 劇物 310.85 0.800
Fluorescence max: 390, 421, 521, 585 (excitation at 384 nm) Flashpoint: 2°C (36°F)
λmax: 223, 248, 281, 323.5 (vs)
Fluorescent tag / protecting group
See also SIT8192.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[129119-77-3] HMIS: 3-4-1-X 10g ¥24,700



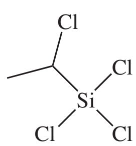
SIC2267.0
2-CHLOROETHYLMETHYLDICHLOROSILANE
$C_3H_7Cl_3Si$ 177.53 157° 1.261 1.4399
Dipole moment: 1.96 debye Flashpoint: 32°C (90°F)
See also SIA0015.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7787-85-1] (既) 2-2047 TSCA EC 232-134-2 HMIS: 3-3-1-X store <5°C 25g ¥13,800 100g ¥37,100



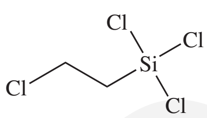
SIC2268.0
2-CHLOROETHYLMETHYLDIMETHOXYSILANE
$C_5H_{13}ClO_2Si$ 168.70 77° / 25 1.029^{25} 1.422^{25}
Flashpoint: 43°C (109°F)
Eliminates ethylene at elevated temperatures or in presence of base
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13508-51-5] (既) 2-2078 EC 236-834-9 HMIS: 2-2-1-X store <5°C 50g ¥38,500



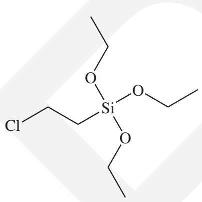
SIC2268.5
2-CHLOROETHYLSILANE
C_2H_7ClSi 94.61 69-71° 0.904 1.4232
Intermediate for H_3SiCl; employed in CVD of SiN.[1]
1. Arkles, B. et al. U.S. Patent 5,968,611, 1999.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18165-19-0] HMIS: 3-4-1-X store <5°C 10g ¥27,300



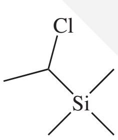
SIC2269.0
1-CHLOROETHYLTRICHLOROSILANE, tech-95
$C_2H_4Cl_4Si$ 197.95 136-7° 1.393 1.456
Dipole moment: 2.30 debye Flashpoint: 15°C (59°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7787-82-8] (既) 2-2046 TSCA EC 232-133-7 HMIS: 3-4-1-X 25g ¥26,800



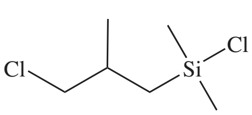
SIC2270.0
2-CHLOROETHYLTRICHLOROSILANE, 95%
$C_2H_4Cl_4Si$ 197.95 152-3° 1.419 1.4640
Dipole moment: 1.51 debye Flashpoint: 28°C (82°F)
Eliminates ethylene at elevated temperatures or in presence of base
Forms silsesquioxanes convertible to SiO_2 films by thermal or UV methods.[1]
1. Arkles, B. et al. *J. Sol-Gel Sci. Techn.* **1997,** *8*, 465.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[6233-20-1] (既) 2-2046 TSCA EC 228-345-4 HMIS: 3-4-1-X 25g ¥13,500 100g ¥36,300



SIC2271.0
2-CHLOROETHYLTRIETHOXYSILANE, 95%
$C_8H_{19}ClO_3Si$ 226.77 88-9° / 9 1.009^{25} 1.4130^{25}
Flashpoint: 48°C (118°F)
Eliminates ethylene at elevated temperatures or in presence of base
Fruit ripening/abscission agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18279-67-9] TSCA EC 242-156-4 HMIS: 2-2-1-X 25g ¥15,600 100g ¥43,200

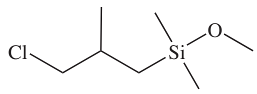


SIC2275.0
1-CHLOROETHYLTRIMETHYLSILANE, 96%
$C_5H_{13}ClSi$ 136.70 118° 0.964 1.4234
Flashpoint: 20°C (68°F)
Lithiated derivative reacts with aldehydes, ketones to form methylketones via epoxysilanes.[1]
1. Magnus, P. et al. *J. Chem. Soc., Chem. Commun.* **1978,** 297.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[7787-87-3] TSCA EC 232-135-8 HMIS: 2-4-0-X 10g ¥26,000

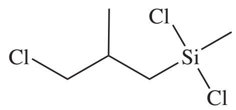


SIC2277.0
3-CHLOROISOBUTYLDIMETHYLCHLOROSILANE
$C_6H_{14}Cl_2Si$ 185.17 89° / 25 1.03^{25} 1.4522^{25}
Flashpoint: 60°C (140°F)
See also SIC2278.0, SIC2336.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18145-83-0] TSCA EC 242-030-9 HMIS: 3-2-1-X 25g ¥15,600 100g ¥43,200

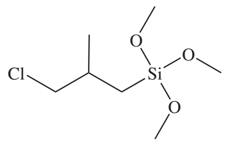
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIC2278.0
3-CHLOROISOBUTYLDIMETHYLMETHOXYSILANE
$C_7H_{17}ClOSi$ — Mw 180.75 — bp 182° — D_4^{20} 0.95 — n_D^{20} 1.4331^{25}
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18244-08-1] TSCA HMIS: 3-3-1-X 25g ¥19,100

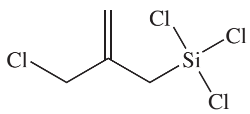


SIC2279.0
3-CHLOROISOBUTYLMETHYLDICHLOROSILANE
$C_5H_{11}Cl_3Si$ — Mw 205.59 — bp 196° — D_4^{20} 1.1703 — n_D^{20} 1.4629
Vapor pressure, 80˚: 15 mm
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1628-11-1] TSCA EC 216-620-1 HMIS: 3-2-1-X 25g ¥22,500

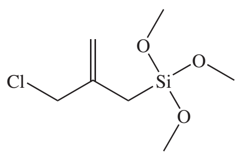


SIC2280.4
3-CHLOROISOBUTYLTRIMETHOXYSILANE
$C_7H_{17}ClO_3Si$ — Mw 212.75 — bp 59-60° / 2 — D_4^{20} 1.054^{25} — n_D^{20} 1.4277^{25}
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17256-27-8] HMIS: 3-2-1-X 25g ¥23,100

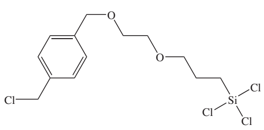
(CHLOROMETHYL)ALLYLDIMETHYLSILANE - see SIA0440.0 ALLYL(CHLOROMETHYL)DIMETHYLSILANE



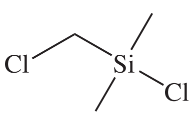
SIC2281.0
2-(CHLOROMETHYL)ALLYLTRICHLOROSILANE
2-(TRICHLOROSILYLMETHYL)ALLYL CHLORIDE
$C_4H_6Cl_4Si$ — Mw 223.99 — bp 110° / 75 — D_4^{20} 1.3473 — n_D^{20} 1.4846
Flashpoint: 82°C (180°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18147-84-7] HMIS: 3-2-1-X 10g ¥34,200



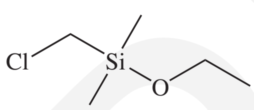
SIC2282.0
2-(CHLOROMETHYL)ALLYLTRIMETHOXYSILANE
$C_7H_{15}ClO_3Si$ — Mw 210.73 — bp 128° / 70 — D_4^{20} 1.09
Flashpoint: 89°C (192°F)
Versatile coupling agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[39197-94-9] HMIS: 3-2-1-X 2.5g ¥22,500



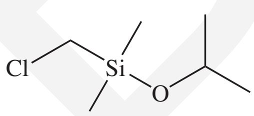
SIC2283.0
3-[2-(4-CHLOROMETHYLBENZYLOXY)ETHOXY]PROPYLTRICHLOROSILANE
$C_{13}H_{18}Cl_4O_2Si$ — Mw 376.18
Reactive long chain benzyl chloride functional silane
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X 2.5g ¥51,200



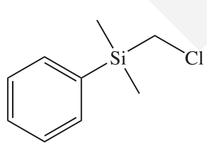
SIC2285.0
CHLOROMETHYLDIMETHYLCHLOROSILANE
CMDMCS
$C_3H_8Cl_2Si$ — Mw 143.09 — bp 115-6° — D_4^{20} 1.0865 — n_D^{20} 1.4360
Flashpoint: 21°C (69°F)
Autoignition temperature: 355˚C
End-capper for silicones
F&F: Vol. 16, p 71; Vol. 17, p 75; Vol. 21, p 129.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1719-57-9] (既) 2-2047 TSCA EC 217-006-6 HMIS: 3-4-1-X 25g ¥7,700 750g ¥47,700 18kg ¥399,000
COMMERCIAL



SIC2286.0
CHLOROMETHYLDIMETHYLETHOXYSILANE
$C_5H_{13}ClOSi$ — Mw 152.70 — bp 132-3° — D_4^{20} 0.944^{25} — n_D^{20} 1.412^{25}
Dipole moment: 2.14 debye
Flashpoint: 26°C (79°F)
TOXICITY: oral rat, LD50: 1,550 mg/kg
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13508-53-7] (既) 2-2078 TSCA EC 236-835-4 HMIS: 3-3-1-X 25g ¥23,600



SIC2286.5
CHLOROMETHYLDIMETHYLISOPROPOXYSILANE
$C_6H_{15}ClOSi$ — Mw 166.73 — bp 145° — D_4^{20} 0.9473 — n_D^{20} 1.4192
Vapor pressure, 64°: 50 mm
Flashpoint: 28°C (82°F)
Forms Grignard reagent
F&F: Vol. 14, p 186.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18171-11-4] HMIS: 3-3-1-X 10g ¥16,200



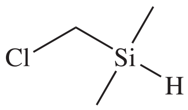
SIC2287.0
(CHLOROMETHYL)DIMETHYLPHENYLSILANE
$C_9H_{13}ClSi$ — Mw 184.73 — bp 106° / 15 — D_4^{20} 1.031 — n_D^{20} 1.522
Dipole moment: 1.93 debye
Flashpoint: 53°C (127°F)
Review of synthetic utility.[1]
Readily forms Grignard reagent, which is useful for Peterson olefinations and as a masked hydroxyl moiety.[2,3]

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 162-166.
2. Boons, G. J. P. H. et al. *Tetrahedron Lett.* **1989**, *30*, 229.
3. Rodgen, S. A.; Schaus, S. E. *Org. Lett.* **2006**, *45*, 4929.

HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[1833-51-8] TSCA EC 217-392-6 HMIS: 3-2-0-X 10g ¥14,600

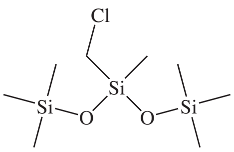
SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

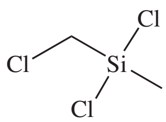


SIC2289.0
CHLOROMETHYLDIMETHYLSILANE
C_3H_9ClSi — Mw 108.64 — bp 81° — D 0.894[25] — n_D 1.4168[25]
Flashpoint: 14°C (57°F)
Hydrosilylation of dendrimers with unsaturated termination allows functionalization.[1]
1. Meijboom, R. et al. *J. Organomet. Chem.* **2004,** *689*, 987.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[3144-74-9] TSCA EC 221-556-2 HMIS: 2-4-1-X 10g ¥26,300

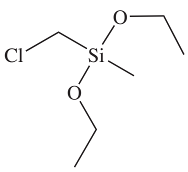
CHLOROMETHYLDIMETHYLVINYLSILANE - see SIV9065.0 VINYL(CHLOROMETHYL)DIMETHYLSILANE



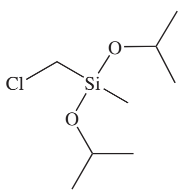
SIC2289.5
3-(CHLOROMETHYL)HEPTAMETHYLTRISILOXANE
$C_8H_{23}ClO_2Si_3$ — Mw 270.98 — bp 185-6° — mp (-85°) — D 0.918 — n_D 1.4058[25]
Viscosity, 25°: 1 cSt — Vapor pressure, 102°: 40 mm
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[17201-87-5] HMIS: 2-2-0-X 25g ¥17,800 100g ¥50,100



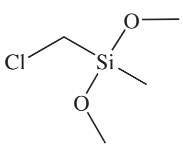
SIC2290.0
CHLOROMETHYLMETHYLDICHLOROSILANE
$C_2H_5Cl_3Si$ — Mw 163.51 — bp 121-2° — mp (-64°) — D 1.285 — n_D 1.4500
Vapor pressure, 20°: 11 mm — Flashpoint: 35°C (95°F)
Dipole moment: 1.82 debye — TOXICITY: oral rat, LD50: >2,000 mg/kg
Autoignition temperature: 375°C
Intermediate for flusilazole fungicide.[1]
1. Moburg, K. U.S. Patent 4,510,136, 1995.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1558-33-4] (既) 2-2047 TSCA EC 216-319-5 HMIS: 3-3-1-X 25g ¥11,900 1kg ¥81,200



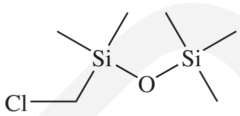
SIC2292.0
CHLOROMETHYLMETHYLDIETHOXYSILANE
$C_6H_{15}ClO_2Si$ — Mw 182.72 — bp 160-1° — D 1.000[25] — n_D 1.407
Vapor pressure, 70°: 20 mm — Flashpoint: 38°C (100°F)
TOXICITY: oral rat, LD50: 1,300 mg/kg
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2212-10-4] (既) 2-2078 TSCA EC 218-657-9 HMIS: 3-3-1-X 25g ¥17,800



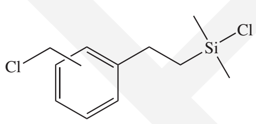
SIC2293.0
CHLOROMETHYLMETHYLDIISOPROPOXYSILANE
$C_8H_{19}ClO_2Si$ — Mw 210.78 — bp 50-2° / 1.5 — D 0.970 — n_D 1.4212
Flashpoint: 48°C (118°F)
Grignard reagent behaves as nucleophilic hydroxymethylation agent
Forms stable Grignard reagent that after reaction and oxidation transfers a hydroxymethyl moiety.[1]
1. Tamao, K. et al. *J. Org. Chem.* **1983**, *48*, 2120.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2212-08-0] HMIS: 2-2-0-X 10g ¥17,800



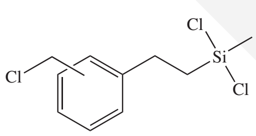
SIC2293.2
CHLOROMETHYLMETHYLDIMETHOXYSILANE
$C_4H_{11}ClO_2Si$ — Mw 154.67 — bp 142° — D 1.065 — n_D 1.4123
ΔHvap: 35 kJ/mole — Flashpoint: 22°C (72°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2212-11-5] HMIS: 3-4-1-X 25g ¥28,900



SIC2294.0
CHLOROMETHYLPENTAMETHYLDISILOXANE
$C_6H_{17}ClOSi_2$ — Mw 198.62 — bp 53° / 10 — D 0.8912 — n_D 1.4477
Flashpoint: 43°C (109°F)
See also SIC2289.5
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[17201-83-1] HMIS: 2-2-0-X 10g ¥14,600

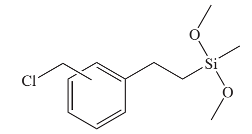


SIC2295.0
((CHLOROMETHYL)PHENYLETHYL)DIMETHYLCHLOROSILANE
$C_{11}H_{16}Cl_2Si$ — Mw 247.24 — bp 134-5° / 20 — D 1.00 — n_D 1.5223
Mixed m-, p-isomers — Flashpoint: 87°C (189°F)
Employed in surface initiated ATRP polymerization.[1]
1. von Werner, T.; Patten, T. E. *J. Am. Chem. Soc.* **1999,** *121*, 7408.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[68092-71-7] TSCA EC 268-469-6 HMIS: 3-2-1-X 25g ¥30,500

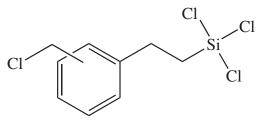


SIC2295.1
((CHLOROMETHYL)PHENYLETHYL)METHYLDICHLOROSILANE
$C_{10}H_{13}Cl_3Si$ — Mw 267.66 — bp 120-5° / 0.6 — D 1.21
Mixed m-, p-isomers — Flashpoint: 104°C (219°F)
Intermediate for silicone analog of Merrifield resins.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[81870-64-6] EC 279-841-2 HMIS: 3-1-1-X 25g ¥19,400 100g ¥55,200

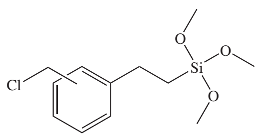
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



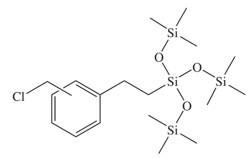
SIC2295.2
((CHLOROMETHYL)PHENYLETHYL)METHYLDIMETHOXYSILANE
$C_{12}H_{19}ClO_2Si$ 258.82 120-5° / 0.5
Mixed m-, p-isomers
Intermediate for silicone analog of Merrifield resins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[160676-60-8]/[160676-58-4] HMIS: 2-1-1-X 25g ¥37,900



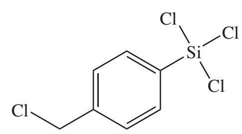
SIC2295.3
((CHLOROMETHYL)PHENYLETHYL)TRICHLOROSILANE
$C_9H_{10}Cl_4Si$ 288.08 111-2° / 1.5 1.32
Mixed m-, p-isomers Flashpoint: >100°C (>212°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[58274-32-1] TSCA EC 261-196-3 HMIS: 3-1-1-X 25g ¥16,400 100g ¥45,600



SIC2295.5
((CHLOROMETHYL)PHENYLETHYL)TRIMETHOXYSILANE
$C_{12}H_{19}ClO_3Si$ 274.82 115° / 1.5 1.09^{25} 1.493^{25}
Mixed m-, p-isomers Flashpoint: 130°C (266°F)
Adhesion promoter for polyphenylenesulfide and polyimide coatings
Employed as a high temperature coupling agent.[1]
1. Arkles, B. et al. *Modern Plastics* **1980,** *57*, 64.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[68128-25-6] TSCA EC 268-575-2 HMIS: 3-1-1-X 25g ¥15,800 100g ¥36,900 2kg ¥275,000
COMMERCIAL

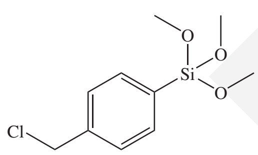


SIC2295.7
CHLOROMETHYLPHENETHYLTRIS(TRIMETHYLSILOXY)SILANE, mixed m,p; α,β isomers
$C_{18}H_{37}ClO_3Si_4$ 449.28 1.007 1.469
Mixed m-, p-; α-, β-isomers
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[167426-89-3] HMIS: 3-2-0-X 25g ¥39,500

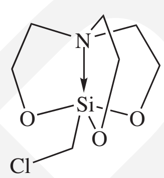


SIC2296.0
(p-CHLOROMETHYL)PHENYLTRICHLOROSILANE, 95%
$C_7H_6Cl_4Si$ 260.02 142-4° / 15 1.361 1.5395
Flashpoint: 78°C (172°F)
High temperature coupling agent
Employed in surface initiated ATRP of poly (N-isopropylacrylamide)[1], poly(methyl methacrylate).[2]
1. Kikuchi, A. et al. *Polymer Preprints* **2005**, *46*, 124.
2. Kang, E. et al. *Macromolecules* **2005**, *38*, 7867.
See also SIC2283.0, SIC2295.3
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13688-90-9] TSCA EC 237-203-0 HMIS: 3-2-1-X 25g ¥21,500

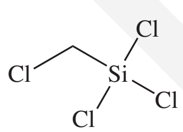
Flexible multi-layer circuit boards for cell-phones use polyimide films coupled with chloromethyl aromatic silanes



SIC2296.2
(p-CHLOROMETHYL)PHENYLTRIMETHOXYSILANE, 95%
$C_{10}H_{15}ClO_3Si$ 246.77 134-43° / 10 1.14 1.4965
Flashpoint: 183°C (361°F)
Coupling agent for polyimides, e.g. in printed circuit boards
Modifies silica for high-throughput peptide synthesis.[1]
1. Houghten, R. et al. *J. Am. Chem. Soc.* **2005**, *127*, 8582.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[24413-04-5] TSCA EC 246-235-4 HMIS: 3-1-1-X 25g ¥19,900 100g ¥57,000 2kg ¥578,000
COMMERCIAL



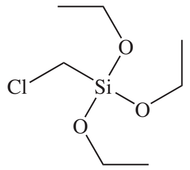
SIC2297.0
CHLOROMETHYLSILATRANE
$C_7H_{14}ClNO_3Si$ 223.73 (221-2°)
TOXICITY: oral rat, LD50: 3,000 mg/kg
Reported to stimulate tissue growth.[1]
1. Voronkov, M. in Biochemistry of Silicon and Related Problems; Bendz, G., Ed.; Plenum, 1978, p 395.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[42003-39-4] TSCA EC 255-621-1 HMIS: 2-1-0-X 10g ¥40,600



SIC2298.0
CHLOROMETHYLTRICHLOROSILANE
CH_2Cl_4Si 183.92 117-8° 1.465 1.4535
Viscosity, 20°: 0.5 cSt
Vapor pressure, 20°: 18 mm
ΔHvap: 157.8 kJ/mole
Dipole moment: 1.61 debye
Surface tension, 27°: 26.5 mN/m
Flashpoint: 69°C (156°F)
TOXICITY: ipr rat, LD100: 150 mg/kg
Autoignition temperature: 380˚C
Critical temperature: 310˚C
Thermal conductivity, 27°: 0.1420 W/m°C
Heat capacity, 27°: 0.912 kJ/kg°C
Decomposes at temperatures >250°
Building block for carbosilanes.[1]
1. Whitmarsh, C.; Interante, L. US Patent 5,153,295, 1992.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1558-25-4] (既) 2-2046 TSCA EC 216-316-9 HMIS: 3-2-1-X 25g ¥13,800 100g ¥37,100

SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

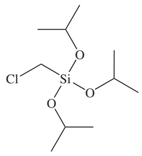


SIC2298.4
CHLOROMETHYLTRIETHOXYSILANE
$C_7H_{17}ClO_3Si$ | 212.75 | 90-1° / 25 | | 1.048 | 1.4069^{25}

Flashpoint: 47°C (117°F)
TOXICITY: oral rat, LD50: 2,400 mg/kg

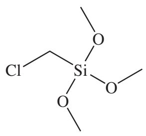
Grignard reacts with chlorosilanes or intermolecularly to form carbosilanes.[1]
1. Brondani, D. et al. *Tetrahedron Lett.* **1993,** *34*, 2111.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[15267-95-5] (既) 2-2079 TSCA EC 239-311-3 HMIS: 2-2-1-X 25g ¥10,800 100g ¥24,100 2kg ¥160,000

COMMERCIAL



SIC2298.5
CHLOROMETHYLTRIISOPROPOXYSILANE
$C_{10}H_{23}ClO_3Si$ | 254.82 | 195-8° | | 0.9836 | 1.4145

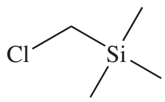
Forms Grignard reagents
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18162-82-8] TSCA-L HMIS: 2-2-1-X 25g ¥28,900



SIC2298.6
CHLOROMETHYLTRIMETHOXYSILANE
$C_4H_{11}ClO_3Si$ | 170.67 | 156° | | 1.125 | 1.4070

Flashpoint: 26°C (79°F)

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5926-26-1] (既) 2-2079 TSCA-L HMIS: 3-4-1-X 10g ¥10,600 50g ¥32,100

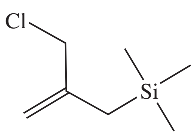


SIC2305.0
CHLOROMETHYLTRIMETHYLSILANE, 98%
$C_4H_{11}ClSi$ | 122.67 | 97-8° | | 0.886 | 1.4180

Dipole moment: 2.03 debye
Solubility, water: 0.4 g/l
Flashpoint: -2°C (28°F)
Autoignition temperature: 295°C
Vapor pressure, 20°: 24 mm

Reagent for Peterson olefination - conversion of cabonyls to olefins.[1]
1. Reviews: Anderson, R. *Synthesis* **1985,** 717; Chan, T. *Acc. Chem. Res.* **1977,** *10*, 422.
See also SIB1892.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2344-80-1] (既) 2-3846 TSCA EC 219-058-5 HMIS: 2-4-0-X 25g ¥7,800 100g ¥25,700 2kg ¥197,000

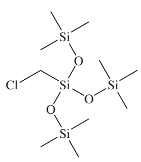
COMMERCIAL



SIC2320.0
2-CHLOROMETHYL-3-TRIMETHYLSILYL1-PROPENE
2-(CHLOROMETHYL)ALLYLTRIMETHYLSILANE
$C_7H_{15}ClSi$ | 162.74 | 162-3° | | 0.899 | 1.4540

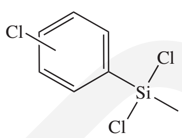
Flashpoint: 43°C (109°F)

Annulation reagent - converts cyclic enones to fused methylene cyclopentanes.[1]
1. Knapp, S. et al. *Tetrahedron Lett.* **1980,** *21*, 4557.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18388-03-9] HMIS: 3-2-0-X 5g ¥79,800



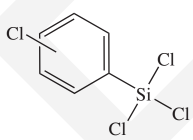
SIC2325.0
CHLOROMETHYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{10}H_{29}ClO_3Si_4$ | 345.13 | 72° / 1.5 | | 0.968 | 1.4044

See also SIC2289.5, SIC2294.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[41919-30-6] TSCA-L HMIS: 2-2-0-X 10g ¥12,700 50g ¥40,600



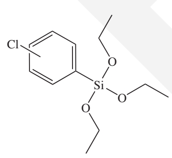
SIC2328.0
(CHLOROPHENYL)METHYLDICHLOROSILANE, 95%
$C_7H_7Cl_3Si$ | 225.58 | 78-82° / 4 | | 1.30 | 1.535

Mixed isomers
Flashpoint: 91°C (196°F)
Intermediate for high refractive index silicone fluids
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[25898-35-5] HMIS: 3-2-1-X 25g ¥36,300



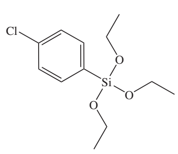
SIC2330.0
CHLOROPHENYLTRICHLOROSILANE, 95%
$C_6H_4Cl_4Si$ | 246.00 | 241-6° | | 1.432 | 1.5418

Mixed isomers
Flashpoint: 95°C (203°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[825-94-5] (既) 3-3379 TSCA EC 212-551-6 HMIS: 3-1-1-X 10g ¥15,600 50g ¥52,200



SIC2332.0
CHLOROPHENYLTRIETHOXYSILANE
$C_{12}H_{19}ClO_3Si$ | 274.82 | 143-5° / 20 | | 1.083^{25} | 1.4721^{25}

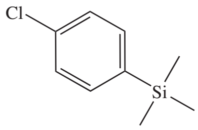
Mixed m-, p-isomers
Flashpoint: 103°C (217°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[21700-74-3] *(p-)*/[53392-05-5] *(m-)* TSCA EC 244-533-9 HMIS: 3-1-0-X 10g ¥23,300



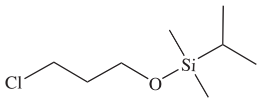
SIC2332.3
p-CHLOROPHENYLTRIETHOXYSILANE
$C_{12}H_{19}ClO_3Si$ | 274.82 | 82-4° / 0.07 | | 1.069^{25} | 1.474^{25}

Flashpoint: 103°C (217°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[21700-74-3] TSCA EC 244-533-9 HMIS: 3-1-0-X 10g ¥42,700

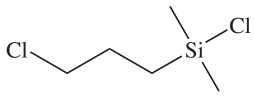
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



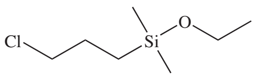
SIC2334.0
p-CHLOROPHENYLTRIMETHYLSILANE
$C_9H_{13}ClSi$ — 184.74 — 206-7° — (0.0°) — 0.996 — 1.5067^{25}
Dipole moment: 1.70 debye — Flashpoint: 49°C (120°F)
Vapor pressure, 120°: 50 mm
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[10557-71-8] TSCA HMIS: 3-2-0-X 25g ¥25,700



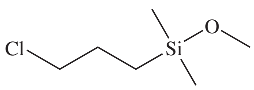
SIC2335.0
(3-CHLOROPROPOXY)ISOPROPYLDIMETHYLSILANE
1-(ISOPROPYLDIMETHYLSILOXY)-3-CHLOROPROPANE
$C_8H_{19}ClOSi$ — 194.77 — 72-3° / 10 — 0.918 — 1.4261^{25}
Forms Grignard reagents
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1191036-21-1] TSCA-L HMIS: 2-2-1-X 5g ¥22,500



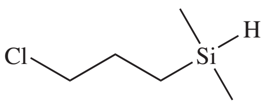
SIC2336.0
3-CHLOROPROPYLDIMETHYLCHLOROSILANE
$C_5H_{12}Cl_2Si$ — 171.14 — 179° — 1.043^{25} — 1.4488^{25}
Flashpoint: 40°C (104°F)
See also SIC2277.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[10605-40-0] (既) 2-2047 TSCA EC 234-234-1 HMIS: 3-2-1-X 10g ¥16,400 50g ¥55,400



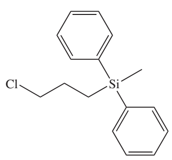
SIC2337.0
3-CHLOROPROPYLDIMETHYLETHOXYSILANE
$C_7H_{17}ClOSi$ — 180.75 — 87° / 30 — 0.932^{25} — 1.427^{25}
Flashpoint: 46°C (115°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13508-63-9] EC 236-837-5 HMIS: 2-3-1-X 25g ¥16,200



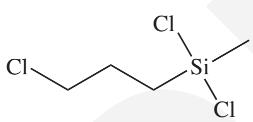
SIC2338.0
3-CHLOROPROPYLDIMETHYLMETHOXYSILANE, 95%
$C_6H_{15}ClOSi$ — 166.73 — 170-1° — 0.941 — 1.4278
Flashpoint: 39°C (102°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18171-14-7] EC 242-055-5 HMIS: 3-2-1-X 10g ¥17,800



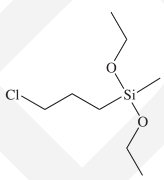
SIC2340.0
3-CHLOROPROPYLDIMETHYLSILANE
$C_5H_{13}ClSi$ — 136.70 — 134-6° — 0.892 — 1.4342
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18157-31-8] TSCA HMIS: 2-3-1-X 10g ¥25,700



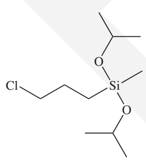
SIC2342.0
3-CHLOROPROPYLDIPHENYLMETHYLSILANE, 95%
$C_{16}H_{19}ClSi$ — 274.85 — 165-6° / 1.5 — 1.07 — 1.5656^{25}
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2632-97-5] HMIS: 2-1-0-X 10g ¥25,200



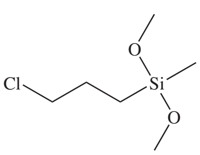
SIC2350.0
3-CHLOROPROPYLMETHYLDICHLOROSILANE
$C_4H_9Cl_3Si$ — 191.56 — 68-70° / 15 — 1.204 — 1.4580
Flashpoint: 86°C (187°F)
Cyclized intermediate can be converted to enoxysilacyclobutanes.[1]
1. Denmark, S. et al. *J. Am. Chem. Soc.* **1994,** *116*, 7026.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7787-93-1] (既) 2-2047 TSCA EC 232-136-3 HMIS: 3-2-1-X 25g ¥8,800 100g ¥20,700



SIC2352.0
3-CHLOROPROPYLMETHYLDIETHOXYSILANE
$C_8H_{19}ClO_2Si$ — 210.77 — 81-3° / 8 — 0.9744 — 1.4260
Flashpoint: 80°C (176°F)
Intermediate for functional silicone polymers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-2-1-X 100g ¥14,600

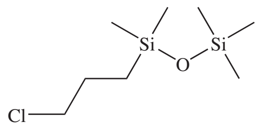


SIC2353.0
3-CHLOROPROPYLMETHYLDIISOPROPOXYSILANE
$C_{10}H_{23}ClO_2Si$ — 238.84 — 92-4° / 10 — 0.93
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-2-1-X 25g ¥16,200

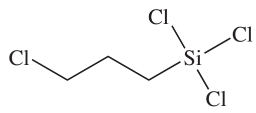


SIC2355.0
3-CHLOROPROPYLMETHYLDIMETHOXYSILANE
$C_6H_{15}ClO_2Si$ — 182.72 — 70-2° / 11 — 1.025 — 1.4253
Specific wetting surface: 428 m²/g — Flashpoint: 80°C (176°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18171-19-2] (既) 2-2078 TSCA EC 242-056-0 HMIS: 3-2-1-X 100g ¥7,400 2kg ¥57,500 18kg ¥335,000
COMMERCIAL

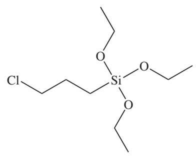
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



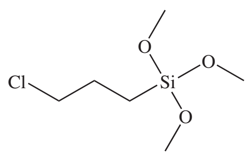
SIC2362.0
(3-CHLOROPROPYL)PENTAMETHYLDISILOXANE
$C_8H_{21}ClOSi_2$ — 224.88 — 115-7° / 70 — 0.899^{25} — 1.4189^{25}
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[18291-27-5] HMIS: 2-2-0-X 25g ¥28,900



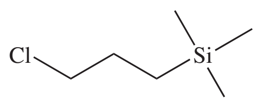
SIC2405.0 *COMMERCIAL*
3-CHLOROPROPYLTRICHLOROSILANE
$C_3H_6Cl_4Si$ — 211.98 — 181-2° — 1.359 — 1.4668
Dipole moment: 4.97 debye
Flashpoint: 84°C (183°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2550-06-3] (既) 2-2046 TSCA EC 219-844-8 HMIS: 3-2-1-X 25g ¥7,700 2.5kg ¥71,000



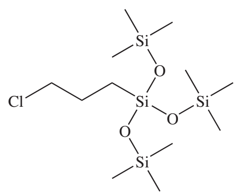
SIC2407.0 *COMMERCIAL*
3-CHLOROPROPYLTRIETHOXYSILANE
$C_9H_{21}ClO_3Si$ — 240.80 — 100-2° / 10 — 1.009 — 1.420
Flashpoint: 78°C (172°F)
Adhesion promoter for polyamine and epoxy resins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5089-70-3] (既) 2-2079 TSCA EC 225-805-6 HMIS: 2-2-0-X 25g ¥3,400 2kg ¥37,800 18kg ¥214,000



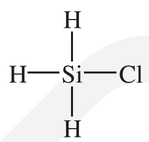
SIC2410.0 *COMMERCIAL*
3-CHLOROPROPYLTRIMETHOXYSILANE
$C_6H_{15}ClO_3Si$ — 198.72 — 100° / 40 — 1.077^{25} — 1.4183^{25}
Viscosity, 20°: 0.56 cSt
γc of treated surface: 40.5 mN/m
Specific wetting surface: 394 m²/g
Flashpoint: 78°C (172°F)
TOXICITY: oral rat, LD50: 5,628 mg/kg
Vapor pressure, 100°: 40 mm
Adhesion promoter for SBR hot-melt adhesives
Powder flow control additive for dry powder fire extinguishing media
see also SIC2280.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2530-87-2] (既) 2-2079 TSCA EC 219-787-9 HMIS: 3-2-1-X 25g ¥3,400 2kg ¥34,100 18kg ¥185,000



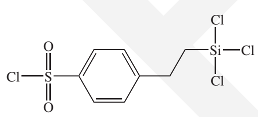
SIC2411.0
3-CHLOROPROPYLTRIMETHYLSILANE
$C_6H_{15}ClSi$ — 150.72 — 151° — 0.879 — 1.432
Flashpoint: 49°C (120°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2344-83-4] (既) 2-2047 TSCA EC 219-059-0 HMIS: 2-2-0-X 10g ¥13,000 50g ¥41,600



SIC2413.0
3-CHLOROPROPYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{12}H_{33}ClO_3Si_4$ — 373.19 — 181° / 100 — 0.922^{25} — 1.4108
Flashpoint: 85°C (185°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18077-31-1] (既) 7-500 EC 241-985-9 HMIS: 2-2-0-X 25g ¥16,200 100g ¥44,800



SIC2414.0
CHLOROSILANE, 95%
MONOCHLOROSILANE
H_3ClSi — 66.56 — -30.4° — (-118°) — 1.145^{-113}
PYROPHORIC; CONTAINS SILANE, DICHLOROSILANE
AIR TRANSPORT FORBIDDEN
ΔHvap: 21 kJ/mole
Flashpoint: -90°C (-133°F)
TOXICITY: ihl rat, LC50: 4,257 ppm/1H
Critical temperature: -123°C
Critical pressure: 48.4 atm
See also SIC2268.5
HYDROLYTIC SENSITIVITY: 10: reacts extremely rapidly with moisture and oxygen - pyrophoric - sealed system required
[13465-78-6] TSCA EC 236-705-7 HMIS: 4-4-3-X store <5°C 10g inquire
** includes gas dispensing cylinder zCYL-HPS-0420*

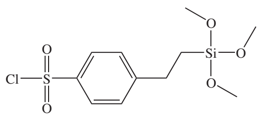


SIC2415.0
2-(4-CHLOROSULFONYLPHENYL)ETHYLTRICHLOROSILANE, 50% in methylene chloride
$C_8H_8Cl_4O_2SSi$ — 338.11 — 1.37
Contains 30% free sulfonic acid and small amounts of silylsulfonic acid condensation products
Employed in preparation of solid phase extraction columns
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[79793-00-3] TSCA EC 279-267-2 HMIS: 4-2-2-X 25g ¥16,200 100g ¥44,800

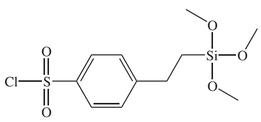
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

SIC2415.4
2-(4-CHLOROSULFONYLPHENYL)ETHYLTRICHLOROSILANE, 50% in toluene
$C_8H_8Cl_4O_2SSi$ 338.11 1.08
Flashpoint: 4°C (39°F)
Contains 30% free sulfonic acid and small amounts of silylsulfonic acid condensation products
See also SIB1811.7
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[79793-00-3] TSCA EC 279-267-2 HMIS: 4-4-2-X 25g ¥17,200 100g ¥48,300

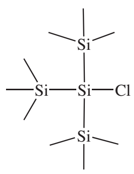
Solid Phase Extraction (SPE) columns with benzenesulfonic acid functionalized silica are utilized to analyse urine samples for amino acids and drug abuse



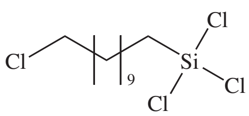
SIC2417.0
2-(4-CHLOROSULFONYLPHENYL)ETHYLTRIMETHOXYSILANE, 50% in methylene chloride
$C_{11}H_{17}ClO_5SSi$ 324.85 1.30^{25}
Amber color
Contains free sulfonic acid
Treated silica acts as etherification catalyst.[1]
Reagent for surface initiated ATRP.[2]
Employed in mesostructured fuel-cell membranes.[3]
1. Sow, B. et al. *Microporous and Mesoporous Mat'ls.* **2005,** *79*, 129.
2. Fukuda, J. et al. *Macromolecules* **2000**, *33*, 2870.
3. Pereira, F. et al. *Chem. Mater.* **2008**, *20,* 1710.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[126519-89-9] HMIS: 3-2-1-X 25g ¥22,500 100g ¥65,500



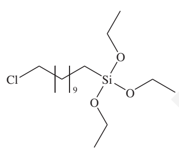
SIC2417.4
2-(4-CHLOROSULFONYLPHENYL)ETHYLTRIMETHOXYSILANE, 50% in toluene
$C_{11}H_{17}ClO_5SSi$ 324.85
Flashpoint: 4°C (39°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[126519-89-9] 25g ¥25,700



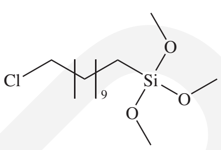
SIC2420.0
CHLOROTRIS(TRIMETHYLSILYL)SILANE, 95%
$C_9H_{27}ClSi_4$ 283.11 95-6° / 2 (47-9°)
Employed as a silylation reagent for photolithography substrates.[1]
1. Wilharm, P. et al. US Patent 5,162,559, 1992.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[5565-32-2] HMIS: 3-3-1-X 2.5g ¥28,900



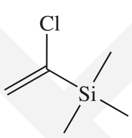
SIC2427.0
11-CHLOROUNDECYLTRICHLOROSILANE
$C_{11}H_{22}Cl_4Si$ 324.19 188° / 15 1.1204 1.4688
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17963-32-5] HMIS: 3-1-1-X 10g ¥40,600



SIC2428.0
11-CHLOROUNDECYLTRIETHOXYSILANE
$C_{17}H_{37}ClO_3Si$ 353.01 112° / 0.01 0.944 1.4390
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[120876-31-5] HMIS: 2-1-1-X 10g ¥45,900

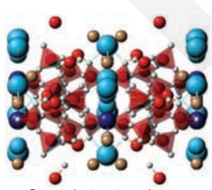


SIC2429.0
11-CHLOROUNDECYLTRIMETHOXYSILANE
$C_{14}H_{31}ClO_3Si$ 310.93 156-8° / 2 0.9855 1.4226
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17948-05-9] HMIS: 2-1-1-X 10g ¥42,700



SIC2432.0
1-CHLOROVINYLTRIMETHYLSILANE
$C_5H_{11}ClSi$ 134.68 104-5° 0.8875 1.4299
Forms acetylene on treatment with Me_4NF.[1]
1. Cunico, R. *J. Organomet. Chem.* **1978,** *162*, 1.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2441-29-4] HMIS: 3-4-1-X 2.5g ¥33,200

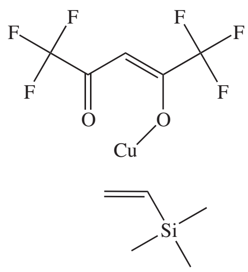
CLAY - see SIA0760.0, SIH5840.15, SIH5840.2, SIK6463.5, SIM6470.7, SIS6948.0, SIS6985.0



Crystal structure image courtesy of webmineral.com

SIC2433.0
CLINOPTILOLITE
HYDRATED SODIUM POTASSIUM CALCIUM ALUMINUM SILICATE
$Na_{1.4}K_{0.7}Ca_{0.3}Al_{4.5}Si_{13.5}O_{36}\cdot 12H_2O$ 2830.35 2.15 1.48
Particle Size: <74 µm
Mohs Hardness: 3.5-4.0
Monoclinic
Colorless to white, platy, minute crystals
Used in molecular sieves, gas adsorption, detergents, cation exchange, catalysis
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12173-10-3] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 10kg ¥53,900

SILICON COMPOUNDS

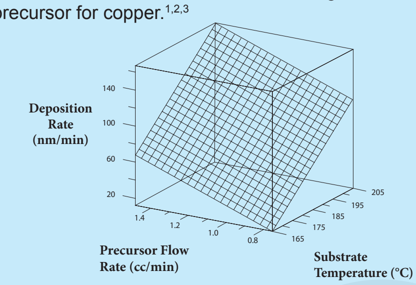


AKC252.8
COPPER(I)/(II) HEXAFLUORO-2,4-PENTANEDIONATE - VINYLTRIMETHYLSILANE COMPLEX

$C_{10}H_{13}CuF_6O_2Si$	370.84	50° / 50	(-5°)	1.49	

10-20% Copper(II)
Flashpoint: 72°C (162°F)
TOXICITY: oral rat, LD50: 540 mg/kg
Autoignition temperature: 340˚C

High deposition rate, stable, optimized precursor for copper.[1,2,3]



1. Kaloyeros, A. et al. U.S. Patent 6,037,001, 2000.
2. Burke, A. et al. *J. Appl. Phys.* **1997**, *82*, 4651.
3. Braeckelmann, G. et al. *J. Vac. Sci. Technol. B* **1996**, *14*, 1828.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[139566-53-3]/[14781-45-4] HMIS: 3-2-1-X 10g ¥20,500 50g ¥68,500

COMMERCIAL

Cu_5Si

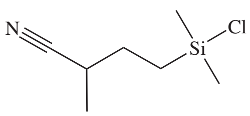
SIC2435.0
COPPER SILICIDE

Cu_5Si	345.79		(825°)	7.7 - 7.8	

Coarse granules
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[12159-07-8] TSCA EC 235-286-8 HMIS: 2-0-0-X 25g ¥26,300

(Z)-CROTYLTRICHLOROSILANE - see SIB1927.2 (Z)-2-BUTENYLTRICHLOROSILANE

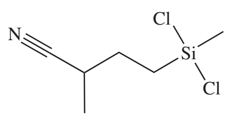
(E)-CROTYLTRICHLOROSILANE - see SIB1927.4 (E)-2-BUTENYLTRICHLOROSILANE



SIC2436.0
(3-CYANOBUTYL)DIMETHYLCHLOROSILANE

$C_7H_{14}ClNSi$ 劇物	175.73	80-4° / 1		0.993	

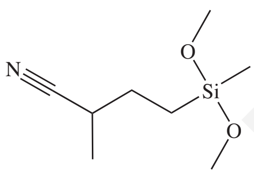
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X 25g ¥16,200 100g ¥44,800



SIC2437.0
(3-CYANOBUTYL)METHYLDICHLOROSILANE

$C_6H_{11}Cl_2NSi$ 劇物	196.17	63° / 0.3		1.104	

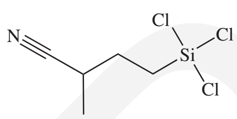
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[71550-62-4] TSCA EC 275-613-1 HMIS: 3-2-1-X 25g ¥16,400



SIC2437.5
(3-CYANOBUTYL)METHYLDIMETHOXYSILANE

$C_8H_{17}NO_2Si$ 劇物	187.32	77° / 1.5		0.947	1.4231

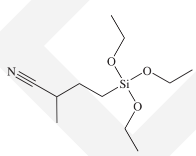
Flashpoint: 93°C (199°F)
Component in solvent resistant silicone resins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[793681-94-4] TSCA HMIS: 3-2-1-X 25g ¥26,800



SIC2438.0
(3-CYANOBUTYL)TRICHLOROSILANE

$C_5H_8Cl_3NSi$ 劇物	216.57	61-3° / 2		1.22	1.4589

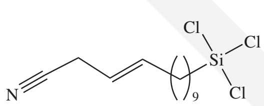
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[163155-56-4] TSCA-L HMIS: 3-2-1-X 25g ¥16,200 100g ¥44,800



SIC2439.0
(3-CYANOBUTYL)TRIETHOXYSILANE

$C_{11}H_{23}NO_3Si$ 劇物	245.39	75° / 4		0.9652	1.4171

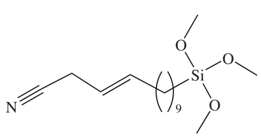
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1049679-56-2] HMIS: 2-2-1-X 25g ¥13,500



SIC2439.5
12-CYANODODEC-10-ENYLTRICHLOROSILANE, tech-95

$C_{13}H_{22}Cl_3NSi$ 劇物	326.77	166-9° / 1			

Primarily *E* isomer
Forms SAMs that interact with heavy metals
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 5g ¥36,300

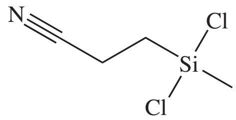


SIC2439.7
12-CYANODODEC-10-ENYLTRIMETHOXYSILANE, tech-95

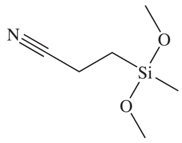
$C_{16}H_{31}NO_3Si$ 劇物	313.51				

Primarily *E* isomer
Forms SAMs that interact with heavy metals
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 5g ¥36,300

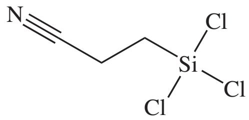
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



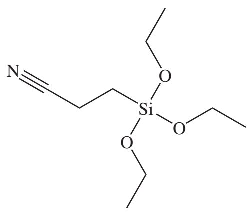
SIC2440.0
2-CYANOETHYLMETHYLDICHLOROSILANE
$C_4H_7Cl_2NSi$ 劇物 — 168.10 — 60-4° / 4 — 1.2015 — 1.4550^{25}
Flashpoint: 60°C (140°F)
Vapor pressure, 60°: 4 mm
Monomer for polar silicones used in GC phases
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1071-21-2] TSCA EC 213-985-9 HMIS: 3-2-1-X 25g ¥42,700



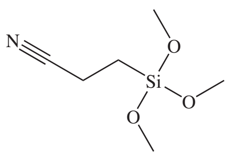
SIC2441.0
2-CYANOETHYLMETHYLDIMETHOXYSILANE
$C_6H_{13}NO_2Si$ 劇物 — 159.26 — 89-90° / 8 — 0.9862 — 1.4192
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2526-61-6] HMIS: 3-2-1-X 10g ¥40,600



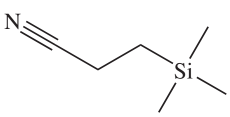
SIC2442.0
2-CYANOETHYLTRICHLOROSILANE
$C_3H_4Cl_3NSi$ 劇物 — 188.52 — 84-6° / 10 — (32-3°) — 1.356 — 1.4615
ΔHvap: 46.9 kJ/mole
TOXICITY: oral rat, LD50: 2,000 mg/kg
Vapor pressure, 85°: 12 mm
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1071-22-3] TSCA EC 213-986-4 HMIS: 3-2-1-X 10g ¥12,700



SIC2445.0
2-CYANOETHYLTRIETHOXYSILANE
$C_9H_{19}NO_3Si$ 劇物 — 217.34 — 224-5° — 0.9792 — 1.4140
Flashpoint: 86°C (187°F)
TOXICITY: oral rat, LD50: 5,630 mg/kg
Crosslinker for moisture-cure silicone RTVs - improves fuel resistance
Forms mesoporous organosilica in combination with bis(triethoxysilyl)ethane.[1]
1. Wahab, M. et al. *Microporous and Mesoporous Materials*, **2004**, *69*, 19.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[919-31-3] TSCA EC 213-050-5 HMIS: 2-2-0-X 25g ¥5,900 100g ¥18,600 2kg ¥104,100
COMMERCIAL

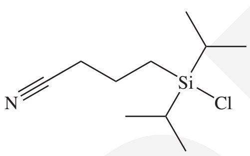


SIC2446.0
2-CYANOETHYLTRIMETHOXYSILANE
$C_6H_{13}NO_3Si$ 劇物 — 175.26 — 112° / 15 — 1.079 — 1.4126
γc of treated surfaces: 34 mN/m
Flashpoint: 79°C (174°F)
Crosslinker for moisture-cure silicones - improves solvent resistance
See also SIT8579.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2526-62-7] TSCA EC 219-764-3 HMIS: 3-2-1-X 25g ¥15,400 100g ¥42,200

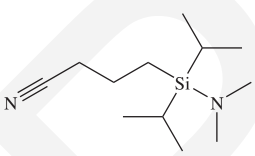


SIC2446.5
2-CYANOETHYLTRIMETHYLSILANE
$C_6H_{13}NSi$ 劇物 — 127.26 — 102° / 30 — 0.8123
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18151-32-1] HMIS: 2-3-0-X 1.0g ¥25,200

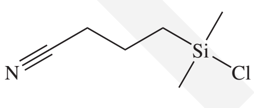
CYANOMETHYLTRIMETHYLSILANE - see SIT8579.0 TRIMETHYLSILYLACETONITRILE



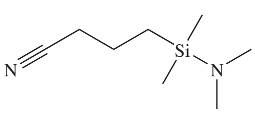
SIC2450.0
3-CYANOPROPYLDIISOPROPYLCHLOROSILANE
4-[CHLOROBIS(1-METHYLETHYL)SILYL]BUTANENITRILE
$C_{10}H_{20}ClNSi$ 劇物 — 217.82 — 95° / 0.2 — 0.97
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[113641-37-5] TSCA HMIS: 3-1-1-X 10g ¥28,900



SIC2451.0
3-CYANOPROPYLDIISOPROPYL(DIMETHYLAMINO)SILANE
4-[DIMETHYLAMINOBIS(1-METHYLETHYL)SILYL]BUTANENITRILE
$C_{12}H_{26}N_2Si$ 劇物 — 226.44 — 96-8° / 0.2 — 0.89
Stable cyanofunctional bonded phase
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[163794-91-0] TSCA HMIS: 3-2-1-X 10g ¥41,900

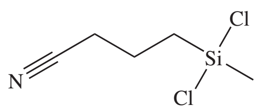


SIC2452.0
3-CYANOPROPYLDIMETHYLCHLOROSILANE
4-(CHLORODIMETHYLSILYL)BUTYRONITRILE
$C_6H_{12}ClNSi$ 劇物 — 161.71 — 108-9° / 15 — 0.986 — 1.4460
Flashpoint: 85°C (185°F)
Coupling agent for antibodies.[1]
Allows formation of electrostatic gated nanopore electrodes.[2]
1. Falipou, S. et al. *Bioconjugate Chem.* **1999**, *10*, 346.
2. Wang, G. et al. *J. Am Chem. Soc.* **2006,** *128*, 7679.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18156-15-5] TSCA EC 242-039-8 HMIS: 3-2-1-X 25g ¥15,600 100g ¥43,200

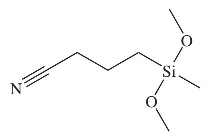


SIC2452.2
3-CYANOPROPYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_8H_{18}N_2Si$ 劇物 — 170.33
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[111873-32-6] HMIS: 3-2-1-X 25g ¥39,500

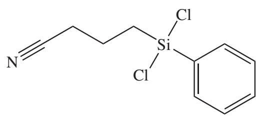
Name | Mw | bp °C/mm | (mp °C) | D_4^{20} | n_D^{20}



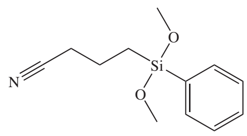
SIC2453.0
3-CYANOPROPYLMETHYLDICHLOROSILANE
$C_5H_9Cl_2NSi$ 劇物 182.12 79-82° / 1 1.145^{25} 1.4551^{25}
Flashpoint: 92°C (198°F)
TOXICITY: oral, rat, LD50: 2,830 mg/kg
Monomer for silicone films for microelectrodes permeable to polar molecules
See also SIC2453.5
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1190-16-5] TSCA EC 214-717-3 HMIS: 3-2-1-X 25g ¥15,100 100g ¥41,400



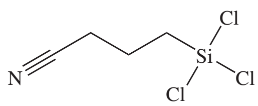
SIC2453.5
3-CYANOPROPYLMETHYLDIMETHOXYSILANE
$C_7H_{15}NO_2Si$ 劇物 173.29 82-3° / 3 0.9970 1.4235
See also SIC2437.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[153723-40-1] HMIS: 3-2-1-X 5g ¥11,100 25g ¥33,700



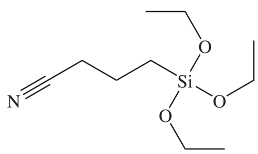
SIC2453.7
3-CYANOPROPYLPHENYLDICHLOROSILANE
$C_{10}H_{11}Cl_2NSi$ 劇物 244.20 145-8° / 2 1.19^{25} 1.5312^{25}
Monomer for high temperature polar phases for GC.[1]
1. Kruppa, R. et al. U.S. Patent 4,063,911, 1977.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1078-96-2] TSCA HMIS: 3-2-1-X 10g ¥34,700



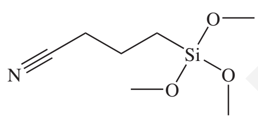
SIC2453.8
3-CYANOPROPYLPHENYLDIMETHOXYSILANE, 95%
$C_{12}H_{17}NO_2Si$ 劇物 235.36 138-9° / 1 1.103 1.4970
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[204760-82-7] HMIS: 3-2-1-X 10g ¥42,200



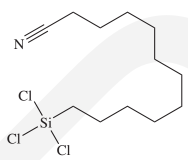
SIC2454.0
3-CYANOPROPYLTRICHLOROSILANE
4-(TRICHLOROSILYL)BUTYRONITRILE
$C_4H_6Cl_3NSi$ 劇物 202.54 93-4° / 8 1.302 1.465
Flashpoint: 75°C (167°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1071-27-8] TSCA EC 213-990-6 HMIS: 3-2-1-X 25g ¥13,000 100g ¥34,500



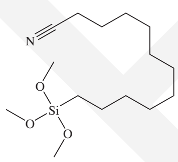
SIC2455.0
3-CYANOPROPYLTRIETHOXYSILANE
$C_{10}H_{21}NO_3Si$ 劇物 231.37 79-80° / 0.6 0.961 1.4174
Viscosity: 2.3 cSt
Flashpoint: 74°C (165°F)
TOXICITY: oral rat, LD50: 2,460 mg/kg
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1067-47-6] TSCA EC 213-931-4 HMIS: 3-2-1-X 25g ¥13,500 100g ¥36,300



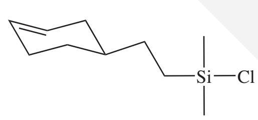
SIC2456.0
3-CYANOPROPYLTRIMETHOXYSILANE
4-(TRIMETHOXYSILYL)BUTYRONITRILE
$C_7H_{15}NO_3Si$ 劇物 189.29 90-2° / 7 1.027 1.4416
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[55453-24-2] TSCA EC 259-646-9 HMIS: 3-2-1-X 10g ¥12,500 50g ¥48,500



SIC2456.3
11-CYANOUNDECYLTRICHLOROSILANE
$C_{12}H_{22}Cl_3NSi$ 劇物 314.76 162-4° / 1 1.075
Treated surface contact angle, water: 68°
Long chain organofunctional silane
See also SIC2439.7, SIC2456.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[724460-16-6] HMIS: 3-2-1-X 5g ¥45,900

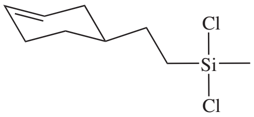


SIC2456.5
11-CYANOUNDECYLTRIMETHOXYSILANE
$C_{15}H_{31}NO_3Si$ 劇物 301.50 160° / 1 0.933 1.4394
Long chain organofunctional silane
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[253788-37-3] HMIS: 2-1-1-X 5g ¥45,900

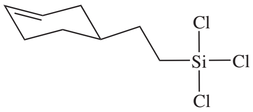


SIC2457.0
[2-(3-CYCLOHEXENYL)ETHYL]DIMETHYLCHLOROSILANE
$C_{10}H_{19}ClSi$ 202.80 105-9° / 10 0.957^{25} 1.4729
Contains isomers
Flashpoint: 74°C (165°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[5089-25-8] HMIS: 3-2-1-X 25g ¥25,700

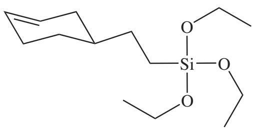
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



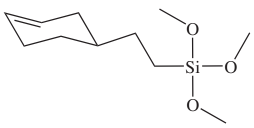
SIC2458.0
[2-(3-CYCLOHEXENYL)ETHYL]METHYLDICHLOROSILANE
$C_9H_{16}Cl_2Si$ — Mw 223.22 — bp 79-81° / 2 — D 1.0771 — n 1.4829
Contains isomers — Flashpoint: 80°C (176°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17864-93-6] TSCA EC 241-815-3 HMIS: 3-2-1-X 25g ¥25,200



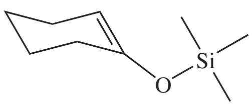
SIC2459.0
[2-(3-CYCLOHEXENYL)ETHYL]TRICHLOROSILANE
$C_8H_{13}Cl_3Si$ — Mw 243.64 — bp 74-5° / 0.7 — D 1.23
Contains isomers — Flashpoint: 86°C (187°F)
TOXICITY: oral rat, LD50: 2,830 mg/kg
Autoignition temperature: 235°C
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18290-60-3] TSCA EC 242-163-2 HMIS: 3-2-1-X 25g ¥24,700



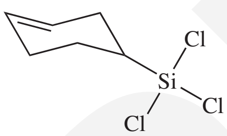
SIC2459.5
[2-(3-CYCLOHEXENYL)ETHYL]TRIETHOXYSILANE
$C_{14}H_{28}O_3Si$ — Mw 272.46 — D 0.948 — n 1.444
Contains isomers — Flashpoint: 120°C (248°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[77756-79-7] HMIS: 2-1-1-X 10g ¥12,500 50g ¥39,500



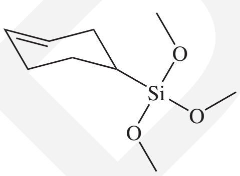
SIC2460.0
[2-(3-CYCLOHEXENYL)ETHYL]TRIMETHOXYSILANE
$C_{11}H_{22}O_3Si$ — Mw 230.38 — bp 109° / 6 — D 1.02 — n 1.4476
Contains isomers — Flashpoint: 80°C (176°F)
Orients liquid crystals in display devices.[1]
Coupling agent for aramid fiber reinforced epoxy.[2]
1. Sharp, *Chem. Abstr.* 101,81758g; Jap. Patent JP 58122517, 1983.
2. Lechner, U. *Chem. Abstr.* 112, 218118x; Germ. Offen. DE 3820971, 1989.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[67592-36-3] TSCA EC 266-749-2 HMIS: 3-2-1-X 10g ¥9,800 50g ¥28,900



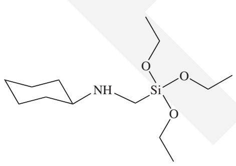
SIC2462.0
(CYCLOHEXENYLOXY)TRIMETHYLSILANE
1-(TRIMETHYLSILOXY)CYCLOHEXENE
$C_9H_{18}OSi$ — Mw 170.33 — bp 67-8° / 16 — D 0.885 — n 1.447
Flashpoint: 51°C (124°F)
Reacts with ethylene oxide to give γ-hydroxy ketones.[1]
Reacts with aldehydes, acetals, and enones w/o Lewis acid catalysis in the presence of hexafluoro-2-propanol.[2]
Hydroboration/oxidation leads to trans-1,2-diols.[3]
Hydroboration/elimination converts silyl enol ethers to olefins.[4]
1. Lalic, G. et al. *Tetrahedron Lett.* **2000**, *41*, 763.
2. Ratnikov, M. O. et al. *Angew. Chem., Int. Ed. Engl.* **2008**, *47*, 9739.
3. Larson, G. L. et al. *J. Organomet. Chem.* **1974**, *76*, 9.
4. Larson, G. L. et al. *Tetrahedron Lett.* **1975**, 4005.
See also SIC2552.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[6651-36-1] TSCA EC 229-675-1 HMIS: 3-2-1-X 10g ¥16,200



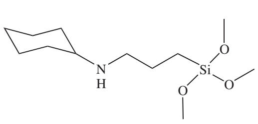
SIC2464.0
3-CYCLOHEXENYLTRICHLOROSILANE
$C_6H_9Cl_3Si$ — Mw 215.58 — bp 87-8° / 16 — D 1.25 — n 1.4905
Flashpoint: 90°C (194°F)
TOXICITY: oral rat, LD50: 2,830 mg/kg
See also SIB0986.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[10137-69-6] TSCA EC 233-377-7 HMIS: 3-2-1-X 50g ¥36,300



SIC2464.1
3-CYCLOHEXENYLTRIMETHOXYSILANE
$C_9H_{18}O_3Si$ — Mw 202.32 — bp 78-9° / 6 — D 1.039
Flashpoint: 60°C (140°F)
See also SIB0992.0, SIC2464.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[21619-76-1] HMIS: 3-2-1-X 5g ¥35,300

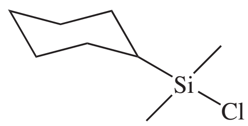


SIC2464.2
(N-CYCLOHEXYLAMINOMETHYL)TRIETHOXYSILANE, 95%
$C_{13}H_{29}NO_3Si$ — Mw 275.46 — bp 236° — D 0.950 — n 1.4377
Flashpoint: 119°C (246°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[26495-91-0] TSCA EC 247-744-4 HMIS: 2-1-1-X 25g ¥10,900 100g ¥27,600



SIC2464.4
N-CYCLOHEXYLAMINOPROPYLTRIMETHOXYSILANE
$C_{12}H_{27}NO_3Si$ — Mw 261.43 — bp 114° / 3 — D 0.99 — n 1.486^{25}
Viscosity: 5-7 cSt — Flashpoint: >110°C (>230°F)
Autoignition temperature: 260°C
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3068-78-8] TSCA EC 221-329-8 HMIS: 3-2-1-X 25g ¥16,200

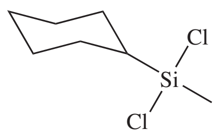
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIC2465.0
CYCLOHEXYLDIMETHYLCHLOROSILANE

$C_8H_{17}ClSi$	176.76	52-3° / 2 Flashpoint: 63°C (145°F)		0.956	1.4626

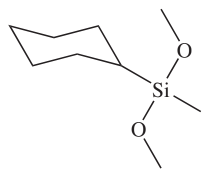
Silane blocking agent with good resistance to Grignard reagents
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[71864-47-6] HMIS: 3-2-1-X 25g ¥31,000



SIC2468.0
CYCLOHEXYLMETHYLDICHLOROSILANE

$C_7H_{14}Cl_2Si$	197.18	83° / 15 Flashpoint: 66°C (151°F)		1.095	1.4724

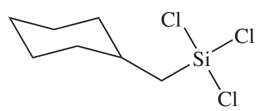
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[5578-42-7] TSCA EC 226-956-0 HMIS: 3-2-1-X 25g ¥11,100 1kg ¥106,700



SIC2469.0
CYCLOHEXYLMETHYLDIMETHOXYSILANE

$C_9H_{20}O_2Si$	188.34	196° Flashpoint: 66°C (151°F) TOXICITY: oral rat, LD50: 3,000 mg/kg		0.9472	1.4354

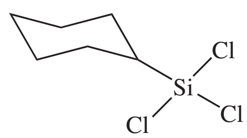
Vapor pressure, 20°: 12 mm
Donor for polyolefin polymerization
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17865-32-6] TSCA HMIS: 2-2-1-X 25g ¥3,400 100g ¥10,100 2kg ¥141,000
COMMERCIAL



SIC2470.0
(CYCLOHEXYLMETHYL)TRICHLOROSILANE

$C_7H_{13}Cl_3Si$	231.62	94-8° / 11			

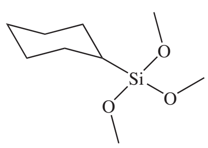
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18388-16-4] TSCA EC 242-265-7 HMIS: 3-2-1-X 10g ¥42,700



SIC2480.0
CYCLOHEXYLTRICHLOROSILANE

$C_6H_{11}Cl_3Si$	217.60	90-1° / 10 Flashpoint: 91°C (196°F)		1.222	1.4774

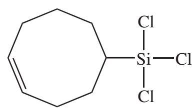
Intermediate for melt-processable silsesquioxane-siloxanes.[1]
Employed in solid-phase extraction columns.[2]
1. Lichtenhan, J. et al. *Macromolecules* **1993,** *26*, 2141.
2. Tippins, B. *Nature* **1988,** *334*, 273.
See also SIB0997.0, SIC2555.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[98-12-4] TSCA EC 202-639-2 HMIS: 3-2-1-X 25g ¥16,200 100g ¥44,800



SIC2482.0
CYCLOHEXYLTRIMETHOXYSILANE

$C_9H_{20}O_3Si$	204.34	207-9°		0.995	1.433

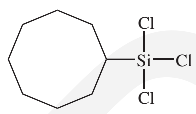
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17865-54-2] HMIS: 2-3-1-X 10g ¥12,500 50g ¥39,500



SIC2485.0
(4-CYCLOOCTENYL)TRICHLOROSILANE, 95%

$C_8H_{13}Cl_3Si$	243.64	49-53° / 0.2			

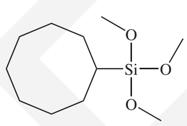
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18441-88-8] HMIS: 3-1-1-X 10g ¥22,500



SIC2490.0
CYCLOOCTYLTRICHLOROSILANE, 95%

$C_8H_{15}Cl_3Si$	245.65	85-9° / 1.25		1.19	

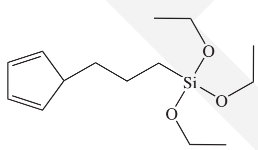
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18290-59-0] HMIS: 3-2-1-X 10g ¥16,700



SIC2492.0
CYCLOOCTYLTRIMETHOXYSILANE

$C_{11}H_{24}O_3Si$	232.40	85° / 1		1.10	1.4537

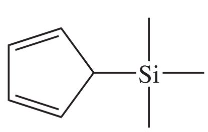
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-3-1-X 5g ¥22,500



SIC2520.0
(3-CYCLOPENTADIENYLPROPYL)TRIETHOXYSILANE

$C_{14}H_{26}O_3Si$	270.44	115° / 0.5 Flashpoint: 100°C (212°F)		0.99	1.4513

Dimer; may be cracked to monomer at ~ 190° at 100 mm
Employed in silica-supported purification of fullerenes.[1]
1. Nie, B. et al. *J. Org. Chem.* **1996,** *61*, 1870.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[102056-64-4] HMIS: 2-1-1-X 10g ¥20,400

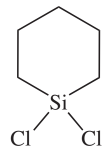


SIC2522.0
CYCLOPENTADIENYLTRIMETHYLSILANE

$C_8H_{14}Si$	138.29	138-40° Flashpoint: 29°C (84°F)		0.833	1.4670

3 isomers in equilibrium 5:1:2
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[25134-15-0] TSCA HMIS: 2-3-0-X 2.5g ¥27,300

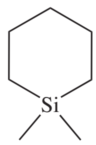
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIC2524.0
CYCLOPENTAMETHYLENEDICHLOROSILANE
1,1-DICHLORO-1-SILACYCLOHEXANE

$C_5H_{10}Cl_2Si$	169.13	170° Flashpoint: 29°C (84°F)		1.156	1.4679

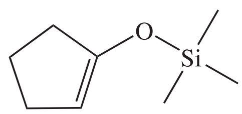
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2406-34-0] HMIS: 3-3-1-X 10g ¥45,900



SIC2525.0
CYCLOPENTAMETHYLENEDIMETHYLSILANE
1,1-DIMETHYLSILACYCLOHEXANE

$C_7H_{16}Si$	128.29	132-3° Flashpoint: 30°C (86°F)		0.804	1.4394

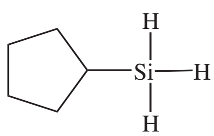
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[4040-74-8] TSCA EC 223-730-3 HMIS: 2-3-0-X 5g ¥25,200



SIC2552.0
(CYCLOPENTENYLOXY)TRIMETHYLSILANE
1-(TRIMETHYLSILOXY)CYCLOPENTENE

$C_8H_{16}OSi$	156.30	158-9° Flashpoint: 38°C (100°F)		0.878	1.4392

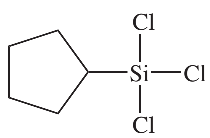
Reacts with aldehydes, acetals, and enones w/o Lewis acid catalysis in the presence of hexafluoro-2-propanol.[1]
1. Ratnikov, M. O. et al. *Angew. Chem., Int. Ed. Engl.* **2008**, *47*, 9739.
See also SIC2462.0, SII6460.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[19980-43-9] TSCA EC 243-448-4 HMIS: 2-2-1-X 10g ¥26,300



SIC2554.0
CYCLOPENTYLSILANE

$C_5H_{12}Si$	100.24	89-90° Flashpoint: -8°C (18°F)		0.775	1.4404

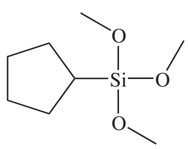
Silane reducing agent
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[80249-74-7] HMIS: 2-4-1-X 5g ¥36,300



SIC2555.0
CYCLOPENTYLTRICHLOROSILANE

$C_5H_9Cl_3Si$	203.57	178-9° Flashpoint: 77°C (171°F)		1.225	1.4713

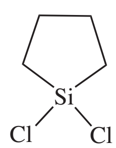
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[14579-03-4] TSCA EC 238-621-6 HMIS: 3-2-1-X 25g ¥17,800 100g ¥50,100



SIC2557.0
CYCLOPENTYLTRIMETHOXYSILANE

$C_8H_{18}O_3Si$	190.31	75° / 10 Flashpoint: 54°C (129°F)		0.990^{25}	1.4240^{25}

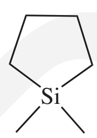
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[143487-47-2] HMIS: 3-2-1-X 10g ¥12,500 50g ¥39,500



SIC2564.0
CYCLOTETRAMETHYLENEDICHLOROSILANE

$C_4H_8Cl_2Si$	155.10	142-3° Flashpoint: 25°C (77°F)		1.185	1.4630

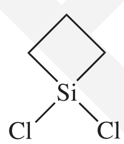
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2406-33-9] TSCA EC 219-299-6 HMIS: 3-3-1-X 10g ¥26,300 50g ¥94,700



SIC2566.0
CYCLOTETRAMETHYLENEDIMETHYLSILANE

$C_6H_{14}Si$	114.26	107° Flashpoint: 15°C (59°F)		0.794	1.4349

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1072-54-4] HMIS: 2-4-0-X 5g ¥26,300



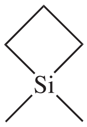
SIC2568.0
CYCLOTRIMETHYLENEDICHLOROSILANE
1,1-DICHLOROSILACYCLOBUTANE

$C_3H_6Cl_2Si$	141.07	113-4° Flashpoint: 9°C (48°F)		1.201	1.4620

Reaction with $LiN(iPr)_2$ and CH_2X_2 provides 1,1-dimethyl-2-halosilacyclopentanes.[1]
Arylchlorosilyl derivatives used in cross-coupling to biaryls.[2]
Vinylchlorosilyl derivatives used in cross-coupling to 1,3-butadienes.[3]
Starting material for spirocyclic organosilanes.[4]
1. Matsumoto, K. *Tetrahedron* **1993,** *49*, 8487.
2. Denmark, S. E.; Wu, Z. *Org. Lett.* **1999,** *1*, 1495.
3. Denmark, S. E.; Choi, J. Y. *J. Am. Chem. Soc.* **1999,** *121*, 5821.
4. Déjean, V. et al. *Organometallics* **2000**, *19*, 711.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2351-33-9] TSCA EC 219-084-7 HMIS: 3-4-1-X 10g ¥24,100 50g ¥86,200

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

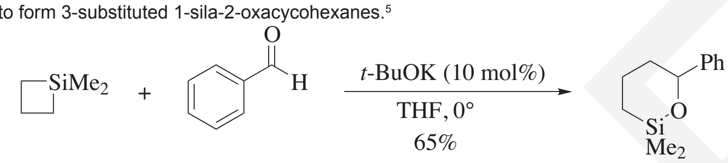
SIC2570.0
CYCLOTRIMETHYLENEDIMETHYLSILANE
1,1-DIMETHYLSILETANE



$C_5H_{12}Si$ — Mw 100.24 — bp 82° — D_4^{20} 0.775 — n_D^{20} 1.4290

Ionization potential: 8.97 eV — Flashpoint: -5°C (23°F)

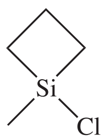
Pyrolysis yields dimethylsilene
Review of synthetic utility.[1]
Undergoes insertion reactions.[2]
Undergoes polymerization.[3]
Undergoes reductive silylation of aldehydes.[4]
Reacts w/ aldehydes to form 3-substituted 1-sila-2-oxacycohexanes.[5]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 261-262.
2. Matsumoto, K. et al. *Tetrahedron Lett.* **1990,** *31*, 6055.
3. Weyenberg, D. et al. *J. Org. Chem.* **1965,** *30*, 2618.
4. Hirano, H. et al. *Org. Lett.* **2006**, *8*, 483.
5. Takeyama, Y. et al. *Tetrahedron Lett.* **1990**, *31*, 6059.

HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2295-12-7] TSCA EC 218-939-1 HMIS: 2-4-0-X Store <5°C 5g ¥27,300

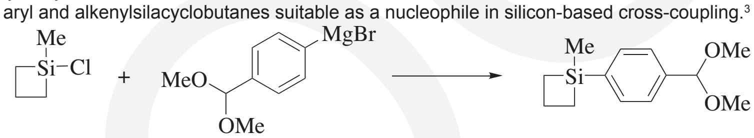
SIC2572.0
CYCLOTRIMETHYLENEMETHYLCHLOROSILANE



C_4H_9ClSi — Mw 120.66 — bp 103° — D_4^{20} 0.985 — n_D^{20} 1.4500

Flashpoint: 2°C (36°F)

Review of synthetic utility.[1]
!Intermediate for enoxysilacyclobutanes.[2]
Precursor to various aryl and alkenylsilacyclobutanes suitable as a nucleophile in silicon-based cross-coupling.[3]

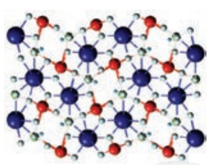


1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 166-170.
2. Denmark, S. et al. *J. Am. Chem. Soc.* **1994,** *116*, 7026.
3. Denmark, S. E.; Sweis, R. F. *Acc. Chem. Res.* **2002**, *35*, 835.

HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2351-34-0] HMIS: 3-4-1-X Store <5°C 5g ¥38,500

DANISHEFSKY'S DIENE - see SIM6494.0 1-METHOXY-3-(TRIMETHYLSILOXY)BUTADIENE

SID2605.0
DATOLITE

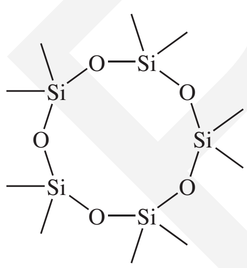

Crystal structure image courtesy of webmineral.com

$CaBSiO_4O(OH)$ — Mw 159.98 — D_4^{20} 2.9 — n_D^{20} 1.63

Particle Size: <150 µm — Mohs Hardness: 5.5; Monoclinic prismatic

Colorless, granular, brittle, transparent
Chemical feedstock for synthetic Colemanite, disodium octabirate
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
TSCA-E HMIS: 1-0-0-X 500g ¥17,300

SID2650.0
DECAMETHYLCYCLOPENTASILOXANE
CYCLIC PENTAMER -D5



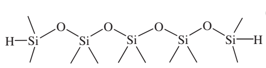
$C_{10}H_{30}O_5Si_5$ — Mw 370.77 — bp 210° — (mp -44°) — D_4^{20} 0.959 — n_D^{20} 1.3982

Viscosity: 3.87 cSt	Flashpoint: 76°C (169°F)
ΔHcomb: -10,021 kJ/mole	Vapor pressure, 50°: 2 mm
ΔHvap: 50.2 kJ/mole	Critical temperature: 344°C
Surface tension, 20°: 18.0 mN/m	Critical pressure: 1.03 mPa
Ring strain: 1.05 kJ/mole	Dielectric constant: 2.50
Solubility, water: 0.03 mg/l	Octanol/water partition coefficient, log K_{ow}: 5.5
	Dipole moment: 1.22

Undergoes ring-opening polymerization
Vehicle for cosmetics
See also SID4625.0, SIM6592.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[541-02-6] (既) 7-475 TSCA EC 208-764-9 HMIS: 1-2-0-X 100g ¥4,500 2kg ¥33,600 17kg ¥115,000

COMMERCIAL

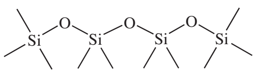
SID2653.0
1,1,3,3,5,5,7,7,9,9-DECAMETHYLPENTASILOXANE, 95%



$C_{10}H_{32}O_4Si_5$ — Mw 356.79 — bp 100° / 20 — D_4^{20} 0.8813 — n_D^{20} 1.3902

Intermediate for silicone block polymers
See also SIO6702.0, DMS-H03
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[995-83-5] HMIS: 2-2-1-X 10g ¥26,800

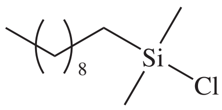
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SID2655.0
DECAMETHYLTETRASILOXANE
MD2M

$C_{10}H_{30}O_3Si_4$	310.69	194-5°	(-76°)	0.8536	1.3895

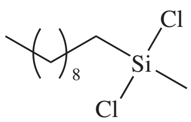
Viscosity: 1.5 cSt
ΔHcomb: -9,581 kJ/mole
ΔHvap: 50.2 kJ/mole
Surface tension: 18.0 mN/m
Specific heat: 1.716 J/g/°
Solubility in water: 6.7 ppb
Solubility parameter: 7.0
Flashpoint: 63°C (145°F)
TOXICITY: oral rat, LD50: >1,000 mg/kg
Autoignition temperature: 430°C
Vapor pressure, 104°: 40 mm
Dielectric constant: 2.39
Octanol/water partition coefficient, log K_{ow}: 8.2
Dipole moment: 1.22
See also SID4626.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[141-62-8] (既) 7-476 TSCA EC 205-491-7 HMIS: 1-2-0-X 25g ¥7,400 250g ¥33,000



SID2660.0
n-DECYLDIMETHYLCHLOROSILANE

$C_{12}H_{27}ClSi$	234.88	98° / 2		0.866	1.441

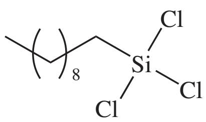
Flashpoint: 137°C (279°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[38051-57-9] TSCA EC 253-761-8 HMIS: 3-1-1-X 25g ¥14,100 100g ¥37,900



SID2662.0
n-DECYLMETHYLDICHLOROSILANE

$C_{11}H_{24}Cl_2Si$	255.31	111-4° / 3		0.960	1.4490

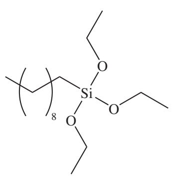
Flashpoint: 120°C (248°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18051-88-2] (既) 2-2041 TSCA EC 241-962-3 HMIS: 3-1-1-X 25g ¥14,600



SID2663.0
n-DECYLTRICHLOROSILANE

$C_{10}H_{21}Cl_3Si$	275.72	133-7° / 5		1.0540	1.4528

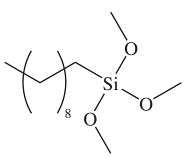
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13829-21-5] (既) 2-2041 TSCA EC 237-540-3 HMIS: 3-1-1-X 25g ¥9,800 100g ¥24,100



SID2665.0
n-DECYLTRIETHOXYSILANE

$C_{16}H_{36}O_3Si$	304.54	150° / 8		0.8790	1.4220

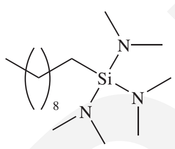
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2943-73-9] EC 220-940-7 HMIS: 2-1-0-X 25g ¥20,600 100g ¥49,900



SID2670.0
n-DECYLTRIMETHOXYSILANE

$C_{13}H_{30}O_3Si$	262.47	132° / 10		0.90	1.4209

For dipodal version see SIB1829.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5575-48-4] (既) 2-3512 HMIS: 3-2-1-X 25g ¥21,500

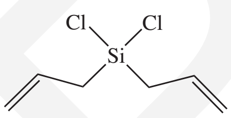


SID2671.0
n-DECYLTRIS(DIMETHYLAMINO)SILANE

$C_{16}H_{39}N_3Si$	301.59	122-4° / 1		0.844	

Vapor-phase reagent for SAMs
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1015787-64-0] HMIS: 3-3-1-X 10g ¥25,700

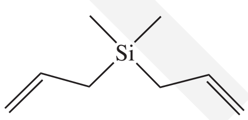
DIACETOXYDI-t-BUTOXYSILANE - see SID2790.0 DI-t-BUTOXYDIACETOXYSILANE



SID2742.0
DIALLYLDICHLOROSILANE

$C_6H_{10}Cl_2Si$	181.14	165-6°		1.075	

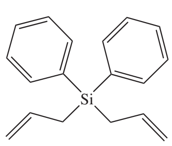
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3651-23-8] TSCA HMIS: 3-3-1-X 5g ¥27,800



SID2745.0
DIALLYLDIMETHYLSILANE, 95%
4,4-DIMETHYL-4-SILA-1,6-HEPTADIENE

$C_8H_{16}Si$	140.30	137°		0.768	1.4220

Contains β-methylvinyl isomers
Dipole moment: 0.54 debye
Flashpoint: 23°C (73°F)
Cyclic polymerization forming linear [(sila-cyclohexane)methylene] polymers with Ziegler catalyst reported.[1]
1. Marvel, C. et al. *J. Org Chem.* **1960,** *25*, 1641.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1113-12-8] TSCA EC 214-199-9 HMIS: 2-4-0-X 25g ¥27,300

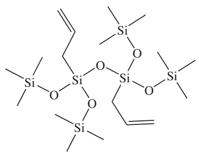


SID2749.0
DIALLYLDIPHENYLSILANE, 95%

$C_{18}H_{20}Si$	264.44	140-1° / 2		0.996	1.5750

Contains β-methylvinyl isomers
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[10519-88-7] TSCA EC 234-061-1 HMIS: 2-1-0-X 10g ¥24,100

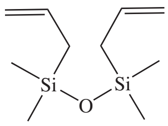
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SID2752.0
1,3-DIALLYLTETRAKIS(TRIMETHYLSILOXY)DISILOXANE, 95%

$C_{18}H_{46}O_5Si_6$	511.07	125° / 1.7		0.89	1.4141

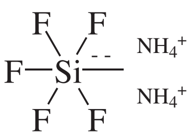
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[211931-07-6] HMIS: 2-1-0-X 10g ¥41,100



SID2754.0
1,3-DIALLYLTETRAMETHYLDISILOXANE, 95%

$C_{10}H_{22}OSi_2$	214.45	179-80°		0.821	1.4280

Cyclized to 7-member ring using Schrock's catalyst.[1]
1. Forbes, M. et al. *J. Am. Chem. Soc.* **1992,** *114*, 10978.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[17955-81-6] HMIS: 2-2-0-X 10g ¥42,200



Reference Compound 1
DIAMMONIUM PENTAFLUOROMETHYLSILICATE

$CH_{11}F_5N_2Si$	174.19		(162° dec.)		

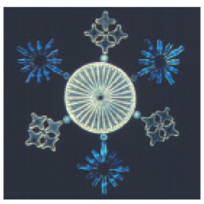
Hexacoordinate slicon
Reference compound. Data is provided for investigators. Not offered for sale by Gelest.


Specimen diatoms

SID2754.2
DIATOMACEOUS EARTH, calcined
SILICON DIOXIDE, DIATOMACEOUS

SiO_2	60.09			2.3	

Particle Size: <24 µm — Mohs hardness: 7.0; Irregular shaped
White, low density, low thermal conductivity
Used in filtration, polishing compounds, coatings, rubber, dental, polyolefin films, pharmaceutical applications
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[68855-54-9] TSCA-E EC 272-489-0 HMIS: 1-0-0-X 500g ¥9,600 10kg ¥48,000

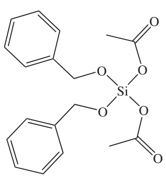


SID2754.4
DIATOMACEOUS EARTH, uncalcined
KIESELGUHR

$SiO_2 \cdot H_2O$	60.09 / 78.10			2.0	1.46

Particle Size: <24 µm — Mohs Hardness: 5.5; Irregular shaped
Cream/gray, low density, low thermal conductivity,
Used in filtration, polishing compounds, coatings, rubber, dental, polyolefin films
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[61790-53-2] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 10kg ¥48,000

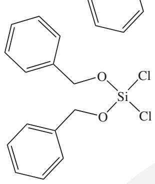
DIAZOMETHYLTRIMETHYLSILANE - see SIT8588.0 TRIMETHYLSILYLDIAZOMETHANE



SID2754.6
DIBENZYLOXYDIACETOXYSILANE, tech-95

$C_{18}H_{20}O_6Si$	360.44			1.18	1.528

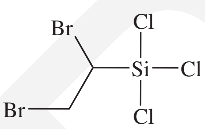
Forms SiO_2 at >200˚C
Thermal degradation of mixtures with gold mercaptan complexes gives "ruby" glass coatings
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[151837-46-6] HMIS: 3-2-1-X 25g ¥25,700



SID2755.0
DIBENZYLOXYDICHLOROSILANE, tech-95

$C_{14}H_{14}Cl_2O_2Si$	313.26	175-7° / 5		1.22	

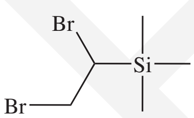
Pyrolytic degradation at >250° yields SiO_2 and benzyl chloride (lachrymator)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18414-52-3] HMIS: 3-2-1-X 10g ¥12,700



SID2756.0
1,2-DIBROMOETHYLTRICHLOROSILANE

$C_2H_3Br_2Cl_3Si$	321.30	90-1° / 11		2.046	1.537

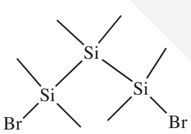
Flashpoint: 65°C (149°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4170-50-7] TSCA EC 224-031-6 HMIS: 3-2-1-X 10g ¥19,400



SID2758.0
1,2-DIBROMOETHYLTRIMETHYLSILANE, 95%

$C_5H_{12}Br_2Si$	260.04	74-5° / 8	(-11°)	1.55	1.505

HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18146-08-2] HMIS: 3-2-0-X 5g ¥34,200

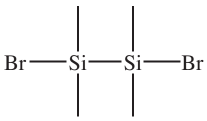


SID2764.0
1,3-DIBROMOHEXAMETHYLTRISILANE, tech-95

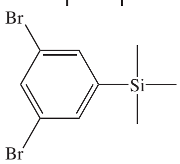
$C_6H_{18}Br_2Si_3$	334.27	95-105° / 10		1.25	

Contains homologs
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[127725-93-3] HMIS: 3-2-1-X 1.0g ¥35,300

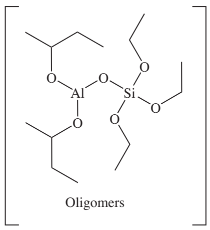
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



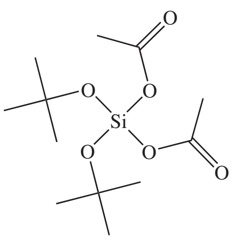
SID2768.0
1,2-DIBROMOTETRAMETHYLDISILANE, tech-95
$C_4H_{12}Br_2Si_2$ — Mw 276.12 — bp 79° / 30 — mp (40°)
Contains homologs
See also SID2764.0, SID3370.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18209-83-1] HMIS: 3-2-1-X 5g ¥45,900



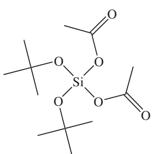
SID2772.0
3,5-DIBROMO-1-TRIMETHYLSILYLBENZENE
$C_9H_{12}Br_2Si$ — Mw 308.09 — mp (40°)
Building block for dendrimers
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[17878-23-8] HMIS: 3-1-0-X 5g ¥39,500



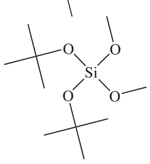
SID2780.0
DI-s-BUTOXYALUMINOXYTRIETHOXYSILANE
$C_{14}H_{33}AlO_6Si$ — Mw 352.48 — D_4^{20} 1.0 — n_D^{20} 1.422^{25}
Flashpoint: 23°C (73°F)
Name is for nominal structure - product is oligomeric oxoalkoxide
Employed in sol-gel preparation of mullites.[1,2]
1. Boilot, J. P. In *Better Ceramics Through Chemistry III;* MRS Proc. 1988; Vol. 121, p.121.
2. Columban, P. *J. Mater. Res.* **1998,** *13*, 803.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[68959-06-8] TSCA EC 273-392-6 HMIS: 2-4-1-X 25g ¥11,900 100g ¥31,000



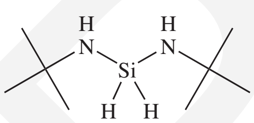
SID2790.0
DI-t-BUTOXYDIACETOXYSILANE, tech-96
SILICON DI-t-BUTOXIDE DIACETATE
$C_{12}H_{24}O_6Si$ — Mw 292.40 — bp 102° / 5 — mp (-4°) — D_4^{20} 1.0196 — n_D^{20} 1.4040
ΔHvap: 342.0 kJ/mole
Flashpoint: 95°C (203°F)
Vapor pressure, 50°: 0.03 mm
COMMERCIAL
Adhesion promoter for silicone RTVs
Impregnant/binder for ceramic coatings
Source for silicon dioxide by LPCVD.[1,3]
Precursor for poly(di-t-butoxysiloxane) photoimageable polymers.[2]
1. Smolinsky, G. et al. *Mater. Lett.* **1986,** *4*, 256.
2. Senkevich, J. et al. *Chem. Mater.* **1999,** *11*, 1814.
3. Sakata, M. et al. *J. Photopolymer Sci. and Tech.* **1992,** *5*, 181.
See also SID2754.6, SID2790.1
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13170-23-5] TSCA EC 236-112-3 HMIS: 3-2-2-X 50g ¥9,000 3kg ¥68,700 15kg ¥198,000



SID2790.1
DI-t-BUTOXYDIACETOXYSILANE, 98%
$C_{12}H_{24}O_6Si$ — Mw 292.40 — bp 102° / 5 — mp (-4°) — D_4^{20} 1.0196 — n_D^{20} 1.4040
Flashpoint: 95°C (203°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13170-23-5] TSCA EC 236-112-3 HMIS: 3-2-2-X 100g ¥32,600



SID2792.0
DI-t-BUTOXYDIMETHOXYSILANE, tech-95
$C_{10}H_{24}O_4Si$ — Mw 236.38 — bp 80-83° / 10
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[6852-04-6] HMIS: 3-2-1-X 5g ¥36,900

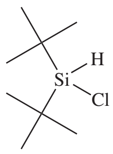


SID2795.0
DI(t-BUTYLAMINO)SILANE
BIS(tert-BUTYLAMINO)SILANE
$C_8H_{22}N_2Si$ — Mw 174.36 — bp 167° — D_4^{20} 0.816
Flashpoint: 30°C (86°F)
TOXICITY: oral rat, LD50: 250-500 mg/kg
Autoignition temperature: 190°C
Lithiation leads to polyhedral silazanes.[1]
1. Becker. G. et al. In *Organosilicon Chem. III;* Auner, N.; Weiss, J., Eds; Wiley-VCH: 1998; p. 346.
See also SIB1068.0, SIH6103.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[186598-40-3] TSCA HMIS: 3-3-1-X 10g ¥34,200

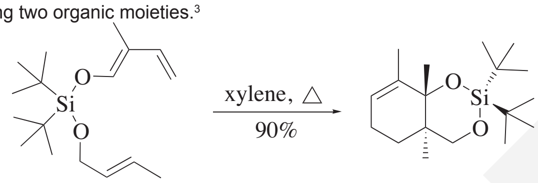
SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

SID3120.0
DI-t-BUTYLCHLOROSILANE
$C_8H_{19}ClSi$ 178.78 82-4° / 45 0.884 1.4414
Flashpoint: 39°C (102°F)



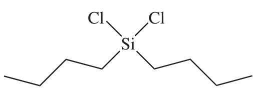
Review of synthetic utility.[1]
Reagent for selective silylation of internal alcohols or diols.[2]
Used as a stable reagent for linking two organic moieties.[3]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 198-201.
2. Tanino, K. et al. *J. Org. Chem.* **1998,** *63*, 2422.
3. Gillard, J. W. et al. *Tetrahedron Lett.* **1991**, *32*, 1145.

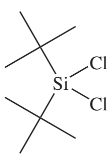
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[56310-18-0] HMIS: 3-2-1-X 10g ¥33,200 50g ¥122,300

SID3203.0
DI-n-BUTYLDICHLOROSILANE
$C_8H_{18}Cl_2Si$ 213.22 212° 0.991 1.4448
Flashpoint: 64°C (147°F)

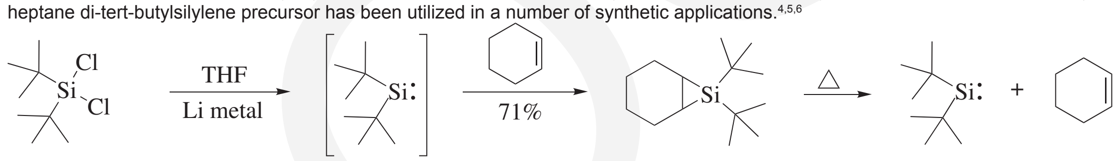


HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[3449-28-3] (既) 2-2041 TSCA HMIS: 3-2-1-X 10g ¥24,100 50g ¥86,200

SID3205.0
DI-t-BUTYLDICHLOROSILANE
$C_8H_{18}Cl_2Si$ 213.22 190-1° (-15°) 1.009 1.4561
Flashpoint: 61°C (142°F)



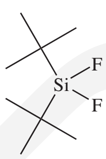
Review of synthetic utility.[1]
Reagent for protection of 1,2 and 1,3 diols.[2]
Used as the source for di-tert-butylsilylene, in particular for the thermal silylene precursor, 1-silabicyclo[4.2.0]heptane.[3] The silabicycloheptane di-tert-butylsilylene precursor has been utilized in a number of synthetic applications.[4,5,6]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 201-207.
2. Trost, B. et al. *Tetrahedron Lett.* **1981,** *22*, 4999.
3. Driver, T. G.; Franz, A. K.; Woerpel, K. A. *J. Am. Chem. Soc.* **2002**, *124*, 6524.
4. Driver, T. G.; Woerpel, K. A. *J. Am. Chem. Soc.* **2004**, *126*, 9993.
5. Driver, T. G.; Woerpel, K. A. *J. Am. Chem. Soc.* **2003**, *125*, 10659.
6. Howard, B. E.; Woerpel, K. A. *Org. Lett.* **2007**, *9*, 4651.

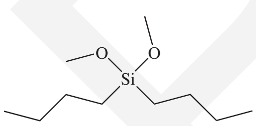
See also SIB1865.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18395-90-9] TSCA EC 242-273-0 HMIS: 3-2-1-X 5g ¥31,000 25g ¥113,800

SID3207.0
DI-t-BUTYLDIFLUOROSILANE
$C_8H_{18}F_2Si$ 180.31 134° 0.896



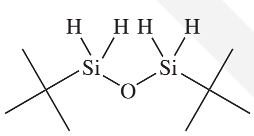
Introduces Si into heteroaromatics.[1]
1. Ishiyama, T. et al. *J. Chem. Soc., Chem. Commun.* **2005**, 5065
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[558-63-4] HMIS: 3-3-1-X 5g ¥65,000

SID3214.0
DI-n-BUTYLDIMETHOXYSILANE
$C_{10}H_{24}O_2Si$ 204.39 125° / 50 0.861 1.4187
Flashpoint: 103°C (217°F)



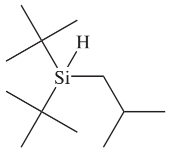
See also SID3530.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18132-63-3] TSCA HMIS: 3-1-1-X 25g ¥20,400

SID3220.0
1,3-DI-t-BUTYLDISILOXANE
$C_8H_{22}OSi_2$ 190.43 90° / 100



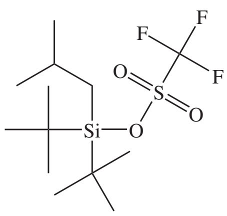
Potential reducing agent: see G. L. Larson, J. L. Fry, “Ionic and Organometallic-Catalyzed Organosilane Reductions”, in *Organic Reactions* S. E. Denmark, Ed. Volume 71, John Wiley and sons, pp 1-771, **2008**.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
HMIS: 2-3-1-X 2.5g ¥40,600

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



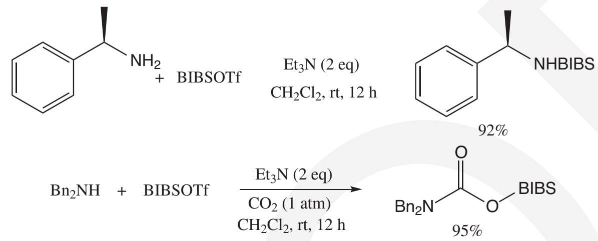
SID3224.0
DI-t-BUTYLISOBUTYLSILANE
$C_{12}H_{28}Si$ — 200.44 — 65-70° / 5 — 0.788[25] — 1.4411[25]

Sterically-hindered potential reducing agent: see G. L. Larson, J. L. Fry, "Ionic and Organometallic-Catalyzed Organosilane Reductions", in *Organic Reactions* S. E. Denmark, Ed. Volume 71, John Wiley and sons, pp 1-771, **2008**.
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[1314639-85-4] HMIS: 2-3-1-X 10g ¥51,200

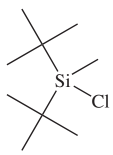


SID3226.0
DI-t-BUTYLISOBUTYLSILYL TRIFLUOROMETHANESULFONATE
DI-t-BUTYLISOBUTYLSILYLTRIFLATE
$C_{13}H_{27}F_3O_3SSi$ — 348.49 — 100-1° / 1 — 1.25[25]

Highly selective and very robust silicon-based protecting group capable of protecting alcohols, phenols, amines, carboxylic acids, and carbamates.[1]

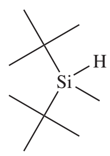


1. Liang, H.; Hu. L.; Corey, E. J. *Org. Lett.* **2011**, *13*, 4120.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1314639-86-5] HMIS: 3-1-1-X 10g ¥47,200



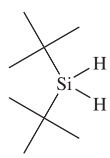
SID3255.0
DI-t-BUTYLMETHYLCHLOROSILANE
$C_9H_{21}ClSi$ — 192.80 — 191-3°
Flashpoint: 69°C (156°F)

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[70892-81-8] (既) 2-2041 TSCA HMIS: 3-2-1-X 10g ¥29,400



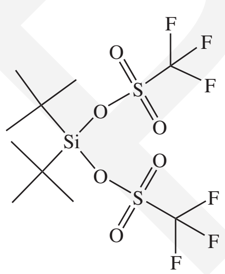
SID3258.0
DI-t-BUTYLMETHYLSILANE
$C_9H_{22}Si$ — 158.36 — 155° — 0.758 — 1.4293
Flashpoint: 30°C (86°F)

HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[56310-20-4] HMIS: 3-3-1-X 10g ¥25,200



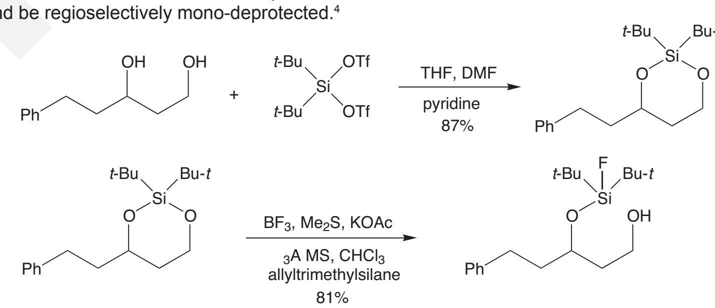
SID3342.0
DI-t-BUTYLSILANE
$C_8H_{20}Si$ — 144.33 — 128° — (-38°) — 0.740 — 1.420
Flashpoint: -2°C (28°F)

Thermal[1] and ECR[2] source for CVD of silicon carbide
1. Grow, J. *Proc. Electrochem. Soc.* **1996,** *96*, 60.
2. Friessnegg, T. et al. *J. Appl. Phys.* **1996,** *80*, 2216.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[30736-07-3] TSCA HMIS: 2-4-1-X 5g ¥19,400



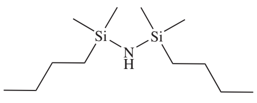
SID3345.0
DI-t-BUTYLSILYLBIS(TRIFLUOROMETHANESULFONATE)
$C_{10}H_{18}F_6O_6S_2Si$ — 440.46 — 73-5° / .35 — 1.358 — 1.3975
Flashpoint: 90°C (194°F)

Review of synthetic utility.[1]
Reagent for protection of diols.[2]
Used to doubly block sialic acid for use in efficient silylation reactions.[3]
Can protect diols and be regioselectively mono-deprotected.[4]

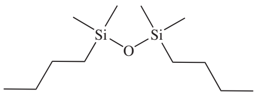


1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 209-222.
2. Corey, E. J.; Hopkins, P. B. *Tetrahedron Lett.* **1982,** *23*, 4871.
3. Hanshima, S. *Eur. J. Org. Chem.* **2009**, 4215.
4. Yu, M.; Pagenkopf, B. L. *J. Org. Chem.* **2002**, *67*, 4553.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[85272-31-7] HMIS: 3-2-1-X 5g ¥17,200 25g ¥44,800

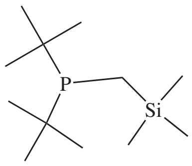
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SID3349.0
1,3-DI-n-BUTYL-1,1,3,3-TETRAMETHYLDISILAZANE
$C_{12}H_{31}NSi_2$ | 245.55 | 81° / 2 | | 0.80 | 1.4353
Flashpoint: 86°C (187°F)
See also SIB1937.0, SID4591.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[82356-80-7] HMIS: 2-2-1-X 25g ¥24,700 100g ¥72,400

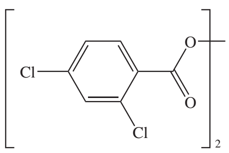


SID3349.4
1,3-DI-n-BUTYLTETRAMETHYLDISILOXANE
$C_{12}H_{30}OSi_2$ | 246.55 | 78° / 4 | | 0.809 | 1.4144
Viscosity: 1.6 cSt
Flashpoint: 76°C (169°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[4619-08-3] HMIS: 2-3-0-X 25g ¥9,800

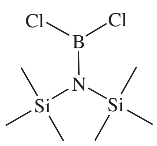


SID3351.5
DI-tert-BUTYL(TRIMETHYLSILYLMETHYL)PHOSPHINE
$C_{12}H_{29}PSi$ | 232.42 | 50-2° / 0.5 | | | 1.4820
Air sensitive liquid
Used in Suzuki cross-coupling reactions.[1]
1. Ionkin, A. S. et al. *Organometallics* **2005**, *24*, 619.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[76181-99-2] HMIS: 4-4-1-X 2.5g ¥88,300

DICARBOXYLIC ACIDS, SILYLATED - see
SIB1852.0 BIS(TRIMETHYLSILYL)ACETYLENEDICARBOXYLATE
SIB1852.6 BIS(TRIMETHYLSILYL) ADIPATE
SIB1860.0 BIS(TRIMETHYLSILYL) ITACONATE
SIB1862.0 BIS(TRIMETHYLSILYL) MALONATE
SIB1870.0 BIS(TRIMETHYLSILYL) SEBACATE

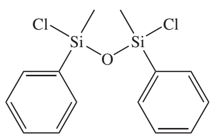


SID3352.0
2,4-DICHLOROBENZOYL PEROXIDE, 50% in polydimethylsiloxane
$C_{14}H_6Cl_4O_4$ | 380.00 | | | 1.26 |
SELF-ACCELERATING DECOMPOSITION TEMPERATURE: 60°C
Contains 5-10% dibutyl phthalate
TOXICITY: oral rat, LD50: 12,918 mg/kg
Typical silicone crosslinking temperature 90-100°C, 10-20 mins
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[133-14-2] (既) 3-1421 TSCA EC 205-094-9 HMIS: 3-3-1-X 100g ¥13,300 500g ¥43,800

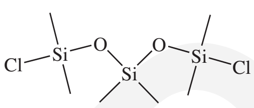


SID3354.0
N-(DICHLOROBORYL)HEXAMETHYLDISILAZANE
$C_6H_{18}BCl_2NSi_2$ | 242.10 | 82° / 11 | | | 1.4554
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[6591-26-0] HMIS: 3-3-1-X 10g ¥35,300

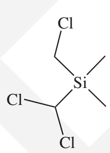
DICHLORODIMETHYLSILANE - see SID4120.0 DIMETHYLDICHLOROSILANE



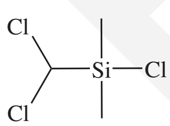
SID3358.0
1,3-DICHLORO-1,3-DIPHENYL-1,3-DIMETHYLDISILOXANE, 96%
$C_{14}H_{16}Cl_2OSi_2$ | 327.36 | 158-9° / 3 | | 1.153^{25} | 1.5318
Flashpoint: 165°C (329°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[3582-72-7] TSCA EC 222-708-0 HMIS: 3-1-1-X 25g ¥21,500



SID3360.0
1,5-DICHLOROHEXAMETHYLTRISILOXANE, tech-95
$C_6H_{18}Cl_2O_2Si_3$ | 277.37 | 184° | (-53°) | 1.018 | 1.4071
ΔHvap: 47.7 kJ/mole
Flashpoint: 76°C (169°F)
Vapor pressure, 50°: 1 mm
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[3582-71-6] (既) 7-742 TSCA EC 222-707-5 HMIS: 3-2-1-X 25g ¥15,100 100g ¥41,400

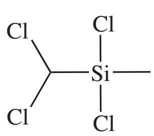


SID3360.5
(DICHLOROMETHYL)(CHLOROMETHYL)DIMETHYLSILANE, tech-95
$C_4H_9Cl_3Si$ | 191.56 | 184° | | 1.209^{25} | 1.4753^{25}
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18171-70-5] HMIS: 2-3-0-X 10g ¥16,200



SID3361.0
(DICHLOROMETHYL)DIMETHYLCHLOROSILANE, tech-95
$C_3H_7Cl_3Si$ | 177.53 | 149° | (-49°) | 1.237 | 1.4614
Flashpoint: 27°C (81°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18171-59-0] (既) 2-2047 TSCA EC 242-058-1 HMIS: 3-3-1-X 25g ¥18,000

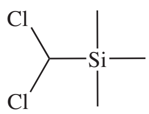
DI(CHLOROMETHYL)METHYLCHLOROSILANE - see SIB1053.0 BIS(CHLOROMETHYL)METHYLCHLOROSILANE



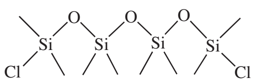
SID3362.0
(DICHLOROMETHYL)METHYLDICHLOROSILANE, tech-95
$C_2H_4Cl_4Si$ | 197.95 | 148-9° | (-43°) | 1.4116 | 1.4700
Viscosity, 20°: 1 cSt
Flashpoint: 28°C (82°F)
ΔHvap: 29.3 kJ/mole
Surface tension, 27°: 30.5 mN/m
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1558-31-2] (既) 2-2047 TSCA EC 216-317-4 HMIS: 3-3-1-X 25g ¥17,000

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

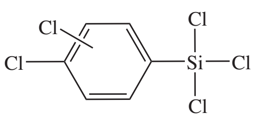
3-(DICHLOROMETHYLSILYL)-1-PROPENE - see SIA0470.0 ALLYLMETHYLDICHLOROSILANE



SID3366.0
(DICHLOROMETHYL)TRIMETHYLSILANE, tech-95
$C_4H_{10}Cl_2Si$ — 157.11 — 134-5° — 1.040 — 1.4452
Dipole moment: 2.28 debye — Flashpoint: 25°C (77°F)
Lithiated compound, $Me_3SiCHClLi$, reacts with methylenephosphines to yield phosphiranes.[1]
Converts aldehydes to 1,2-dichloroalkenes.[2]
1. Becker, P. et al. *Chem. Ber.* **1992,** *125*, 771.
2. Hosomi, A. et al. *Tetrahedron Lett.* **1983**, *24*, 4727.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[5926-38-5] TSCA EC 227-658-3 HMIS: 3-3-0-X 25g ¥20,400



SID3367.0
1,7-DICHLOROOCTAMETHYLTETRASILOXANE, 95%
$C_8H_{24}Cl_2O_3Si_4$ — 351.52 — 222° — (-62°) — 1.011 — 1.4027
Flashpoint: 98°C (208°F)
Vapor pressure, 50°: 1 mm
Intermediate for siloxane block polymers.[1]
1. Yoshino, K. et al. *Chem. Lett.* **1990,** 2133.
See also SID3360.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2474-02-4] (既) 7-462 TSCA EC 219-597-6 HMIS: 3-1-1-X 25g ¥20,400 100g ¥58,600

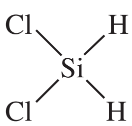


SID3367.6
DICHLOROPHENYLTRICHLOROSILANE, 95%
$C_6H_3Cl_5Si$ — 280.44 — 260-1° — 1.553 — 1.564
Isomeric mixture — Flashpoint: 150°C (302°F)
Vapor pressure, 102°: 7 mm
Monomer for high refractive index resins
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[27137-85-5] TSCA EC 248-254-3 HMIS: 3-1-1-X 25g ¥16,400

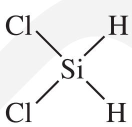
4,4-DICHLORO-4-SILABUTENE - see SIA0445.0 ALLYLDICHLOROSILANE

1,1-DICHLOROSILACYCLOBUTANE - see SIC2568.0 CYCLOTRIMETHYLENEDICHLOROSILANE

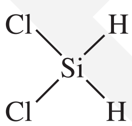
1,1-DICHLOROSILACYCLOPENTANE - see SIC2564.0 CYCLOTETRAMETHYLENEDICHLOROSILANE



SID3368.0
DICHLOROSILANE
H_2Cl_2Si — 101.01 — 8.3° — (-122°) — 1.22^7
CAUTION: CAN FORM PYROPHORIC REACTION PRODUCTS ON CONTACT WITH WATER OR AMINES
AIR TRANSPORT FORBIDDEN
Vapor pressure, -34°: 100 mm — Flashpoint: -37°C (-35°F)
Vapor pressure, 20°: 1.62 atm (23.8 psia) — TOXICITY: inh mouse, LC50: 144 ppm/4h
ΔHform: -314 kJ/mole — Autoignition temperature: 57.8°C
ΔHvap: 27.2 kJ/mole — Critical temperature: 176°C
Dipole moment: 1.17 debye — Critical pressure: 46.1 atm
Specific heat: 1.122 J/g/°
For epitaxial deposition
Undergoes hydrosilylation reactions
HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required
[4109-96-0] (既) 1-217 TSCA EC 223-888-3 HMIS: 4-4-3-X 250g inquire 2kg inquire
** includes gas dispensing cylinder*
COMMERCIAL

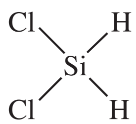


SID3368.1
DICHLOROSILANE, 99.9+%
H_2Cl_2Si — 101.01 — 8.3° — (-122°) — 1.22^7
CAUTION: CAN FORM PYROPHORIC REACTION PRODUCTS ON CONTACT WITH WATER OR AMINES
AIR TRANSPORT FORBIDDEN
Flashpoint: -37°C (-35°F)
HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required
[4109-96-0] (既) 1-217 TSCA EC 223-888-3 HMIS: 4-4-3-X 250g inquire
** includes zCYL-HPS-0420-33 cylinder*
COMMERCIAL



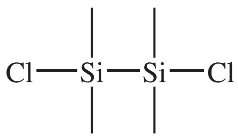
SID3368.3
DICHLOROSILANE, 25% in heptane
H_2Cl_2Si — 101.01 — 8.3° — (-122°) — 0.76
CAUTION: CAN FORM PYROPHORIC REACTION PRODUCTS ON CONTACT WITH WATER OR AMINES
AIR TRANSPORT FORBIDDEN
Flashpoint: -37°C (-35°F)
HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required
[4109-96-0] (既) 1-217 TSCA EC 223-888-3 HMIS: 4-4-3-X 750g inquire 2kg inquire
** includes liquid dispensing cylinder*
COMMERCIAL

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

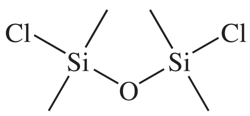


SID3368.6
DICHLOROSILANE, 25% in xylene
H_2Cl_2Si — Mw 101.01 — D_4^{20} 0.94
CAUTION: CAN FORM PYROPHORIC REACTION PRODUCTS ON CONTACT WITH WATER OR AMINES
AIR TRANSPORT FORBIDDEN
HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required
[4109-96-0] (既) 1-217 TSCA HMIS: 3-4-2-X 750g inquire 2kg inquire
** includes liquid dispensing cylinder*
COMMERCIAL

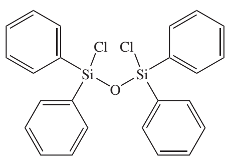
1,3-DICHLOROTETRAISOPROPYLDISILOXANE see SIT7273.0 1,1,3,3-TETRAISOPROPYL-1,3-DICHLORODISILOXANE



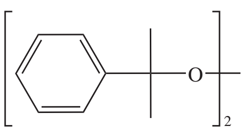
SID3370.0
1,2-DICHLOROTETRAMETHYLDISILANE, 95%
$C_4H_{12}Cl_2Si_2$ — Mw 187.20 — bp 148-9° — D_4^{20} 1.005 — n_D^{20} 1.454
Flashpoint: 37°C (99°F)
Primarily 1,2-dichloro with 1,1-dichloro isomer
See also SID2768.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4342-61-4] (既) 2-2040 TSCA EC 224-400-1 HMIS: 3-3-1-X 25g ¥25,700 100g ¥75,800



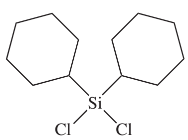
SID3372.0
1,3-DICHLOROTETRAMETHYLDISILOXANE
$C_4H_{12}Cl_2OSi_2$ — Mw 203.22 — bp 138° — (mp -37°) — D_4^{20} 1.039 — n_D^{20} 1.4054
Flashpoint: 15°C (59°F)
Vapor pressure, 25°: 8 mm
Diol protection reagent
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2401-73-2] (既) 7-472 TSCA EC 219-278-1 HMIS: 3-4-1-X 25g ¥13,600 100g ¥43,200 2kg ¥214,000
COMMERCIAL



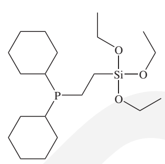
SID3374.0
1,3-DICHLOROTETRAPHENYLDISILOXANE
$C_{24}H_{20}Cl_2OSi$ — Mw 451.50 — bp 238-41° / 1 — (mp 36-8°)
Monomer for high refractive index silicones
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7756-87-8] TSCA EC 231-815-1 HMIS: 3-1-1-X 25g ¥19,900



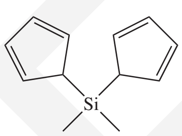
SID3379.0
DICUMYL PEROXIDE, 25%; in polydimethylsiloxane 40%, with 35% calcium carbonate
$C_{18}H_{22}O_2$ — Mw 270.36
Catalyst for heat-cure silicone rubbers
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[80-43-3] (既) 3-1086 TSCA EC 201-279-3 HMIS: 2-3-2-X 100g ¥13,800 500g ¥45,900



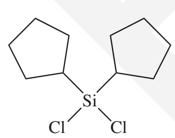
SID3382.0
DICYCLOHEXYLDICHLOROSILANE
$C_{12}H_{22}Cl_2Si$ — Mw 265.30 — bp 123° / 0.4 — D_4^{20} 1.103
Flashpoint: 149°C (300°F)
See also SID3390.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18035-74-0] HMIS: 3-1-1-X 25g ¥28,900



SID3385.0
(2-DICYCLOHEXYLPHOSPHINOETHYL)TRIETHOXYSILANE
$C_{20}H_{41}O_3PSi$ — Mw 388.60 — bp 140° / 0.03 — D_4^{20} 0.979^{25} — n_D^{20} 1.4811^{25}
Ligand for immobilization of precious metal catalytic complexes
See also SIB1091.0 SID4558.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[55289-47-9] HMIS: 3-1-0-X 5g ¥45,900

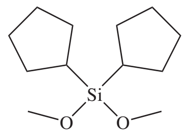


SID3388.0
DI(CYCLOPENTADIENYL)DIMETHYLSILANE
$C_{12}H_{16}Si$ — Mw 188.34 — bp 73° / 25
Intermediate for metallocenes
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18053-74-2] HMIS: 2-3-0-X 1.0g ¥34,200

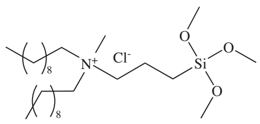


SID3390.0
DICYCLOPENTYLDICHLOROSILANE
$C_{10}H_{18}Cl_2Si$ — Mw 237.24 — bp 105-7° / 10 — D_4^{20} 1.110
Flashpoint: 84°C (183°F)
See also SID3537.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[139147-73-2] HMIS: 3-2-1-X 10g ¥11,100 50g ¥34,200

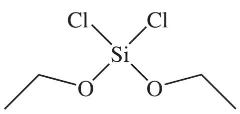
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



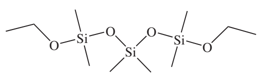
SID3391.0
DICYCLOPENTYLDIMETHOXYSILANE
$C_{12}H_{24}O_2Si$ — 228.40 — 120° / 6 — 1.000 — 1.4663
Viscosity: 2.5 cSt
Flashpoint: 102°C (216°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Autoignition temperature: 235˚C
Employed in propylene polymerization
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[126990-35-0] TSCA HMIS: 3-1-1-X 10g ¥9,800 50g ¥28,900



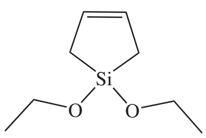
SID3392.0
N,N-DIDECYL-N-METHYL-N-(3-TRIMETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 40-42% in methanol
$C_{27}H_{60}ClNO_3Si$ — 510.32 — 0.863 — 1.4085
Contains 3-5% $Cl(CH_2)_3Si(OMe)_3$
Flashpoint: 11°C (52°F)
In combination with TEOS forms high pore volume xerogels with adsorptive capacity.[1]
1. Markovitz, M. et al. *Langmuir* **2001,** *17*, 7085.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[68959-20-6] TSCA EC 273-403-4 HMIS: 3-4-0-X 25g ¥16,400



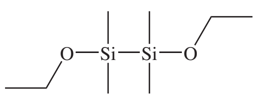
SID3393.0
DIETHOXYDICHLOROSILANE, tech-90
$C_4H_{10}Cl_2O_2Si$ — 189.11 — 137-8° — 1.129
Contains triethoxychlorosilane
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4667-38-3] (既) 2-2043 HMIS: 3-3-1-X Store <5°C 10g ¥23,600



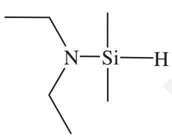
SID3394.0
1,5-DIETHOXYHEXAMETHYLTRISILOXANE
$C_{10}H_{28}O_4Si_3$ — 296.59 — 51-2° / 0.8 — 0.912 — 1.3889
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17928-13-1] HMIS: 2-2-1-X 25g ¥34,700



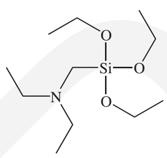
SID3395.0
1,1-DIETHOXY-1-SILACYCLOPENT-3-ENE, tech-95
$C_8H_{16}O_2Si$ — 172.30 — 168° — 0.950 — 1.4370
Flashpoint: 29°C (84°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[67059-49-8] HMIS: 2-3-1-X 10g ¥37,400



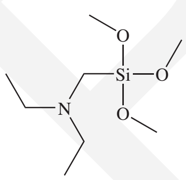
SID3395.2
1,2-DIETHOXYTETRAMETHYLDISILANE
$C_8H_{22}O_2Si_2$ — 206.43 — 85-9° / 50 — 0.8499 — 1.423
Flashpoint: 42°C (108°F)
Cross-coupling reagent
Used to convert aryl bromides to aryldimethylsilanols useful for cross-coupling protocols.[1]
1. Denmark, S. E.; Kallemeyn, J. M. *Org. Lett.* **2003**, *5*, 3483.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18419-84-6] HMIS: 2-3-1-X 1.0g ¥28,900



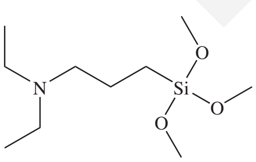
SID3395.3
DIETHYLAMINODIMETHYLSILANE, 95%
$C_6H_{17}NSi$ — 131.30 — 109-110° — 0.80 — 1.4080
Silylation reagent providing derivatives more volatile than corresponding TMS derivative for GC analysis
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1386-66-3] HMIS: 3-3-1-X 25g ¥38,500



SID3395.4
(N,N-DIETHYLAMINOMETHYL)TRIETHOXYSILANE
$C_{11}H_{27}NO_3Si$ — 249.43 — 74-6° / 3 — 0.9336^{25} — 1.4142^{25}
Catalyst for neutral cure 1-part RTVs
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[15180-47-9] TSCA-L HMIS: 2-2-1-X 25g ¥15,100 100g ¥41,400 2kg ¥169,200
COMMERCIAL



SID3395.6
(N,N-DIETHYLAMINOMETHYL)TRIMETHOXYSILANE, 95%
$C_8H_{21}NO_3Si$ — 207.40 — 0.95 — 1.415
Charge control agent for toner particles
Crosslinker for moisture-cure silicone RTVs
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[67475-66-5] TSCA-L HMIS: 3-2-1-X 25g ¥16,200

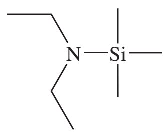


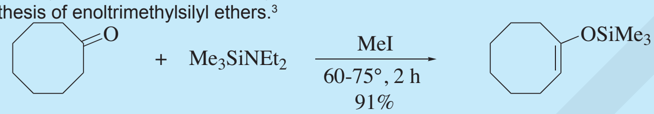
SID3396.0
(N,N-DIETHYL-3-AMINOPROPYL)TRIMETHOXYSILANE
$C_{10}H_{25}NO_3Si$ — 235.40 — 120° / 20 — 0.934 — 1.4245
Flashpoint: 100°C (212°F)
Provides silica-supported catalyst for 1,4-addition reactions.[1]
Used together w/ SIA0591.0 to anchor $PdCl_2$ catalyst to silica for acceleration of the Tsuji-Trost reaction.[2]
1. Mutukura, K. et al. *Chem.-Eur. J.* **2009**, *15*, 10871.
2. Noda, H. et al. *Angew. Chem., Int. Ed. Engl.* **2012**, *51*, 8017.
See also SID3395.6, SID3547.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[41051-80-3] TSCA EC 255-192-0 HMIS: 2-1-1-X 25g ¥16,200 100g ¥41,400

SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

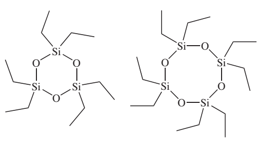
SID3398.0
(DIETHYLAMINO)TRIMETHYLSILANE
TMSDEA
$C_7H_{19}NSi$ 145.32 126-7° (-10°) 0.7627 1.4109
ΔHform: -367 kJ/mole
Flashpoint: 10°C (50°F)
Silylation reagent
Review of synthetic utility.[1]
Reacts with benzynes and aldehydes to form o-aminobenzyl alcohols.[2]
Provides a convenient synthesis of enoltrimethylsilyl ethers.[3]

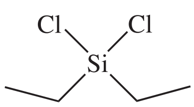


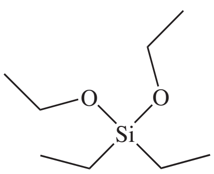


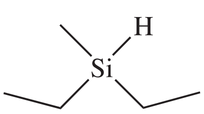
COMMERCIAL

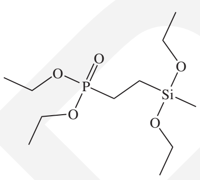
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 598-599.
2. Yoshida, H. et al. *Org. Lett.* **2007**, *9*, 3367.
3. Yamamoto, Y.; Matui, C. *Organometallics* **1997**, *16*, 2204.
F&F: Vol. 3, p 317; Vol. 4, p 544; Vol. 6, p 634; Vol. 18, p 382.
See also SID3395.3, SID3605.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[996-50-9] TSCA EC 213-637-6 HMIS: 3-4-1-X 25g ¥7,200 100g ¥27,300 2kg ¥207,000

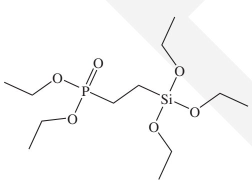
SID3399.0

DIETHYLCYCLOSILOXANES
$((C_2H_5)_2SiO)_{3-6}$ 307 - 612 117-160° / 10 1.04-1.06
>90% cyclotri- and cyclotetrasiloxanes
Specific heat: 1.8 J/g/°
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[2031-79-0] HMIS: 1-2-0-X 10g ¥14,100 50g ¥45,900

SID3402.0

DIETHYLDICHLOROSILANE
$C_4H_{10}Cl_2Si$ 157.11 130° (-96.5°) 1.0504 1.4309
ΔHvap: 41.9 kJ/mole
Flashpoint: 27°C (81°F)
Dipole moment: 2.4 debye
TOXICITY: oral rat, LD20: 1,000 mg/kg
Surface tension: 30.3 mN/m
Vapor pressure, 21°: 10 mm
Thermal conductivity: 0.134 W/m°C
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1719-53-5] (既) 2-2041 TSCA EC 217-005-0 HMIS: 3-3-1-X 25g ¥11,900 100g ¥31,000

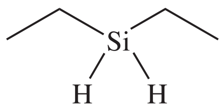
SID3404.0

DIETHYLDIETHOXYSILANE
$C_8H_{20}O_2Si$ 176.33 157° 0.8622 1.4022
Flashpoint: 43°C (109°F)
Vapor pressure, 73°: 100 mm
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5021-93-2] (既) 2-2052 TSCA EC 225-706-8 HMIS: 2-2-1-X 10g ¥15,400 50g ¥51,200

SID3410.0

DIETHYLMETHYLSILANE
$C_5H_{14}Si$ 102.25 78° 0.705 1.3984
Flashpoint: -24°C (-11°F)
In combination w/ $Co_2(CO)_8$ and Ph_3P effects one carbon homologation of aldehydes
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[760-32-7] TSCA EC 212-080-6 HMIS: 2-4-1-X 25g ¥13,500 100g ¥36,300

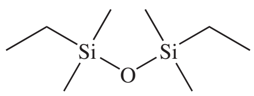
SID3411.0

(2-DIETHYLPHOSPHATOETHYL)METHYLDIETHOXYSILANE, tech-95
$C_{11}H_{27}O_5PSi$ 298.39 124° / 2 1.020 1.4270^{25}
Comonomer for hydrophilic coatings
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18048-06-1] HMIS: 3-2-1-X 10g ¥24,100

SID3412.0

(2-DIETHYLPHOSPHATOETHYL)TRIETHOXYSILANE, tech-95
DIETHYLPHOSPHONATOETHYLTRIETHOXYSILANE
$C_{12}H_{29}O_6PSi$ 328.41 141° / 2 1.031^{25} 1.4216
Flashpoint: 70°C (158°F)
Water-soluble silane; anti-pilling agent for textiles.
Hydrolysis product catalytically hydrates olefins, forming alcohols.[1]
Forms corrosion resistant films for magnesium alloys.[2]
1. Young, F. et al. U.S. Patent 3,816,550, 1974.
2. Kramov, A. et al. *Thin Solid Films* **2006**, *174*, 514.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[757-44-8] TSCA EC 212-056-5 HMIS: 3-2-1-X 25g ¥17,200 100g ¥48,300

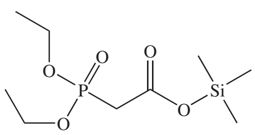
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



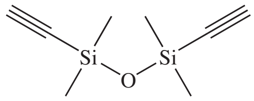
SID3415.0
DIETHYLSILANE
$C_4H_{12}Si$ 88.22 56° (-132°) 0.6837 1.3921
Viscosity, 25°: 0.4 cSt. Flashpoint: -20°C (-4°F)
ΔHcomb: -3,981 kJ/mole Autoignition temperature: 218°C
ΔHform: -155 kJ/mole
ΔHvap: 30.1 kJ/mole
Employed in oxygen plasma assisted deposition of SiO_2 for microelectronics.[1]
Directs the borylation of N-containing heterocycles.[2]
Allows direct functionalization of C-H bonds. Forms 1,3-diols from alcohols in good yields.[3]
Reduces esters to aldehydes in excellent yields.[4]
1. Levy, R. et al. *Chem. Mater.* **1993,** *5*, 1710.
2. Robbins, D. W. et al. *J. Am. Chem. Soc.*. **2010**, *132*, 4068.
3. Simmons, E. M.; Hartwig, J. F. *Nature* **2012**, *483*, 70; DOI: 10.1038/nature10785
4. Cheng, C.; Burkhart, M. *Angew. Chem., Int. Ed. Engl.* **2012**, *51*, 9422.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[542-91-6] TSCA EC 208-834-9 HMIS: 3-4-1-X 10g ¥15,100 50g ¥50,100



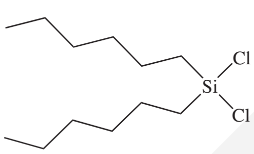
SID3418.0
1,3-DIETHYLTETRAMETHYLDISILOXANE
$C_8H_{22}OSi_2$ 190.43 155-6° (-120°) 0.7969 1.4012
Viscosity: 1.0 cSt Flashpoint: 30°C (86°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[2295-17-2] HMIS: 2-3-0-X 25g ¥21,500 100g ¥61,800



SID3420.0
DIETHYL(TRIMETHYLSILOXYCARBONYLMETHYL)PHOSPHONATE, 95%
$C_9H_{21}O_5PSi$ 268.33 93° / 0.0005 1.059 1.4300
Flashpoint: 44°C (111°F)
Forms α,β-unsaturated acids from carbonyls.[1]
1. Lombardo, L. et al. *Synthesis* **1978,** 131.
F&F: Vol. 8, p 171.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[66130-90-3] EC 266-171-0 HMIS: 2-2-1-X 10g ¥53,800



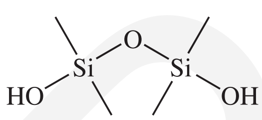
SID3425.0
1,3-DIETHYNYLTETRAMETHYLDISILOXANE
$C_8H_{14}OSi_2$ 182.37 122-8° 0.842 1.4104
Flashpoint: 20°C (68°F)
End-capper for acetylene functional silicones
Useful in silicon-mediated Sonogashira cross-coupling reactions.[1]
1. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18204-93-8] HMIS: 2-4-0-X Store <5°C 10g ¥59,100



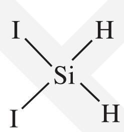
SID3510.0
DI-n-HEXYLDICHLOROSILANE
$C_{12}H_{26}Cl_2Si$ 269.33 111-3° / 6 0.962 1.4518
Flashpoint: 88°C (190°F)
See also SID3203.0, SID4400.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18204-93-8] (既) 2-2041 TSCA EC 242-093-2 HMIS: 3-2-1-X 10g ¥16,200 50g ¥54,400

DIHYDROTETRAMETHYLDISILAZANE - see SIT7542.0 1,1,3,3-TETRAMETHYLDISILAZANE

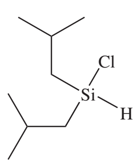
DIHYDROXYDIPHENYLSILANE - SID4560.0 DIPHENYLSILANEDIOL



Reference Compound 2
1,3-DIHYDROXYTETRAMETHYLDISILOXANE
$C_4H_{14}O_3Si_2$ 166.33 (68°) 1.10
Condenses at room temperature to form cyclic and linear dimethylsiloxanes
Reference compound. Data is provided for investigators. Not offered for sale by Gelest.
HMIS: 2-3-0-X

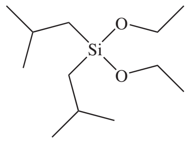


SID3520.0
DIIODOSILANE, 95%
H_2I_2Si 283.91 55-60° / 25 (-1°) 2.834
ΔHvap: 33.7 kJ/mole Flashpoint: 38°C (100°F)
Surface tension, 15°: 44.1 mN/m
Cleaves ethers; converts alcohols to iodides.[1]
Reagent for conversion of carbamates to ureas via isocyanates.[2]
1. Keinan, E. et al. *J. Org. Chem.* **1987,** *52*, 4846.
2. Gastaldi, S. et al. *J. Org. Chem.* **2000,** *65*, 3239.
HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required
[13760-02-6] HMIS: 3-2-2-X 10g ¥32,600

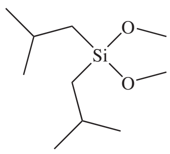


SID3526.0
DIISOBUTYLCHLOROSILANE
$C_8H_{19}ClSi$ 178.78 166-7° 0.995 1.4340
Flashpoint: 42°C (108°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18279-73-7] HMIS: 3-2-1-X 25g ¥38,500

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

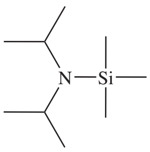


SID3528.0
DIISOBUTYLDIETHOXYSILANE
$C_{12}H_{28}O_2Si$ 232.44 221° 0.845 1.4179
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18297-14-8] HMIS: 2-2-1-X 10g ¥27,800

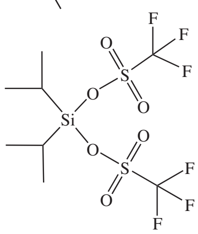


SID3530.0
DIISOBUTYLDIMETHOXYSILANE
$C_{10}H_{24}O_2Si$ 204.39 120° / 6 0.87 1.4167
Flashpoint: 102°C (216°F)
Intermediate for diisobutylsilanediol, a liquid crystal
Employed in polyolefin polymerization
See also SID3258.0, SID3391.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17980-32-4] TSCA HMIS: 2-1-1-X 25g ¥9,800 100g ¥24,100 2kg ¥125,400

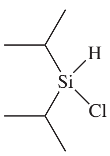
COMMERCIAL



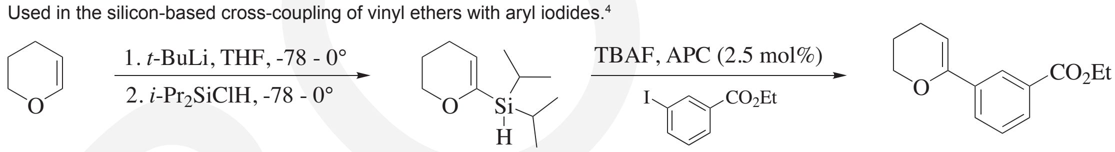
SID3533.0
(DIISOPROPYLAMINO)TRIMETHYLSILANE
$C_9H_{23}NSi$ 173.37 157° 0.786 1.4232
Flashpoint: 28°C (82°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17425-88-6] HMIS: 3-3-1-X 10g ¥38,500



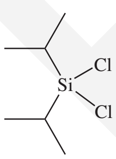
SID3534.0
DIISOPROPYLBIS(TRIFLUOROMETHANESULFONYL)SILANE
$C_8H_{14}F_6O_6S_2Si$ 412.40 85-6° / 2 1.396 1.382
Flashpoint: >110°C (>230°F)
Review of synthetic utility.[1]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 241-248.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[85272-30-6] HMIS: 3-2-1-X 10g ¥33,700



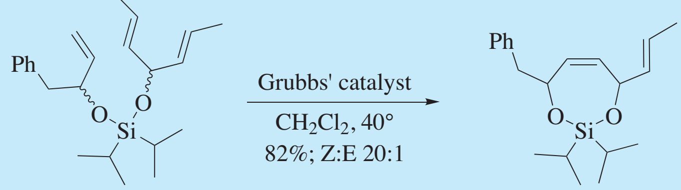
SID3535.0
DIISOPROPYLCHLOROSILANE
$C_6H_{15}ClSi$ 150.72 137° 0.872 1.4278
Flashpoint: 22°C (72°F)
Review of synthetic utility.[1]
Reduces β-hydroxyketones stereoselectively.[2]
Used in the tethered reactions of unsaturated alcohols.[3]
Used in the silicon-based cross-coupling of vinyl ethers with aryl iodides.[4]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 151-156.
2. Anwar, S. et al. *Chem. Comm.* **1986,** 831.
3. Robertson, J. et al. *Tetrahedron Lett.* **1998,** *39*, 669.
4. Evans, P. A.; Baum, E. W. *J. Am. Chem. Soc.* **2004**, *126*, 11150.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2227-29-4] (既) 2-2041 TSCA HMIS: 3-4-1-X 5g ¥14,100 25g ¥45,900



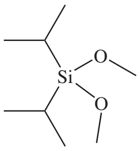
SID3537.0
DIISOPROPYLDICHLOROSILANE
$C_6H_{14}Cl_2Si$ 185.17 64-5° / 25 1.026 1.4450
Flashpoint: 43°C (109°F)
Review of synthetic utility.[1]
Forms bis(blocked) or tethered alcohols.[2,3]
Used as tether in ring-closing-metathesis (RCM) reaction.[4]
The bifunctional nature of the reagent allows for the templating of diverse groups in intermolecular reactions and ring formation.[5]



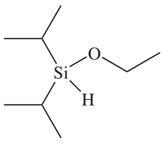
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 222-228.
2. Bradford, C. et al. *Tetrahedron Lett.* **1995,** *36*, 4189.
3. Hutchinson, J. et al. *Tetrahedron Lett.* **1991,** *32*, 573.
4. Evans, P. A. et al. *J. Am. Chem. Soc.* **2003**, *125*, 14702.
5. Evans, P. A. et al. *Angew. Chem., Int. Ed. Engl.* **2003**, *42*, 1734.
See also SID3390.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7751-38-4] (既) 2-2041 HMIS: 3-2-1-X 10g ¥9,000 50g ¥25,700 1kg ¥203,000

COMMERCIAL

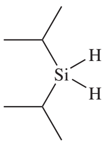
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



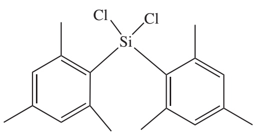
SID3538.0
DIISOPROPYLDIMETHOXYSILANE
$C_8H_{20}O_2Si$ — Mw 176.33 — bp 85-7° / 50 — D_4^{20} 0.875 — n_D^{20} 1.4140
Viscosity: 1.0 cSt
Flashpoint: 43°C (109°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Autoignition temperature: 240°C
Cocatalyst for α-olefin polymerization.[1]
1. Lee, S. et al. U.S. Patent 5,223,466, 1993.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18230-61-0] TSCA HMIS: 3-2-1-X 10g ¥7,200 50g ¥18,300 2kg ¥146,000
COMMERCIAL



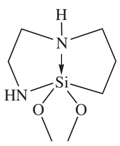
SID3539.0
DIISOPROPYLETHOXYSILANE
$C_8H_{20}OSi$ — Mw 160.33 — bp 148° — D_4^{20} 0.745
Flashpoint: 35°C (95°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[90633-16-2] HMIS: 2-3-1-X 10g ¥34,700



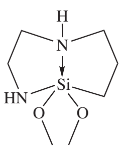
SID3539.4
DIISOPROPYLSILANE
$C_6H_{16}Si$ — Mw 116.27 — bp 98-9° — D_4^{20} 0.7085 — n_D^{20} 1.4041^{25}
Flashpoint: -11°C (13°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18209-66-0] HMIS: 2-4-1-X 10g ¥35,300



SID3540.0
DIMESITYLDICHLOROSILANE
$C_{18}H_{22}Cl_2Si$ — Mw 337.36 — mp (120-1°)
Flashpoint: >110°C (>230°F)
Intermediate for stable disilenes.[1]
1. West, R. et al. *Science* **1981,** *214*, 1343.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5599-27-9] HMIS: 3-1-1-X 5g ¥52,200

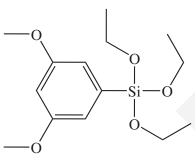


SID3543.0
2,2-DIMETHOXY-1,6-DIAZA-2-SILACYCLOOCTANE
$C_7H_{18}N_2O_2Si$ — Mw 190.32 — bp 71-3° / 2.5 — mp (61-2°)
Volatile coupling agent
See also SIB1932.4, SID3543.1
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[182008-07-7] HMIS: 3-2-1-X 25g ¥27,800

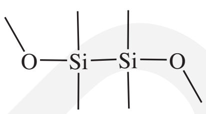


SID3543.1
2,2-DIMETHOXY-1,6-DIAZA-2-SILACYCLOOCTANE, 10% in cyclohexane
$C_7H_{18}N_2O_2Si$ — Mw 190.32 — D_4^{20} 0.79
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[182008-07-7] 25g ¥16,200

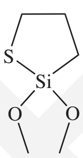
DIMETHOXYMETHYLSILYLPROPANETHIOL - see SIM6474.0 3-MERCAPTOPROPYLMETHYLDIMETHOXYSILANE



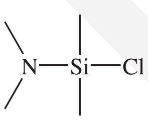
SID3544.0
3,5-DIMETHOXYPHENYLTRIETHOXYSILANE
$C_{14}H_{24}O_5Si$ — Mw 300.43 — bp 136-8° / 0.6 — D_4^{20} 1.050
Adhesion promoter; cross-coupling reagent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-1-1-X 5g ¥49,900



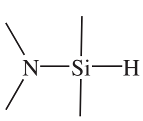
SID3544.6
1,2-DIMETHOXYTETRAMETHYLDISILANE
$C_6H_{18}O_2Si_2$ — Mw 178.38 — bp 138° — D_4^{20} 0.8683 — n_D^{20} 1.4405
Vapor pressure, 43°: 1 5 mm
See also SID3395.2
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[10124-62-6] HMIS: 3-4-1-X 5g ¥29,400



SID3545.0
2,2-DIMETHOXY-1-THIA-2-SILACYCLOPENTANE
$C_5H_{12}O_2SSi$ — Mw 164.29 — bp 57-8° / 7 — D_4^{20} 1.094
Reagent for modification of silver and gold surfaces; coupling agent for rubber
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[26903-85-5] HMIS: 3-3-1-X 25g ¥27,100



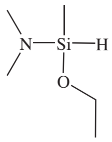
SID3546.5
(N,N-DIMETHYLAMINO)DIMETHYLCHLOROSILANE, 95%
$C_4H_{12}ClNSi$ — Mw 137.68 — bp 108-9° — D_4^{20} 0.908
Hazy liquid
Flashpoint: 7°C (45°F)
HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required
[18209-60-4] TSCA EC 242-095-3 HMIS: 3-4-2-X 10g ¥19,400



SID3546.6
(N,N-DIMETHYLAMINO)DIMETHYLSILANE, 95%
DIMETHYLSILYLDIMETHYLAMINE
$C_4H_{13}NSi$ — Mw 103.24 — bp 67-8° — D_4^{20} 0.726
Contains $HMe_2SiOSiMe_2H$
Flashpoint: -13°C (8°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[22705-32-4] TSCA EC 245-162-5 HMIS: 3-4-1-X 10g ¥13,500 50g ¥43,800

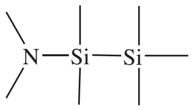
SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

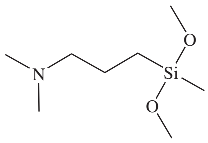


SID3546.8
(DIMETHYLAMINO)METHYLETHOXYSILANE, tech-95
$C_5H_{15}NOSi$ 133.27 100-1°
Flashpoint: 2°C (36°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[96836-74-7] HMIS: 3-4-1-X 10g ¥25,200

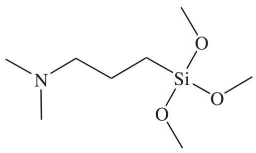
(DIMETHYLAMINO)OCTYLDIMETHYLSILANE - see SIO6711.3 n-OCTYLDIMETHYL(DIMETHYLAMINO)SILANE



SID3546.9
N,N-DIMETHYLAMINOPENTAMETHYLDISILANE
$C_7H_{21}NSi_2$ 175.42 156° 0.75 1.4431
Flashpoint: 22°C (72°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[26798-98-1] HMIS: 3-3-1-X 25g ¥49,600

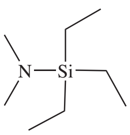


SID3546.94
(N,N-DIMETHYL-3-AMINOPROPYL)METHYLDIMETHOXYSILANE
$C_8H_{21}NO_2Si$ 191.36 92° / 25 0.894 1.4203
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[67353-42-8] HMIS: 2-2-1-X 10g ¥21,500

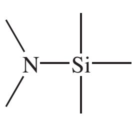


SID3547.0
(N,N-DIMETHYL-3-AMINOPROPYL)TRIMETHOXYSILANE
$C_8H_{21}NO_3Si$ 207.34 106° / 30 0.948^{25} 1.4150
Flashpoint: 99°C (210°F)
Derivatized silica catalyzes Michael reactions.[1]
1. Mode, J. et al. *Synlett* 1998, 625.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2530-86-1] TSCA EC 219-786-3 HMIS: 2-2-1-X 10g ¥12,500 50g ¥39,500

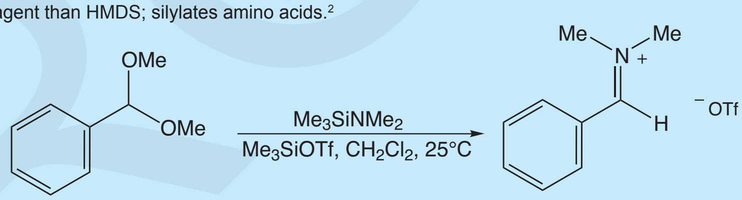
5-DIMETHYLAMINO-N-(3-TRIETHOXYSILYLPROPYL)NAPHTHALENE-1-SULFONAMIDE - see SIT8187.0 N-(TRIETHOXYSILYLPROPYL)DANSYLAMIDE



SID3603.0
(N,N-DIMETHYLAMINO)TRIETHYLSILANE
$C_8H_{21}NSi$ 159.35 166-7° 0.8044 1.4325
Flashpoint: 26°C (79°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3550-35-4] HMIS: 3-3-1-X 50g ¥41,900

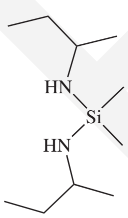


SID3605.0
(N,N-DIMETHYLAMINO)TRIMETHYLSILANE
TMSDMA, PENTAMETHYLSILANAMINE
$C_5H_{15}NSi$ 117.27 85-6° 0.741 1.3970
ΔHvap: 31.8 kJ/mole
Flashpoint: -19°C (-2°F)
Selectively silylates equatorial hydroxyl groups in prostaglandin synthesis.[1]
Stronger silylation reagent than HMDS; silylates amino acids.[2]



COMMERCIAL

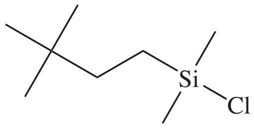
Dialkylaminotrimethylsilanes are used in the synthesis of pentamethinium salts.[3]
With aryl aldehydes converts ketones to α,β-unsaturated ketones.[4]
1. Yankee, E. et al. *J. Am. Chem. Soc.* **1972,** *94*, 3651.
2. Rühlman, K. *Chem. Ber.* **1961,** *94*, 1876.
3. Kořínek, M. et al. *Synthesis* **2009**, 1291.
4. Mojtahedi, M. M. et al. *Synthesis*, **2011**, 3821.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2083-91-2] TSCA EC 218-222-3 HMIS: 3-4-1-X 25g ¥8,000 100g ¥20,100 2kg ¥207,000



SID4040.0
DIMETHYLBIS(s-BUTYLAMINO)SILANE, 95%
$C_{10}H_{26}N_2Si$ 202.42 82° / 15 (<-50°) 0.81 1.4271
Vapor pressure, 20°: 3 mm
Flashpoint: 40°C (104°F)
TOXICITY: oral rat, LD50: 907 mg/kg
Autoignition temperature: 225˚C (437˚F)
Chain extender for silicones
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[93777-98-1] TSCA EC 298-130-8 HMIS: 3-3-1-X 25g ¥15,600 100g ¥43,200

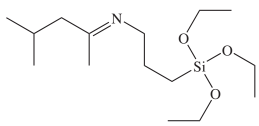
SID4045.0
DIMETHYL[BIS(CYCLOPENTADIENYL)SILYL] ZIRCONIUM DICHLORIDE
$C_{12}H_{14}Cl_2SiZr$ 348.46
Color: yellow
Soluble: THF, methylene chloride
Catalyst for olefin polymerization
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[86050-32-0] HMIS: 2-2-1-X 1.0g ¥64,400

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

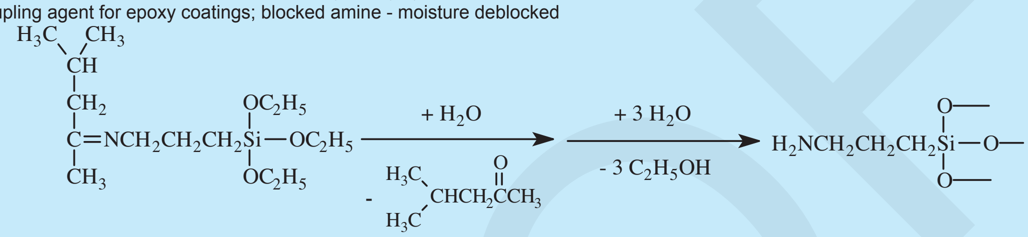


SID4065.0
(3,3-DIMETHYLBUTYL)DIMETHYLCHLOROSILANE
NEOHEXYLDIMETHYLCHLOROSILANE
$C_8H_{19}ClSi$ | 178.78 | 167° | | 0.849 | 1.4240
Flashpoint: 38°C (100°F)

Blocking agent, forms bonded phases for HPLC
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[96220-76-7] TSCA-L HMIS: 3-3-1-X 25g ¥12,500 100g ¥32,600

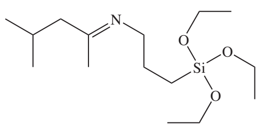


SID4068.0
3-(1,3-DIMETHYLBUTYLIDENE)AMINOPROPYLTRIETHOXYSILANE, tech-95
$C_{15}H_{33}NO_3Si$ | 303.52 | 134° / 5 | | 0.93 | 1.437[25]
Flashpoint: 131°C (268°F)
Contains oligomers
Preferred adhesion promoter for low viscosity epoxy systems
Coupling agent for epoxy coatings; blocked amine - moisture deblocked



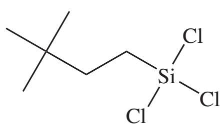
COMMERCIAL

See also SIM6572.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[116229-43-7] TSCA HMIS: 2-1-1-X 25g ¥7,700 100g ¥17,200 2kg ¥101,000

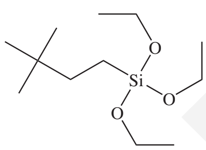


SID4068.1
3-(1,3-DIMETHYLBUTYLIDENE)AMINOPROPYLTRIETHOXYSILANE, 98%
$C_{15}H_{33}NO_3Si$ | 303.52 | 134° / 5 | | 0.93 | 1.437[25]
Flashpoint: 131°C (268°F)

Preferred adhesion promoter for low viscosity epoxy systems
Coupling agent for epoxy coatings; blocked amine - moisture deblocked
See also SIM6572.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[116229-43-7] TSCA HMIS: 2-1-1-X 25g ¥25,700

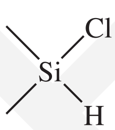


SID4069.0
(3,3-DIMETHYLBUTYL)TRICHLOROSILANE
NEOHEXYLTRICHLOROSILANE
$C_6H_{13}Cl_3Si$ | 219.61 | 183-4° | | 1.1355 | 1.4479
Flashpoint: 68°C (155°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[105732-02-3] HMIS: 3-3-1-X 25g ¥16,200



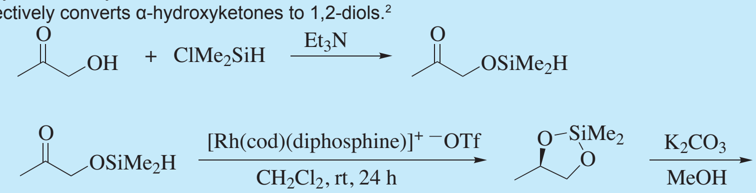
SID4069.4
(3,3-DIMETHYLBUTYL)TRIETHOXYSILANE
NEOHEXYLTRIETHOXYSILANE
$C_{12}H_{28}O_3Si$ | 248.44 | 54-5° / 1.5 | | 0.909 | 1.4068
Flashpoint: 83°C (181°F)

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[41966-94-3] HMIS: 2-2-1-X 25g ¥28,900



SID4070.0
DIMETHYLCHLOROSILANE, 98%
C_2H_7ClSi | 94.62 | 36° | (-111°) | 0.868 | 1.3827
ΔHvap: 26.2 kJ/mole
Surface tension: 17.1 mN/m
Flashpoint: -25°C (-13°F)
Critical temperature: 202°C
Specific heat: 1.13 J/g/°
Thermal conductivity: 0.116 W/m˚K

Undergoes hydrosilylation reactions
Review of synthetic utility.[1]
Enantioselectively converts α-hydroxyketones to 1,2-diols.[2]



COMMERCIAL

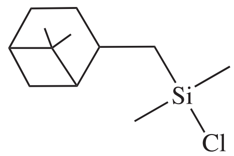
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 156-157.
2. Burk, M. J.; Feaster, J. E. *Tetrahedron Lett.* **1992**, *33*, 2099.

HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1066-35-9] (既) 2-2041 TSCA EC 213-912-0 HMIS: 3-4-2-X 25g ¥4,900 750g ¥30,700 15kg ¥334,000

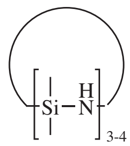
(DIMETHYLCHLOROSILYL)(CHLOROMETHYLPHENYL)ETHANE -
see SIC2295.0 ((CHLOROMETHYL)PHENYLETHYL)DIMETHYLCHLOROSILANE

SILICON COMPOUNDS

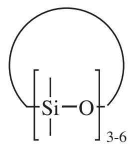
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



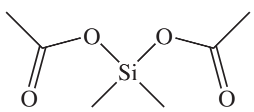
SID4074.0
(DIMETHYLCHLOROSILYL)METHYL-7,7-DIMETHYLNORPINANE
2-[(CHLORODIMETHYLSILYL)METHYL]-6,6-DIMETHYLBICYCLO[3.1.1]HEPTANE
$C_{12}H_{23}ClSi$ — 230.85 — 93-4° / 2 — 0.957 — 1.478
1*S,2*S,5*S
Flashpoint: 92°C (198°F)
[α]d: -5.15; >95% optical purity
Acetylenic derivative forms chiral polymer membrane that resolves amino acids.[1]
1. Aoki, T. et al. *Makromol. Chem., Rapid Commun*. **1992,** *13*, 565.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[72269-53-5] TSCA EC 218-562-2 HMIS: 3-2-1-X 10g ¥13,300



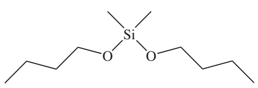
SID4074.4
1,1-DIMETHYLCYCLOSILAZANES, 22-25% in hexane — 0.69
Primarily trimer and tetramer
Flashpoint: -23°C (-9°F)
Hydrophobic surface treatment for silica
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
TSCA HMIS: 2-4-1-X 100g ¥8,800 1.5kg ¥46,300 12kg ¥280,000
COMMERCIAL



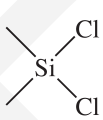
SID4075.0
DIMETHYLCYCLOSILOXANES, 99%
$((CH_3)_2SiO)_{3-6}$ — 222.5 - 445.0 — 132-245° — 0.96
Polymerization grade cyclics
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
TSCA HMIS: 1-3-0-X 2kg ¥18,800 17kg ¥88,000
COMMERCIAL



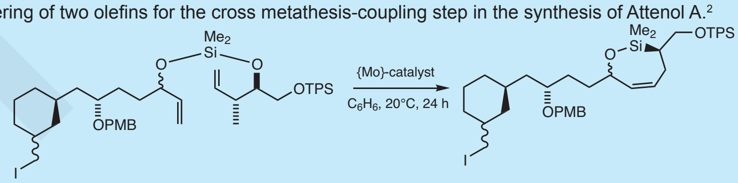
SID4076.0
DIMETHYLDIACETOXYSILANE
$C_6H_{12}O_4Si$ — 176.24 — 164-6° — 1.054 — 1.4030
Flashpoint: 37°C (99°F)
Reagent for the preparation of cis-diols and corticosteroids.[1]
1. Kelley, R. J. *Chromatogr.* **1969,** *43*, 229.
F&F: Vol. 3, p. 113.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2182-66-3] (既) 9-1939 TSCA EC 218-562-2 HMIS: 2-3-1-X 100g ¥13,800 500g ¥45,900



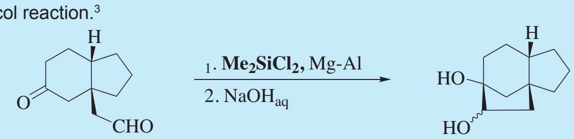
SID4080.0
DIMETHYLDI-n-BUTOXYSILANE
$C_{10}H_{24}O_2Si$ — 204.38 — 82° / 12 — 0.834 — 1.4058
Viscosity: 2 cSt
Flashpoint: 79°C (174°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1591-02-2] TSCA EC 216-467-0 HMIS: 2-2-1-X 25g ¥12,700



SID4120.0
DIMETHYLDICHLOROSILANE, 98%
$C_2H_6Cl_2Si$ — 129.06 — 70-1° — (-76°) — 1.0637 — 1.4055
AIR TRANSPORT FORBIDDEN
Viscosity: 0.47 cSt
Vapor pressure, 17°: 100 mm
Specific heat: 0.92 J/g/°
ΔHcomb: -2,055 kJ/mole
ΔHvap: 33.5 kJ/mole
Surface tension: 20.1 mN/m
Coefficient of thermal expansion: 1.3×10^{-3}
Flashpoint: -10°C (14°F)
TOXICITY: ihl rat, LC50: 930 ppm/4H
Autoignition temperature: 410˚C
Critical temperature: 247.2°C
Critical pressure: 34.4 atm
Flammability limit: 3.4-10.4%
Fundamental monomer for silicones
Review of synthetic utility.[1]
Employed in the tethering of two olefins for the cross metathesis-coupling step in the synthesis of Attenol A.[2]

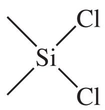


Aids in the intramolecular Pinacol reaction.[3]

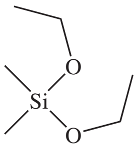


1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 228-230.
2. Van de Weghe, P. et al. *Org. Lett.* **2002,** *4*, 4105.
3. Corey, E. J.; Carney, R. L. *J. Am. Chem. Soc.* **1971**, *93*, 7318.
F&F: Vol. 3, p 114; Vol. 4, p 183.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[75-78-5] (既) 2-2041 TSCA EC 200-901-0 HMIS: 3-4-2-X 500g inquire 18kg inquire
** zDR-S-019 or zCYL-S-019 container required - not included*
COMMERCIAL

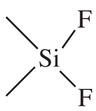
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



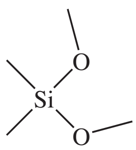
SID4120.1
DIMETHYLDICHLOROSILANE, 99+%
$C_2H_6Cl_2Si$ | 129.06 | 70-1° | (-76°) | 1.0637 | 1.4055
AIR TRANSPORT FORBIDDEN
Redistilled — Flashpoint: -10°C (14°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[75-78-5] (既) 2-2041 TSCA EC 200-901-0 HMIS: 3-4-2-X — 25g inquire — 500g inquire — 18kg inquire
** zDR-S-019 or zCYL-S-019 container required - not included*
COMMERCIAL



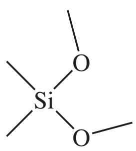
SID4121.0
DIMETHYLDIETHOXYSILANE, 98%
$C_6H_{16}O_2Si$ | 148.28 | 114-5° | (-97°) | 0.8395 | 1.3805
Viscosity: 0.53 cSt
ΔHcomb: -4,684 kJ/mole
ΔHform: 837 kJ/mole
ΔHvap: 41.0 kJ/mole
Dipole moment: 1.39 debye
Flashpoint: 11°C (52°F)
TOXICITY: oral rat, LDLo: 1,000 mg/kg
Vapor pressure, 25°: 15 mm
Coefficient of thermal expansion: 1.3×10^{-3}
Hydrophobic surface treatment and release agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[78-62-6] (既) 2-2052 TSCA EC 201-127-6 HMIS: 2-4-1-X — 100g ¥5,400 — 2kg ¥33,300 — 15kg ¥278,000
COMMERCIAL



SID4122.0
DIMETHYLDIFLUOROSILANE
$C_2H_6F_2Si$ | 96.15 | 2-3° | (-88°)
AIR TRANSPORT FORBIDDEN
Flashpoint: <0°C (<32°F)
Vapor pressure, 20°: 2.38 atm (35 psia)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[353-66-2] TSCA EC 206-540-5 HMIS: 4-4-1-X — 50g inquire
** includes gas dispensing cylinder zCYL-G-0325*

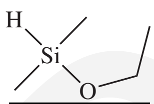


SID4123.0
DIMETHYLDIMETHOXYSILANE, 96%
$C_4H_{12}O_2Si$ | 120.22 | 82° | (-80°) | 0.8646 | 1.3708
Contains methanol
Viscosity, 20˚: 0.44 cSt
ΔHcomb: 3,483 kJ/mole
ΔHform: 716 kJ/mole
Dipole moment: 1.33 debye
Flashpoint: -8°C (18°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Autoignition temperature: 325˚C
Vapor pressure, 36°: 100 mm
Coefficient of thermal expansion: 1.3×10^{-3}
Provides hydrophobic surface treatments in vapor phase applications
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1112-39-6] (既) 2-2052 TSCA EC 214-189-4 HMIS: 3-4-1-X — 25g ¥3,400 — 2kg ¥32,200 — 15kg ¥209,000
COMMERCIAL



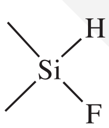
SID4123.1
DIMETHYLDIMETHOXYSILANE, 99+%
DMDMOS
$C_4H_{12}O_2Si$ | 120.22 | 82° | (-80°) | 0.8646 | 1.3708
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1112-39-6] TSCA EC 214-189-4 HMIS: 3-4-1-X — 25g ¥6,400 — 500g ¥14,500

2,5-DIMETHYL-2,5-DISILAHEXANE - see SIT7537.0 1,1,4,4-TETRAMETHYL-1,4-DISILABUTANE
DIMETHYLDIVINYLSILANE - see SID4606.0 DIVINYLDIMETHYLSILANE



SID4125.0
DIMETHYLETHOXYSILANE
$C_4H_{12}OSi$ | 104.22 | 54-5° | | 0.757 | 1.3683
Vapor pressure, 25°: 281 mm
Flashpoint: 15°C (59°F)
TOXICITY: oral rat, LD50: 5,000 mg/kg
Undergoes hydrosilylation reactions
Waterproofing agent for space shuttle thermal tiles.[1]
1. Hill, W. et al. *Polym. Mater. Sci. Eng.* **1990,** *62*, 668.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[14857-34-2] (既) 2-2052 TSCA EC 238-921-7 HMIS: 2-4-1-X — 25g ¥13,000 — 100g ¥34,200

DIMETHYLETHOXYVINYLSILANE - see SIV9072.0 VINYLDIMETHYLETHOXYSILANE

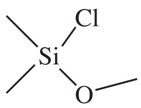


SID4145.0
DIMETHYLFLUOROSILANE
C_2H_7FSi | 78.16 | -9° | (-115°)
AIR TRANSPORT FORBIDDEN
ΔHvap: 23.4 kJ/mole
Undergoes hydrosilylation reactions
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[865-46-3] HMIS: 4-4-1-X — 25g inquire
** includes gas dispensing cylinder zCYL-G-0325*

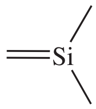
SILICON COMPOUNDS

Gelest

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SID4210.0
DIMETHYLMETHOXYCHLOROSILANE, tech-90
C_3H_9ClOSi 124.64 77° 0.953[25] 1.3865
Contains dimethyldimethoxysilane Flashpoint: -9°C (16°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1825-68-9] (既) 2-2051 TSCA HMIS: 3-4-1-X 25g ¥17,800 100g ¥49,900

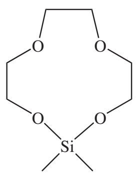


Reference Compound 4
DIMETHYLMETHYLENESILANE
C_3H_8Si 72.18
Transient intermediate
Synthesis: Barton, T. et al. *J. Chem. Soc., Chem. Commun. 1972,* **15**, 861.
Reference compound. Data is provided for investigators. Not offered for sale by Gelest.
[4112-23-6]

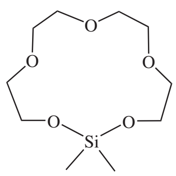
DIMETHYLOCTADECYLCHLOROSILANE - see SIO6615.0 n-OCTADECYLDIMETHYLCHLOROSILANE

DIMETHYLPHENYLSILANE - see SIP6729.0 PHENYLDIMETHYLSILANE

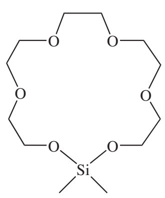
2,2-DIMETHYL-2-SILA-3-CHLOROBUTANE - see SIC2275.0 1-CHLOROETHYLTRIMETHYLSILANE



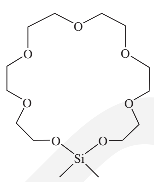
SID4220.4
DIMETHYLSILA-11-CROWN-4, 95%
1,1-DIMETHYL-1,3,6,9,11-TETRAOXA-1-SILACYCLOUNDECANE
$C_8H_{18}O_4Si$ 206.31 96° / 9 1.07 1.4487
Flashpoint: 77°C (171°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18339-94-1] EC 242-221-7 HMIS: 3-2-0-X 25g ¥17,200



SID4220.5
DIMETHYLSILA-14-CROWN-5, 95%
2,2-DIMETHYL-1,3,6,9,12-PENTAOXA-2-SILACYCLOTETRADECANE
$C_{10}H_{22}O_5Si$ 250.37 125-9° / 0.5 1.08 1.4522
Flashpoint: >110°C (>230°F)
TOXICITY: oral rat, LD50: 9,900 mg/kg
Potential Li ion electrolyte
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[70851-49-9] TSCA EC 274-934-4 HMIS: 2-1-0-X 25g ¥18,000



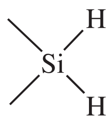
SID4220.6
DIMETHYLSILA-17-CROWN-6, 90%
$C_{12}H_{26}O_6Si$ 294.42 168-70° / 0.3 1.09
Contains other homologs Flashpoint: >110°C (>230°F)
ΔH K^+ complex formation: 33 kJ/mole
Phase transfer catalyst.[1]
Catalyst for cyanoacrylate polymerization on surface insesnsitive stubstrates.[2]
Forms functional hybrid carbon electrodes.[3]
1. Arkles, B. et al. *Organometallics* **1983,** 2, 454.
2. O'Connor, J. *Chemtech* **1994,** *24(9)*, 51.
3. Colilla, M. et al. *Comptes Rendus Chimie* **2010**, *13*, 227.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[83890-22-6] TSCA EC 281-175-2 HMIS: 2-1-0-X 10g ¥17,200



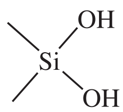
SID4220.7
DIMETHYLSILA-20-CROWN-7, 90%
$C_{14}H_{30}O_7Si$ 338.47 274-7° / 1 1.092
Contains other homologs Flashpoint: >110°C (>230°F)
Ionophore selective for K^+ ions
Inhibits ion mobility in electrical resins
Se also SID4221.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[83890-23-7] HMIS: 2-1-0-X 5g ¥21,700

SID4221.0
DIMETHYLSILACROWNS, mixed
$C_{12}H_{26}O_6Si$ 250 - 338 125-295° / 0.3 1.09
Flashpoint: >110°C (>230°F)
Contains: 70-75% Dimethylsila-17-crown-6, 10-20% dimethylsila-14-crown-5, 10-20% dimethylsila-20-crown-7
Low cost phase transfer catalyst
Reduces cure time for cyanoacrylates on cellulosic substrates.[1]
1. Lui, J. U.S. Patent 4,906,317, 1990.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[83890-22-6] / [83890-23-7] TSCA HMIS: 2-1-0-X 25g ¥13,000 100g ¥34,200

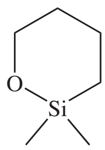
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SID4230.0
DIMETHYLSILANE
2MS
C_2H_8Si — Mw 60.17 — bp -20° — (mp -150°) — D 0.68^{-20}
ΔHcomb: -2,612 kJ/mole — Flashpoint: <-40°C (<-40°F)
ΔHform: -96 kJ/mole — Vapor pressure, -80: 30 mm
ΔHvap: 23.0 kJ/mole
Dipole moment: 0.75 debye
CVD precursor for low k dielectric layers in damascene metallization applications
Generates cubic silicon carbide by plasma CVD.[1]
Epitaxial growth of cubic silicon carbide carried out by triode plasma CVD.[2]
1. Hashim, A. et al. *Semiconductor Electronics, IEE Int'l. Conf. Proc.* **2006**, 646.
2. Yasuiet, K. et al. *Appl. Surf. Sci.* **2000**, *159*, 556.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[1111-74-6] TSCA EC 214-184-7 HMIS: 3-4-1-X 50g inquire
** includes gas dispensing cylinder zCYL-G-0325*

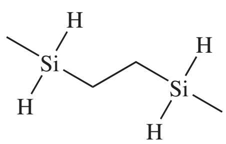


Reference Compound 5
DIMETHYLSILANEDIOL
$C_2H_8O_2Si$ — Mw 92.17 — (mp 98-8°) — D 1.097 — n_D 1.454^{25}
Condenses at room temperature to form cyclic and linear dimethylsiloxanes
Synthesis: Hyde, J. *J. Am. Chem. Soc.* **1953,** *75*, 2166.
Reference compound. Data is provided for investigators. Not offered for sale by Gelest.
[1066-42-8]



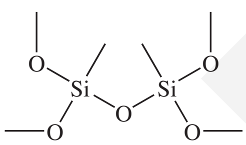
SID4234.0
1,1-DIMETHYL-1-SILA-2-OXACYCLOHEXANE, 96%
$C_6H_{14}OSi$ — Mw 130.26 — bp 122-5° — n_D 1.4260
Flashpoint: 14°C (57°F)
Undergoes ring-opening polymerization
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5833-47-6] TSCA EC 227-416-7 HMIS: 2-4-0-X 10g ¥15,600 50g ¥47,700

DIMETHYLSILAPENTANESULFONATE - see SIT8599.0 TRIMETHYLSILYLPROPANESULFONIC ACID, SODIUM SALT
DIMETHYLSILAZANE TETRAMER - see SIO6698.0 OCTAMETHYLCYCLOTETRASILAZANE
DIMETHYLSILAZANE TRIMER - see SIH6102.0 1,1,3,3,5,5-HEXAMETHYLCYCLOTRISILAZANE
1,1-DIMETHYLSILETANE - see SIC2570.0 CYCLOTRIMETHYLENEDIMETHYLSILANE

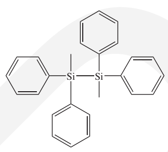


SID4235.0
1,4-DIMETHYLDISILETHANE
1,2-ETHANEDIYLBIS(METHYLSILANE), 2,5-DISILAHEXANE
$C_4H_{14}Si_2$ — Mw 118.33 — bp 96-8° — D 0.726 — n_D 1.4220
Flashpoint: -12°C (10°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[4405-22-5] HMIS: 3-4-1-X 10g ¥35,300

DIMETHYLSILYLDIMETHYLAMINE - see SID3546.6 (N,N-DIMETHYLAMINO)DIMETHYLSILANE
1,4-DIMETHYL-1,1,4,4-TETRACHLORO-1,2-DISILETHYLENE - see SIB1614.0 BIS(METHYLDICHLOROSILYL)ETHANE

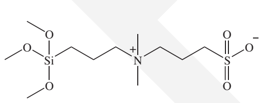


SID4236.0
1,3-DIMETHYLTETRAMETHOXYDISILOXANE, 95%
$C_6H_{18}O_5Si_2$ — Mw 226.38 — bp 165° — D 1.010 — n_D 1.3834
Flashpoint: 30°C (86°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18186-97-5] TSCA EC 242-072-8 HMIS: 3-3-1-X 10g ¥13,000 50g ¥41,400



SID4238.0
1,2-DIMETHYL-1,1,2,2-TETRAPHENYLDISILANE
$C_{26}H_{26}Si_2$ — Mw 394.66 — (mp 142-4°)
Reacts with Li to form diphenylmethylsilyl lithium
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1172-76-5] TSCA EC 214-632-1 HMIS: 2-2-0-X 10g ¥27,300

DIMETHYLTHEXYLSILYL CHLORIDE - see SIT7906.0 THEXYLDIMETHYLCHLOROSILANE

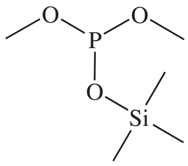


SID4241.0
3-{[DIMETHYL(3-TRIMETHOXYSILYL)PROPYL]AMMONIO}PROPANE-1-SULFONATE, tech 95
$C_{11}H_{27}NO_6SSi$ — Mw 329.50
White, hygroscopic solid
Zwitter-ionic betaine
Inhibits aggregation of silica nanoparticles.[1,2]
A viable option to PEGylation in preventing protein adsorption to silica.[2]
1. Estephan, Z. G. et al. *Langmuir*, **2010**, *26*, 16884.
2. Estephan, Z. G. et al. *Langmuir*, **2011**, *27*, 6794.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[151778-80-2] HMIS: 3-2-1-X 25g ¥28,900

N,N-DIMETHYLTRIMETHYLSILYLAMINE - see SID3605.0 (N,N-DIMETHYLAMINO)TRIMETHYLSILANE

SILICON COMPOUNDS

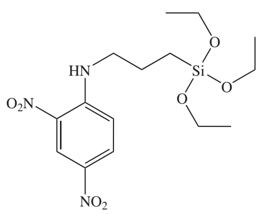
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SID4245.0
O,O'-DIMETHYL(TRIMETHYLSILYL)PHOSPHITE, tech-95

$C_5H_{15}O_3PSi$	182.23	73-7° / 56 Flashpoint: 38°C (100°F)		0.954	1.4091

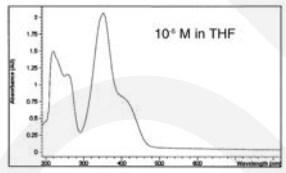
Carries out phosphonylations of aldimines.[1,2]
1. Das, B, et al. *J. Org. Chem.* **2009**, *74*, 4393.
2. Hatano, M. et al. *Tetrahedron Lett.* **2009**, *50*, 3171.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[36198-87-5] EC 252-908-3 HMIS: 3-2-1-X 10g ¥24,700



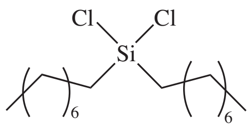
SID4352.0
3-(2,4-DINITROPHENYLAMINO)PROPYLTRIETHOXYSILANE, 95%
N-[3-(TRIETHOXYSILYL)PROPYL]-2,4-DINITROPHENYLAMINE

$C_{15}H_{25}N_3O_7Si$	387.46	Flashpoint: >110°C (>230°F)	(27-30°)		1.5665

Viscous liquid or solid
UV max: 222, 258, 350(s), 410
Forms χ2 non-linear optical sol-gel materials by corona poling.[1,2]



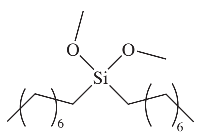
1. Toussaere, E. et al. *Non-Linear Optics* **1992,** *2*, 37.
2. Lebeau, J. et al. *J. Mater. Chem.* **1994,** *4*, 1855.
See also SIN6597.25
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[71783-41-0] HMIS: 2-1-0-X 25g ¥24,100



SID4400.0
DI-n-OCTYLDICHLOROSILANE

$C_{16}H_{34}Cl_2Si$	325.44	145° / 0.2		0.940	

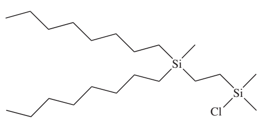
See also SIB1097.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18416-07-4] HMIS: 3-2-1-X 25g ¥20,400 100g ¥58,300



SID4400.4
DI-n-OCTYLDIMETHOXYSILANE

$C_{18}H_{40}O_2Si$	316.60	132-4° / 0.2		0.854	1.4388

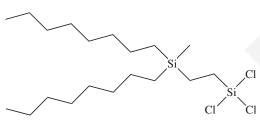
Hydrophobic surface treatment
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[947155-81-9] HMIS: 3-2-1-X 25g ¥33,200



SID4401.0
2-(DI-n-OCTYLMETHYLSILYL)ETHYLDIMETHYLCHLOROSILANE

$C_{21}H_{47}ClSi_2$	391.23	165-6° / 0.1		0.859	

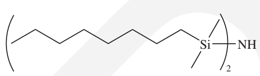
Forms bonded phases for reverse phase chromatography
See also SIC2266.5
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[475213-03-7] HMIS: 3-2-1-X 25g ¥35,300



SID4401.5
2-(DI-n-OCTYLMETHYLSILYL)ETHYLTRICHLOROSILANE

$C_{19}H_{41}Cl_3Si_2$	432.06	166-8° / 0.1		0.966	

Forms bonded phases for reverse phase HPLC
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[475213-02-6] HMIS: 3-2-1-X 25g ¥35,300



SID4404.0
1,3-DI-n-OCTYL-1,1,3,3-TETRAMETHYLDISILAZANE

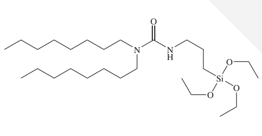
$C_{20}H_{47}NSi_2$	357.77	160-5° / 1 Flashpoint: >110°C (>230°F)		0.826	1.4500

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[69519-51-3] HMIS: 2-1-0-X 10g ¥16,400

SID4406.0
1,3-DI-n-OCTYLTETRAMETHYLDISILOXANE

$C_{20}H_{46}OSi_2$	358.76	122-5° / 0.2 Flashpoint: >110°C (>230°F)	(-36°)	0.891	1.4740^{25}

Viscosity, 25°: 4.1 cSt
End-capper for silicones with hydrocarbon compatibility used in cosmetics
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[18642-94-9] HMIS: 2-1-0-X 25g ¥11,900 100g ¥30,800

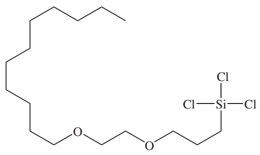


SID4465.0
N,N-DIOCTYL-N'-TRIETHOXYSILYLPROPYLUREA

$C_{26}H_{56}N_2O_4Si$	488.83			0.924^{25}	1.4521^{25}

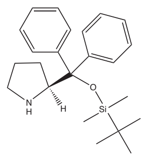
Forms hydrophobic phases with embedded hydrophilicity
Forms organic-inorganic vesicles (cerasomers).[1]
1. Hashizume, M. et al. *J. Thin Solid Films* **2003,** *438*, 20.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[259727-10-1] HMIS: 2-2-1-X 25g ¥26,800

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



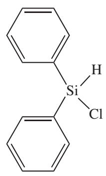
SID4472.0
4,7-DIOXAOCTADECYLTRICHLOROSILANE, 95%
$C_{16}H_{33}Cl_3O_2Si$ — 391.88 — 165° / 0.7 — 1.028

Forms C_{18} bonded phases with embedded hydrophilicity
See also SIB1815.1
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-1-1-X — 10g ¥52,500



SID4480.0
2-(S)-[(DIPHENYL)(t-BUTYLDIMETHYLSILOXY)METHYL]PYRROLIDINE
$C_{23}H_{33}NOSi$ — 367.59 — (71-3°)

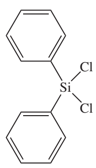
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[864466-71-7] HMIS: 3-1-1-X — 0.5g ¥67,100



SID4495.0
DIPHENYLCHLOROSILANE, tech-95
$C_{12}H_{11}ClSi$ — 218.76 — 143° / 10 — 1.118 — 1.581
Flashpoint: 105°C (221°F)

Review of synthetic utility.[1]
Precursor for silanediol-based peptidomimetic inhibitors.[2]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 162.
2. Organ, M. G. et al. *Org. Lett.* **2002,** *4*, 2683.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1631-83-0] (既) 3-2634 TSCA EC 216-634-8 HMIS: 3-1-1-X — 10g ¥18,800 — 50g ¥59,000

DIPHENYLDIALLYLSILANE - see SID2749.0 DIALLYLDIPHENYLSILANE

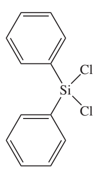


SID4510.0
DIPHENYLDICHLOROSILANE, 95%
$C_{12}H_{10}Cl_2Si$ — 253.20 — 304-5° — (-22°) — 1.2216 — 1.5819

Viscosity, 25°: 4.1 cSt
ΔHvap: 62.8 kJ/mole
Dipole moment: 2.6 debye
Flashpoint: 157°C (314°F)
TOXICITY: ipr mouse, LD50: 383 mg/kg
Vapor pressure, 125°: 2mm
Coefficient of thermal expansion: 0.7×10^{-3}
Specific heat: 1.26 J/g/°

Silicone monomer
Forms diol on contact with water
See also SID4588.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[80-10-4] (既) 3-2634 TSCA EC 201-251-0 HMIS: 3-1-1-X — 100g ¥7,300 — 1kg ¥23,000 — 20kg ¥265,000

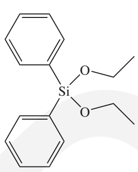
COMMERCIAL



SID4510.1
DIPHENYLDICHLOROSILANE, 99%
$C_{12}H_{10}Cl_2Si$ — 253.20 — 304-5° — (-22°) — 1.2216 — 1.5819
Flashpoint: 157°C (314°F)
TOXICITY: ipr mouse, LD50: 383 mg/kg

HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[80-10-4] (既) 3-2634 TSCA EC 201-251-0 HMIS: 3-1-1-X — 25g ¥5,300 — 100g ¥11,000 — 750g ¥42,400

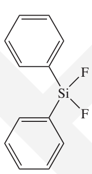
COMMERCIAL



SID4525.0
DIPHENYLDIETHOXYSILANE
$C_{16}H_{20}O_2Si$ — 272.42 — 167° / 15 — 1.0329 — 1.5269
Flashpoint: 175°C (347°F)
Vapor pressure, 125°: 2 mm

Provides hydrophobic coatings with good thermal and UV resistance
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2553-19-7] (既) 3-2635 TSCA EC 219-860-5 HMIS: 2-1-0-X — 25g ¥5,000 — 100g ¥11,800 — 2kg ¥94,900

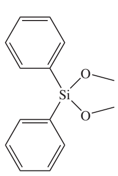
COMMERCIAL



SID4530.0
DIPHENYLDIFLUOROSILANE
$C_{12}H_{10}F_2Si$ — 220.29 — 156° / 50 — 1.145^{17} — 1.5221^{25}

ΔHvap: 54.0 kJ/mole
Dipole moment: 2.57 debye
Flashpoint: 87°C (189°F)
Vapor pressure, 100°: 5 mm

Review of synthetic utility.[1]
Potential for the transfer of a phenyl group in silicon-based, Hiyama cross-coupling.[2]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 276-277.
2. Hatanaka, Y. et al. *Tetrahedron*, **1994**, *50*, 8301.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[312-40-3] TSCA EC 206-226-8 HMIS: 3-2-1-X — 25g ¥19,400 — 100g ¥55,200

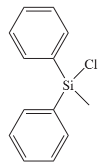


SID4535.0
DIPHENYLDIMETHOXYSILANE, 98%
$C_{14}H_{16}O_2Si$ — 244.36 — 161° / 15 — 1.0771 — 1.5447

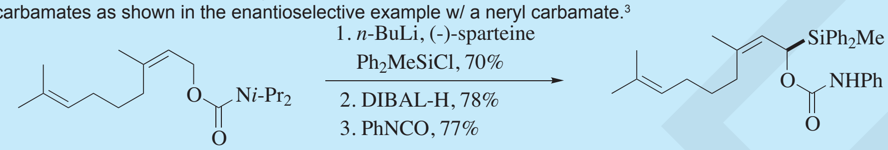
Viscosity, 25°: 8.4 cSt
Flashpoint: 121°C (250°F)
Intermediate for high temperature silicone resins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[6843-66-9] (既) 3-2635 TSCA EC 229-929-1 HMIS: 3-1-1-X — 100g ¥7,200 — 2kg ¥60,000 — 18kg ¥343,000

COMMERCIAL

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

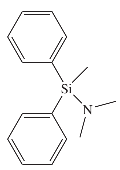


SID4552.0
DIPHENYLMETHYLCHLOROSILANE
$C_{13}H_{13}ClSi$ 232.78 295° (-22°) 1.128 1.5742
Viscosity: 5.3 cSt — Flashpoint: 141°C (286°F)
ΔHvap: 623.7 kJ/mole — Vapor pressure, 125°: 3 mm
Surface tension: 40.0 mN/m — Thermal conductivity: 0.112 W/m˚C
Review of synthetic utility.[1]
α-silylates esters, lactones; precursors to silyl enolates.[2]
C-Silylates carbamates as shown in the enantioselective example w/ a neryl carbamate.[3]

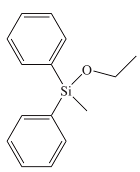


COMMERCIAL

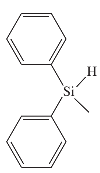
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 381-388.
2. Larson, G. L. et al. *J. Am. Chem. Soc.* **1981,** *103*, 2418.
3. Duvold, T. et al. *Biorg. Med. Chem. Lett.* **2002**, *12*, 3569 and references therein.
F&F: Vol. 10, p 91; Vol. 12, p 321; Vol. 13, p 74.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[144-79-6] (既) 3-2461 TSCA EC 205-639-0 HMIS: 3-1-1-X 25g ¥8,600 100g ¥31,000 1kg ¥84,400



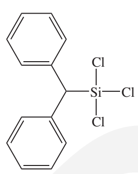
SID4552.5
(DIPHENYL)METHYL(DIMETHYLAMINO)SILANE
$C_{15}H_{19}NSi$ 241.41 98-9° / 0.25 1.011
See also SIT7753.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[68733-63-1] TSCA HMIS: 3-3-1-X 25g ¥16,200



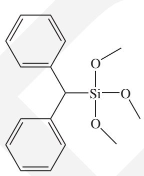
SID4553.0
DIPHENYLMETHYLETHOXYSILANE
$C_{15}H_{18}OSi$ 242.39 100-2° / 0.3 (-27°) 1.018 1.5440^{25}
Viscosity, 25˚: 6.5 cSt — Flashpoint: 165°C (329°F)
ΔHvap: 61.9 kJ/mole — Vapor pressure, 125°: 3 mm
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1825-59-8] (既) 3-2639 EC 217-368-5 HMIS: 2-0-0-X 10g ¥10,300 50g ¥31,000



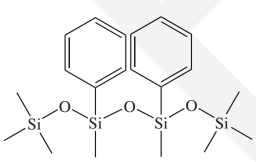
SID4555.0
DIPHENYLMETHYLSILANE
$C_{13}H_{14}Si$ 198.34 266-7° 0.9973 1.5694
ΔHvap: 64.5 kJ/mole — Flashpoint: 120°C (248°F)
Vapor pressure, 100°: 1 mm
Employed in the kinetic resolution of racemic alcohols.[1]
1. Weickgenannt, A. et al. *Angew. Chem., Int. Ed. Engl.* **2010**, *49*, 2223.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[776-76-1] TSCA EC 212-281-9 HMIS: 3-1-1-X 25g ¥14,100 100g ¥37,900



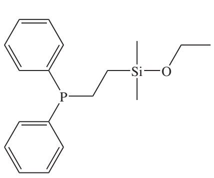
SID4555.5
(DIPHENYLMETHYL)TRICHLOROSILANE
$C_{13}H_{11}Cl_3Si$ 301.67 167-8° / 9 (57-8°) 1.5821
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18089-94-6] HMIS: 3-2-1-X 10g ¥45,900



SID4555.6
(DIPHENYLMETHYL)TRIMETHOXYSILANE
$C_{16}H_{20}O_3Si$ 288.41 120° / 10
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 10g ¥40,600

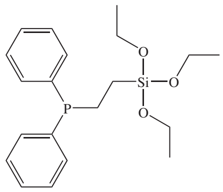


SID4556.0
3,5-DIPHENYLOCTAMETHYLTETRASILOXANE, 95%
$C_{20}H_{34}O_3Si_4$ 434.83 140-5° / 0.4 (-40°) 0.979 1.4774
Viscosity, 20°: 6 cSt — Heat capacity, 27°: 1.569 kJ/kg°C
Surface tension, 25°: 32.5 mN/m
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[13270-97-8] HMIS: 1-1-0-X 25g ¥17,800



SID4557.5
(2-DIPHENYLPHOSPHINO)ETHYLDIMETHYLETHOXYSILANE
$C_{18}H_{25}OPSi$ 316.46 160° / 1 1.004 1.5630
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[359859-29-3] HMIS: 2-2-1-X 10g ¥41,600

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

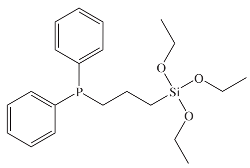


SID4558.0
2-(DIPHENYLPHOSPHINO)ETHYLTRIETHOXYSILANE
$C_{20}H_{29}O_3PSi$ | 376.50 | 182° / 1.3 | | 1.05 | 1.5384
Flashpoint: 134°C (273°F)

Immobilizing ligand for precious metals
Adhesion promoter for gold substrates in microelectronic applications.[1]
Forms stable bonds to silica and basic alumina suitable for catalyst immobilization.[2]
Forms luminescent gels on hydrolysis with $(EtO)_4Si$ and $Eu(NO_3)_3$.[3]
Used to immobilize an iridium catalyst for the enantioselective hydrogenation of aryl ketones.[4]
Used in the preparation of solid-phase Pd catalyst for Suzuki-Miyaura cross-coupling.[5]

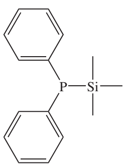
1. Helbert, J. U.S. Patent 4,497,890, 1985.
2. Merchle, C. H. et al. *Chem. Mater.* **2001,** *13*, 3617.
3. Corriu, R. et al. *J. Chem. Soc., Chem. Commun*. **2001**, 1116.
4. Liu, G. et al. *Adv. Synth. Catal.* **2008**, *350,* 1464.
5. Zhang, X. et al. *Synthesis*, **2011**, 2975.

See also SIB1091.0, SID3385.0, SID4557.2
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18586-39-5] TSCA EC 242-427-7 HMIS: 3-1-1-X 5g ¥15,400 25g ¥51,200



SID4558.2
3-(DIPHENYLPHOSPHINO)PROPYLTRIETHOXYSILANE
$C_{21}H_{31}O_3PSi$ | 390.53 | 190° / 1
Flashpoint: >110°C (>230°F)

See also SIB1091.0, SID4558.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[52090-23-0] HMIS: 3-1-1-X 1.0g ¥26,300

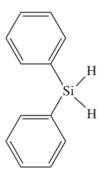


SID4558.5
(DIPHENYLPHOSPHINO)TRIMETHYLSILANE, 95%
$C_{15}H_{19}PSi$ | 258.38 | 120° / 0.2 | | 1.009 | 1.6030
Flashpoint: 10°C (50°F)

Used in the synthesis of α,β-unsaturated 3-iminophosphines.[1]

1. Shaffer, A. R.; Schmidt, J. A. R. *Chem. Eur. J.* **2009**, *15*, 2662.

HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required
[17154-34-6] HMIS: 3-3-1-X 5g ¥37,400

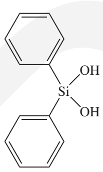


SID4559.0
DIPHENYLSILANE
$C_{12}H_{12}Si$ | 184.31 | 95-7° / 13 | | 0.9969 | 1.5795
Flashpoint: 98°C (208°F)

Reducing agent.[1]
Converts amides to aldehydes in combination with $Ti(OiPr)_4$.[2]
Selective reduction of esters.[3]
Silylates 1,2-diols in presence of tris(pentafluorophenyl)borane.[4]
Used in enantioselective reduction of imines.[5]

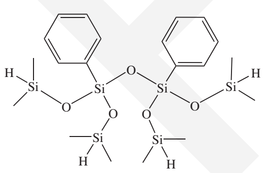
1. F&F: Vol. 1, p 348.
2. Bower, S. et al. *Angew. Chem., Int. Ed. Engl.* **1996,** *35*, 1515.
3. Onta, T. et al. *Tetrahedron Lett.* **1999,** *40*, 6963.
4. Blackwell, J. M. et al. *J. Org. Chem.* **1999,** *64*, 4887.
5. Takai, I. et al. *Organometallics* **1999,** *18*, 2271.

HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[775-12-2] TSCA EC 212-271-4 HMIS: 2-1-1-X 25g ¥19,400 100g ¥55,200



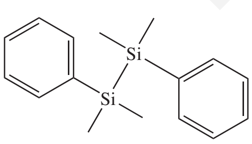
SID4560.0
DIPHENYLSILANEDIOL
$C_{12}H_{12}O_2Si$ | 216.32 | | (138-142° dec.)
ΔHcomb: 6,279 kJ/mole — Flashpoint: >110°C (>230°F)
ΔHform: 1,046 kJ/mole — TOXICITY: ipr mouse, LD50: 2,500 mg/kg
Dipole moment: 1.74 debye
Bulk density: 0.4-0.5 g/ml
Anti-structuring (crepe hardening) additive for filled silicone elastomers
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[947-42-2] (既) 3-2638 TSCA EC 213-427-4 HMIS: 2-1-0-X 100g ¥11,900 500g ¥37,400 10kg ¥351,000

COMMERCIAL



SID4582.0
1,3-DIPHENYLTETRAKIS(DIMETHYLSILOXY)DISILOXANE, 95%
$C_{20}H_{38}O_5Si_6$ | 527.03 | 95-6° / 0.25 | | 0.992 | 1.4367
Flashpoint: >110°C (>230°F)

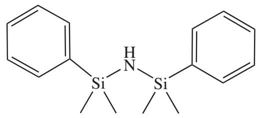
Crosslinker for medium refractive index vinyl addition silicone elastomers
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[66817-59-2] TSCA HMIS: 2-1-1-X 5g ¥9,300 25g ¥26,800



SID4584.0
1,2-DIPHENYLTETRAMETHYLDISILANE
$C_{16}H_{22}Si_2$ | 270.52 | 111° / 1 | (34°) | 0.9763 | 1.5161
Optical bandgap: 6.0 eV — Flashpoint: 105°C (221°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1145-98-8] HMIS: 2-1-0-X 10g ¥24,100 50g ¥86,200

SILICON COMPOUNDS

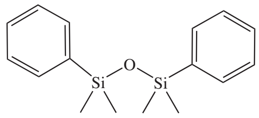
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SID4586.0
1,3-DIPHENYL-1,1,3,3-TETRAMETHYLDISILAZANE

$C_{16}H_{23}NSi_2$	285.54	96-9° / 0.1		0.985	1.5384

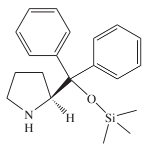
Flashpoint: 162°C (324°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3449-26-1] TSCA EC 222-372-5 HMIS: 2-1-1-X 5g ¥13,000 25g ¥41,600



SID4588.0
1,3-DIPHENYLTETRAMETHYLDISILOXANE

$C_{16}H_{22}OSi_2$	286.52	155-8° / 13	(-89°)	0.976	1.5176

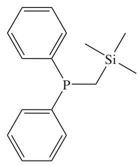
Viscosity: 3.45 cSt.
ΔHvap: 56.1 kJ/mole
Flashpoint: 156°C (313°F)
Specific heat: 1.76 J/g/°
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[56-33-7] TSCA EC 200-265-4 HMIS: 2-1-0-X 50g ¥23,100



SID4589.0
(S)-(-)-[(DIPHENYL)TRIMETHYLSILOXYMETHYL]PYRROLIDINE

$C_{20}H_{27}NOSi$	325.52				

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[848821-58-9] HMIS: 3-3-1-X 5g ¥49,900

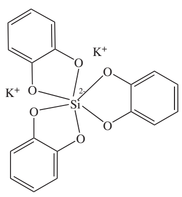


SID4589.5
DIPHENYL(TRIMETHYLSILYLMETHYL)PHOSPHINE

$C_{16}H_{21}PSi$	272.39	139-43° / 0.6		1.005	1.581

Air sensitive liquid
Used to make stable gold(I) complexes.[1]
1. Bardaji, M. *Eur. J. Inorg. Chem.* **1998**, 989.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4451-96-1] HMIS: 4-4-1-X 5g ¥77,700

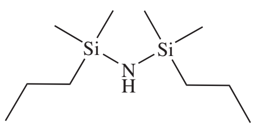
DIPHENYLVINYLCHLOROSILANE - see SIV9074.0 VINYLDIPHENYLCHLOROSILANE



SID4590.0
DIPOTASSIUM TRIS(1,2-BENZENEDIOLATO-O,O')SILICATE

$C_{18}H_{12}K_2O_6Si$	461.55		(360°)		

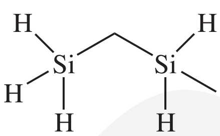
Undergoes reactions with Grignard reagents.[1]
1. Chuit, R. *Chem. Rev.* **1993,** *93*, 1371.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[101519-13-5] HMIS: 2-0-0-X 10g ¥20,400



SID4591.0
1,3-DI-n-PROPYL-1,1,3,3-TETRAMETHYLDISILAZANE

$C_{10}H_{27}NSi_2$	217.51	84° / 9		0.80	1.429

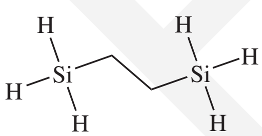
Flashpoint: 65°C (149°F)
See also SID4439.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[14579-90-9] HMIS: 3-2-1-X 25g ¥40,600



SID4592.0
1,3-DISILABUTANE
1-METHYLDISILMETHYLENE

$C_2H_{10}Si_2$	90.27	44-5°		0.80	1.436^{25}

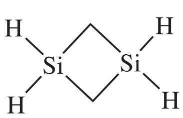
Flashpoint: -19°C (-2°F)
For CVD of silicon carbide
Precursor for low temperature CVD of silicon carbide MEMS.[1,2]
1. Stoldt, C. et al. *Sens.Actuators, A* **2002**, *97-8*, 410.
2. Stoldt, C. et al. *Appl. Phys. Lett.* **2001**, 347.
See also SIT8709.8
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[6787-86-6] HMIS: 3-4-2-X store <5°C 5g ¥54,400



SID4593.0
1,4-DISILABUTANE
1,2-ETHANEDIYLBIS(SILANE)

$C_2H_{10}Si_2$	90.27	45-6°	(-15°)	0.697	1.4141

CAUTION: VAPORS HAVE BEEN REPORTED TO SPONTANEOUSLY IGNITE
Flashpoint: -31°'C (-24°F)
Autoignition temperature: 152˚C
Bonds to oxide-free titanium, gold and silicon substrates.[1]
Forms 0.2-1.7% carbon doped silicon films.[2]
1. Arkles, B. et al. *J. Adhes. Sci. Technol.* **2012**, *26*, 41.
2. Okada, L. et al. *Surf. Sci.* **1998**, *418*, 353.
HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required
[4364-07-2] HMIS: 2-4-2-X 5g ¥32,600

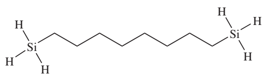


Reference Compound 3
1,3-DISILACYCLOBUTANE

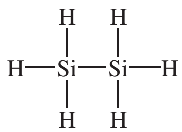
$C_2H_8Si_2$	88.26	57°			

Synthesis: Auner, N. et al. *J. Organomet. Chem.* **1980**, *188*, 1512.
Reference compound. Data is provided for investigators. Not offered for sale by Gelest.
[287-55-8]

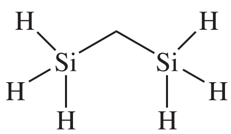
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



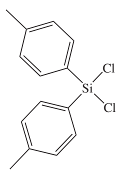
SID4593.5
1,10-DISILADECANE
$C_8H_{22}Si_2$ — 174.44 — 35° / 0.3 — 0.772 — 1.4461
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[4364-10-7] HMIS: 2-3-1-X 10g ¥35,300



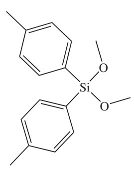
SID4594.0
DISILANE, 99.9+%
H_6Si_2 — 62.22 — -14.5° — (-132°) — 0.686^{25}
CAUTION: PYROPHORIC, FORMS EXPLOSIVE MIXTURES WITH AIR
AIR TRANSPORT FORBIDDEN
Cylinder pressure: ~50 psi
Autoignition temperature: <50˚C
Critical temperature: 158.85°C
Critical pressure: 50.63 atm
Employed in epitaxial deposition of silicon for solar and photoelectric devices.[1]
1. Lin, H. et al. *Solid State Electron.* **1996**, *39*, 1731.
HYDROLYTIC SENSITIVITY: 10: reacts extremely rapidly with moisture and oxygen - pyrophoric - sealed system required
[1590-87-0] EC 216-466-5 HMIS: 4-4-2-X 25g inquire
** includes gas dispensing cylinder zCYL-HPS-0420-35*



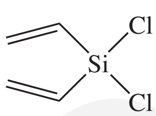
SID4595.0
1,3-DISILAPROPANE
DISILMETHYLENE
CH_8Si_2 — 76.24 — 14.7° — 0.697^{4} — 1.4115^{4}
CAUTION: PYROPHORIC, FORMS EXPLOSIVE MIXTURES WITH AIR
AIR TRANSPORT FORBIDDEN
See also SIT8709.8
HYDROLYTIC SENSITIVITY: 10: reacts extremely rapidly with moisture and oxygen - pyrophoric - sealed system required
[1759-88-2] HMIS: 4-4-2-X 25g inquire
** includes gas dispensing cylinder zCYL-G-0325*



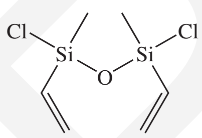
SID4598.0
DI(p-TOLYL)DICHLOROSILANE, tech-95
$C_{14}H_{14}Cl_2Si$ — 281.26 — 225-6° / 50 — 1.10 — 1.568
Contains 4,4'-dimethylbiphenyl
Forms polymers with liquid crystal behavior.[1]
1. Lee, M. et al. *Polymer* **1993,** *34*, 4882.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18414-38-5] HMIS: 3-2-1-X 10g ¥14,100 50g ¥45,900



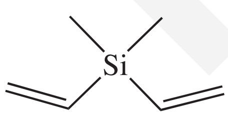
SID4599.0
DI(p-TOLYL)DIMETHOXYSILANE
$C_{16}H_{20}O_2Si$ — 272.42 — 140° / 0.5 — 1.023 — 1.5353^{25}
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[92779-72-1] HMIS: 3-2-1-X 25g ¥45,400



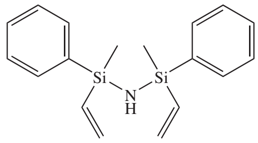
SID4600.0
DIVINYLDICHLOROSILANE, 90%
$C_4H_6Cl_2Si$ — 153.09 — 118-9° — 1.0813 — 1.4509
Flashpoint: 15°C (59°F)
Intermediate with t-BuLi for formation of silaspirocycles.[1]
Intermediate through polydivinylsilazane or carbodiimide to Si-B-C-N ceramics.[2]
1. Goetze, B. et al. In *Organosilicon III;* Auner, N.; Weiss, J., Eds.; Wiley: 1997; p 102.
2. Muller, A. et al. *Chem. Mater.* **2002,** *14*, 3398.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1745-72-8] (既) 2-2037 EC 217-118-5 HMIS: 3-4-1-X 5g ¥22,500 25g ¥79,800



SID4604.0
1,3-DIVINYL-1,3-DIMETHYL-1,3-DICHLORODISILOXANE
$C_6H_{12}Cl_2OSi_2$ — 227.24 — 67° / 16 — 1.090
Flashpoint: 54°C (129°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[15948-19-3] EC 240-081-1 HMIS: 3-2-1-X 10g ¥16,200 50g ¥54,400



SID4606.0
DIVINYLDIMETHYLSILANE
$C_6H_{12}Si$ — 112.25 — 82° — 0.7337 — 1.4176
Flashpoint: 8°C (46°F)
Forms copolymers with maleic anhydride.[1]
Forms polyamine macrocycles on reaction with Li dialkylamides, e.g. $LiEtNCH_2CH_2NEtLi$.[2]
Forms "smart" silamine polymers on reaction with 3,6-diazaoctane.[3]
Potential vinyl nucleophile in cross-coupling reactions.[4]
1. Butler, G. et al. *J. Polym. Sci.* **1970,** *A1-8*, 523.
2. Nagasaki, Y. et al. *Chem. Lett.* **1993,** 1825.
3. Nagasaki, Y. et al. *Chemtech* **1997,** *27(3)*, 23.
4. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[10519-87-6] EC 234-060-6 HMIS: 2-4-0-X 5g ¥10,900 25g ¥33,200

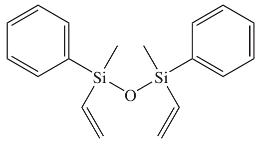


SID4607.0

1,3-DIVINYL-1,3-DIPHENYL-1,3-DIMETHYLDISILAZANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{18}H_{23}NSi_2$	309.56	118° / 1 Flashpoint: 165°C (329°F)		1.001	1.5450

Employed in passivation of GC supports
Employed in "dip-pen" nanolithography.[1]
1. Ivanisevic, A. et al. *J. Am. Chem. Soc.* **2001,** *123*, 7887.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[23038-10-0] HMIS: 2-1-1-X 5g ¥32,100

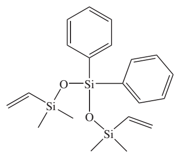


SID4608.0

1,3-DIVINYL-1,3-DIPHENYL-1,3-DIMETHYLDISILOXANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{18}H_{22}OSi_2$	310.54	160° / 6 Flashpoint: >110°C (>230°F)		0.995^{25}	1.5310^{25}

Viscosity, 25°: 4.7 cSt
End-capper for Pt cure silicone elastomers
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[2627-97-6] TSCA EC 220-101-5 HMIS: 2-1-0-X 10g ¥15,400 50g ¥53,800

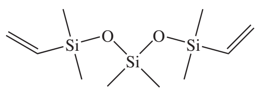


SID4609.0

1,5-DIVINYL-3,3-DIPHENYL-1,1,5,5-TETRAMETHYLTRISILOXANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{20}H_{28}O_2Si_3$	384.70	141-4° / 1		0.976	1.5057

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[18586-22-6] TSCA EC 242-426-1 HMIS: 1-1-0-X 10g ¥19,400 50g ¥67,100

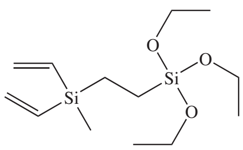


SID4610.0

1,5-DIVINYLHEXAMETHYLTRISILOXANE, 95%

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{10}H_{24}O_2Si_3$	260.56	80° / 20 Flashpoint: 32°C (90°F)		0.8619	1.4138

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[136777-27-0] HMIS: 1-3-0-X 10g ¥17,200 50g ¥58,600

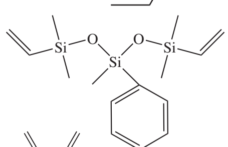


SID4610.3

2-(DIVINYLMETHYLSILYL)ETHYLTRIETHOXYSILANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{13}H_{28}O_3Si_2$	288.54	79-81° / 0.15		0.895	

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-1-1-X 5g ¥52,200

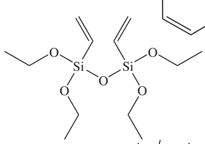


SID4610.5

1,5-DIVINYL-3-PHENYLPENTAMETHYLTRISILOXANE, 95%

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{15}H_{26}O_2Si_3$	322.63	117-8° / 5		0.938	1.4646

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[17902-95-3] HMIS: 1-1-0-X 10g ¥16,400 50g ¥55,400

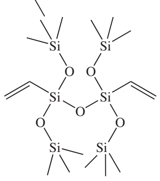


SID4611.0

1,3-DIVINYLTETRAETHOXYDISILOXANE, 95%

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{12}H_{26}O_5Si_2$	306.51	119° / 19 Flashpoint: 58°C (136°F)		0.962^{25}	1.4100^{25}

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3682-26-6] HMIS: 1-2-1-X 10g ¥18,800 50g ¥65,000

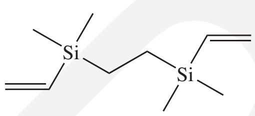


SID4611.4

1,3-DIVINYLTETRAKIS(TRIMETHYLSILOXY)DISILOXANE, 95%

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{16}H_{42}O_5Si_6$	483.03	120-5° / 5			

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[94071-24-6] EC 301-825-1 HMIS: 2-1-0-X 10g ¥18,800

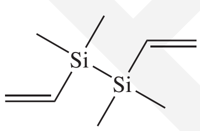


SID4614.0

1,4-DIVINYL-1,1,4,4-TETRAMETHYL-1,4-DISILABUTANE
BIS(ETHENYLDIMETHYLSILYL)ETHANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{10}H_{22}Si_2$	198.45	165-9° Flashpoint: 40°C (104°F)			

Intermediate for curare analogs.[1]
Potential vinyl nucleophile in cross-coupling reactions.[2]
1. Tacke, R. et al. *Z. Naturforsch., B: Anorg. Chem., Org. Chem.* **1982,** *37B*, 1461.
2. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[84677-98-5] HMIS: 2-2-0-X 10g ¥16,400

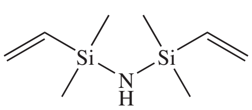


SID4611.6

1,2-DIVINYLTETRAMETHYLDISILANE, 95%

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_8H_{18}Si_2$	170.40	55° / 21		0.7803	1.4613

UV irradiation affords silene (Si=C) reactive intermediate
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[1450-29-9] HMIS: 2-3-1-X store <5°C 5g ¥33,700



SID4612.0

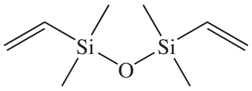
1,3-DIVINYL-1,1,3,3-TETRAMETHYLDISILAZANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_8H_{19}NSi_2$	185.42	160-1° Flashpoint: 34°C (93°F)		0.819	1.4405

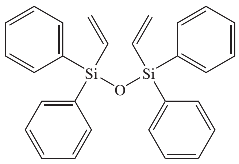
Adhesion promoter for negative photoresists
For silylation of glass capillary columns.[1]
1. Jaroniec, M. et al. *J. High Resolut. Chromatogr.* **1982,** *5*, 3.
See also SIT8736.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[7691-02-3] TSCA EC 231-701-1 HMIS: 3-3-1-X 50g ¥11,400 250g ¥35,300 2kg ¥133,300

COMMERCIAL

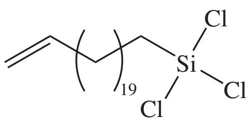
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



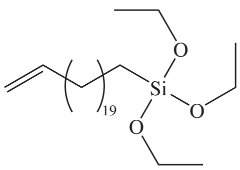
SID4613.0
1,3-DIVINYLTETRAMETHYLDISILOXANE
$C_8H_{18}OSi_2$ — 186.40 — 139° — (-99°) — 0.811 — 1.4123
Flashpoint: 24°C (76°F)
TOXICITY: oral rat, LD50 >12,500 mg/kg
Silicone end-capper
Potential vinyl nucleophile in cross-coupling reactions.[1]
1. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
See also SID4609.0, SID4610.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[2627-95-4] (既) 7-483 TSCA EC 220-099-6 HMIS: 2-3-0-X 50g ¥6,000 2kg ¥110,000 15kg ¥317,000
COMMERCIAL



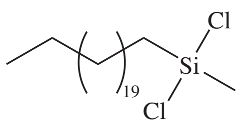
SID4616.0
1,3-DIVINYLTETRAPHENYLDISILOXANE, 95%
$C_{28}H_{26}OSi_2$ — 434.68 — (77-81°)
See also SID4608.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[18769-05-6] HMIS: 2-1-0-X 5g ¥22,500



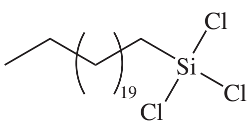
SID4617.0
DOCOSENYLTRICHLOROSILANE, 90%,
$C_{22}H_{43}Cl_3Si$ — 442.03 — 200-5° / 1 — 0.966
Contains internal isomers
Forms SAMs
See also SIU9047.0, SID4623.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 1.0g ¥59,700



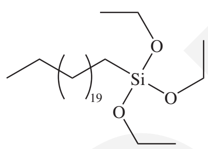
SID4618.0
DOCOSENYLTRIETHOXYSILANE, 95%
$C_{28}H_{58}O_3Si$ — 470.88 — 187-195° / 0.05
Contains isomers
Forms self-assembled monolayers that can be modified to hydroxyls.[1]
1. Penansky, J. et al. *Langmuir* **1995,** 11, 953.
See also SIA0482.0, SID4623.6, SIU9049.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[330457-44-8] HMIS: 1-1-0-X 1.0g ¥41,100



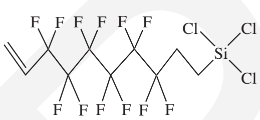
SID4620.0
DOCOSYLMETHYLDICHLOROSILANE, blend
$C_{23}H_{48}Cl_2Si$ — 423.62 — 218-20° / 0.5 — (21-9°) — 0.93
Contains C_{20} to C_{24} homologs
Flashpoint: 172°C (342°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[67892-56-2] TSCA EC 267-590-1 HMIS: 3-1-1-X 50g ¥41,100



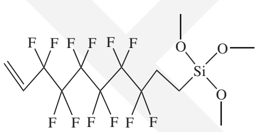
SID4621.0
DOCOSYLTRICHLOROSILANE, blend
$C_{22}H_{45}Cl_3Si$ — 444.04 — 210° / 0.2 — (20-8°) — 0.94
Contains C_{20} to C_{24} homologs
Flashpoint: 200°C (392°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7325-84-0] TSCA EC 230-802-8 HMIS: 3-1-1-X 25g ¥27,100



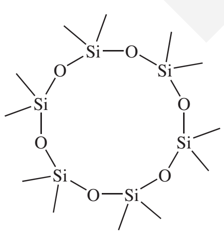
SID4622.0
DOCOSYLTRIETHOXYSILANE, blend
$C_{28}H_{60}O_3Si$ — 472.87 — (18-22°) — 0.86
Contains C_{20} to C_{24} homologs
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 1-1-1-X 25g ¥34,200



SID4623.4
DODECAFLUORODEC-9-ENE-1-YLTRICHLOROSILANE
$C_{10}H_7Cl_3F_{12}Si$ — 489.59
Forms self-assembled monolayers
Reagent for immobilization of DNA
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-1-1-X 1.0g ¥35,300



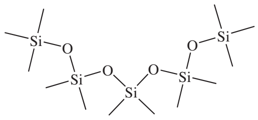
SID4623.6
DODECAFLUORODEC-9-ENE-1-YLTRIMETHOXYSILANE
$C_{13}H_{16}F_{12}O_3Si$ — 476.33
Forms self-assembled monolayers
Reagent for immobilization of DNA
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-1-1-X 1.0g ¥35,300



SID4625.0
DODECAMETHYLCYCLOHEXASILOXANE
D6
$C_{12}H_{36}O_6Si_6$ — 445.93 — 245° — (-3°) — 0.9672 — 1.4015
Viscosity, 25°: 6.6 cSt
ΔHcomb: -12,022 kJ/mole
ΔHvap: 56.5 kJ/mole
Octanol/water partition coefficient, log K_{ow}: 6.3
Solubility, water, 23°: 0.00513 mg/l
TOXICITY: oral rat, LD50: >1,000 mg/kg
Vapor pressure, 25°: 0.03 mm
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[540-97-6] (既) 7-475 TSCA EC 208-762-8 HMIS: 1-2-0-X 25g ¥20,400 100g ¥58,300 2kg ¥345,800

SILICON COMPOUNDS

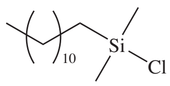
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SID4626.0
DODECAMETHYLPENTASILOXANE
MD3M

$C_{12}H_{36}O_4Si_5$	384.84	91° / 3	(-80°)	0.876	1.3925

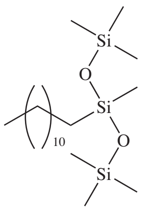
Viscosity, 25°: 2.06 cSt — Flashpoint: 70°C (158°F)
ΔHcomb: -11,553 kJ/mole — Autoignition temperature: 430°C
ΔHvap: 41.0 kJ/mole — Vapor pressure, 91°: 3 mm
Surface tension: 18.7 mN/m — Specific heat: 1.352 J/g/°
Solubility parameter: 7.1
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[141-63-9] TSCA EC 205-492-2 HMIS: 1-2-0-X 5g ¥8,800 25g ¥24,400



SID4627.0
DODECYLDIMETHYLCHLOROSILANE

$C_{14}H_{31}ClSi$	262.94	291-3°		0.865	1.445

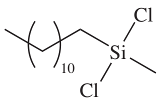
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[66604-31-7] EC 266-421-9 HMIS: 3-2-1-X 25g ¥23,100



SID4627.6
3-DODECYLHEPTAMETHYLTRISILOXANE, 95%
LAURYLMETHICONE

$C_{19}H_{46}O_2Si_3$	390.83	180° / 3	(-14°)	0.835	1.4307

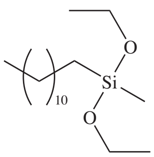
Viscosity: 5.5 cSt
See also SIH6168.7, SIO6711.5
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[139614-44-1] HMIS: 1-1-0-X 100g ¥24,700



SID4628.0
DODECYLMETHYLDICHLOROSILANE

$C_{13}H_{28}Cl_2Si$	283.36	124-7° / 3		0.955	1.4581

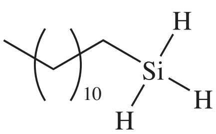
Flashpoint: 143°C (289°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18407-07-3] TSCA EC 242-286-1 HMIS: 3-1-1-X 25g ¥23,100



SID4629.0
DODECYLMETHYLDIETHOXYSILANE

$C_{17}H_{38}O_2Si$	302.57	140° / 0.5		0.845^{25}	

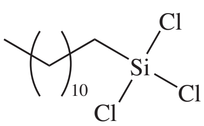
Flashpoint: 152°C (305°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[60317-40-0] TSCA EC 262-170-4 HMIS: 2-1-0-X 25g ¥22,500



SID4629.6
DODECYLSILANE

$C_{12}H_{28}Si$	200.44	80° / 7		0.7753	1.438^{25}

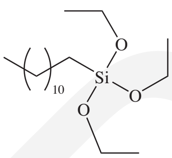
Forms SAMs on gold and titanium surfaces
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[872-19-5] HMIS: 2-2-1-X 10g ¥24,100



SID4630.0 *COMMERCIAL*
DODECYLTRICHLOROSILANE

$C_{12}H_{25}Cl_3Si$	303.77	120° / 3	(-30°)	1.024	1.4581

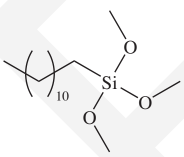
Flashpoint: 165°C (329°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4484-72-4] (既) 2-2041 TSCA EC 224-769-9 HMIS: 3-1-1-X 25g ¥5,900 750g ¥54,000



SID4632.0
DODECYLTRIETHOXYSILANE

$C_{18}H_{40}O_3Si$	332.60	152-3° / 3		0.884^{25}	1.4330^{25}

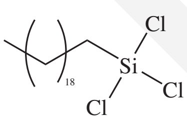
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18536-91-9] TSCA EC 242-409-9 HMIS: 2-1-0-X 25g ¥11,100 100g ¥28,400



SID4635.0 *COMMERCIAL*
DODECYLTRIMETHOXYSILANE

$C_{15}H_{34}O_3Si$	290.52	110-1° / 1		0.894^{25}	1.428

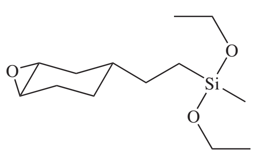
Flashpoint: >110°C (>230°F)
Hydrophobic surface treatment that improves compatibility with hydrocarbon fluids and polymers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3069-21-4] EC 242-332-4 HMIS: 3-2-1-X 25g ¥7,200 2kg ¥72,300 15kg ¥264,000



SIE4661.0
EICOSYLTRICHLOROSILANE, 95%

$C_{20}H_{41}Cl_3Si$	415.90	225-7° / 3		0.940	

Flashpoint: 230°C (446°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18733-57-8] (既) 2-2041 TSCA EC 242-545-9 HMIS: 3-0-1-X 25g ¥51,200

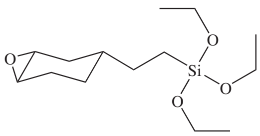


SIE4666.0
2-(3,4-EPOXYCYCLOHEXYL)ETHYLMETHYLDIETHOXYSILANE

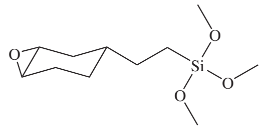
$C_{13}H_{26}O_3Si$	258.43	114-7° / 1		0.976^{25}	1.4248^{25}

UV polymerizeable monomer
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[14857-35-3] HMIS: 2-2-1-X 25g ¥26,800

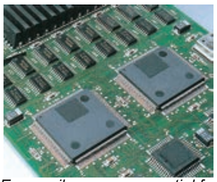
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



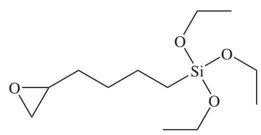
SIE4668.0
2-(3,4-EPOXYCYCLOHEXYL)ETHYLTRIETHOXYSILANE
$C_{14}H_{28}O_4Si$ 288.46 114-7° / 0.4 1.015 1.4455
Flashpoint: 104°C (219°F)
Adhesion promoter for water-borne coatings on alkaline substrates
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[10217-34-2] TSCA HMIS: 2-1-1-X 25g ¥7,200 100g ¥15,600 2kg ¥93,500
COMMERCIAL



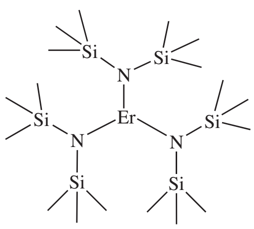
SIE4670.0 サイラエース **S810**
2-(3,4-EPOXYCYCLOHEXYL)ETHYLTRIMETHOXYSILANE
$C_{11}H_{22}O_4Si$ 246.38 95-7° / 0.25 1.065 1.4490
Viscosity: 5.2 cSt
γc of treated surfaces: 39.5 mN/m
Specific wetting surface: 317 m²/g
Flashpoint: 146°C (295°F)
TOXICITY: oral rat, LD50: 12,300 mg/kg
Vapor pressure, 152˚: 10 mm
Coefficient of thermal expansion: 0.8 x 10^{-3}
Ring epoxide more reactive than glycidoxypropyl systems
UV initiated polymerization of epoxy group with weak acid donors
Forms UV-curable coating resins by controlled hydrolysis.[1]
Used to make epoxy-organosilica particles w/ high positive Zeta potential.[2]
1. Crivello, J.; Mao, Z. *Chem. Mater.* **1997**, *9*, 1554.
2. Nakamura, M.; Ishimura, K. *Langmuir* **2008**, *24*, 12228.
See also SIE4668.0, SIG5840.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
サイラエース S530 100g ¥4,900 1kg ¥9,300
[3388-04-3] (既) 3-2647 TSCA EC 222-217-1 HMIS: 3-1-1-X 100g inquire 2kg inquire 18kg inquire
COMMERCIAL



Epoxy-silanes are essential for performance of epoxy resin encapsulants for microchips

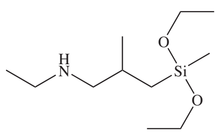


SIE4675.0
5,6-EPOXYHEXYLTRIETHOXYSILANE
$C_{12}H_{26}O_4Si$ 262.42 115-9° / 1.5 0.960^{25} 1.4254^{25}
Flashpoint: 99°C (210°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[86138-01-4] HMIS: 3-2-1-X 10g ¥30,500

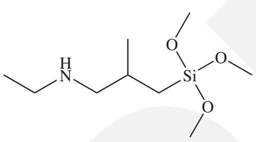


SIE4885.0
ERBIUM TRIS(HEXAMETHYLDISILAZIDE)
$C_{18}H_{54}ErN_3Si_6$ 648.43 165° / 0.04 sub. (173-9°)
Color: pink
Employed in CVD of IR transmission optical materials.
Soluble: hexane, toluene, THF, dimethoxyethane
Dopant for semiconductors for optoelectonic applications.[1]
1. Just, O. et al. *Mat. Res. Soc. Symp. Proc.* **1996**, *415*, 111.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[103457-72-3] HMIS: 2-1-1-X 5g ¥80,400

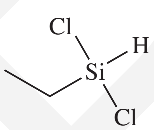
ETHOXYTRIMETHYLSILANE - see SIT8515.0 TRIMETHYLETHOXYSILANE



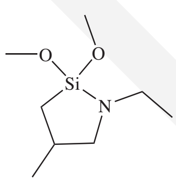
SIE4885.8
(3-(N-ETHYLAMINO)ISOBUTYL)METHYLDIETHOXYSILANE
$C_{11}H_{27}NO_2Si$ 233.43 89° / 27
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[275378-62-6] HMIS: 3-2-1-X 25g ¥25,200



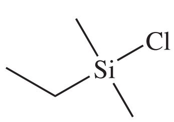
SIE4886.0
(3-(N-ETHYLAMINO)ISOBUTYL)TRIMETHOXYSILANE
$C_9H_{23}NO_3Si$ 221.37 95° / 10 0.952^{25} 1.4234
Flashpoint: 91°C (196°F)
Reacts with isocyanate resins (urethanes) to form moisture cureable systems
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[227085-51-0] TSCA HMIS: 3-2-1-X 25g ¥8,200 100g ¥18,800 2kg ¥104,100
COMMERCIAL



SIE4890.0
ETHYLDICHLOROSILANE
$C_2H_6Cl_2Si$ 129.06 74-6° (-107°) 1.093 1.4129
Viscosity: 0.53 cSt
ΔHform: -391 kJ/mole
ΔHvap: 7.5 kJ/mole
Dipole moment: 2.04 debye
Surface tension: 21.7 mN/m
Flashpoint: -9°C (16°F)
Vapor pressure, 21°: 100 mm
Critical temperature: 252˚C
See also SIH6154.0, SIP6725.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1789-58-8] (既) 2-2041 TSCA EC 217-255-0 HMIS: 3-4-2-X 25g ¥24,100 100g ¥70,800



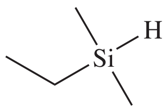
SIE4891.0
1-ETHYL-2,2-DIMETHOXY-4-METHYL-1-AZA-2-SILACYCLOPENTANE
$C_8H_{19}NO_2Si$ 189.33
Cyclic azasilane utilized for vapor-phase surface treatment of nano-featured substrates
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-3-1-X 25g ¥21,500



SIE4892.0
ETHYLDIMETHYLCHLOROSILANE
$C_4H_{11}ClSi$ 122.67 91° 0.8756 1.4050
Flashpoint: -4°C (25°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[6917-76-6] (既) 2-2041 HMIS: 3-4-1-X 10g ¥13,000 50g ¥41,600

SILICON COMPOUNDS

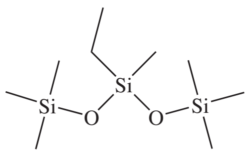
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



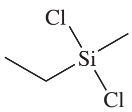
SIE4894.0
ETHYLDIMETHYLSILANE
$C_4H_{12}Si$ 88.22 45-6° 0.668 1.3783
Flashpoint: -25°C (-13°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[758-21-4] TSCA EC 212-061-2 HMIS: 3-4-1-X 10g ¥20,400

ETHYLENEBIS(TETRAMETHYLSILANAMINE) - see SIB1073.0 BIS(DIMETHYLAMINODIMETHYLSILYL)ETHANE

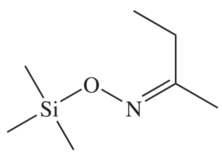
ETHYLENE GLYCOL BIS(TRIMETHYLSILYL) ETHER - see SIB1840.0 1,2-BIS(TRIMETHYLSILOXY)ETHANE



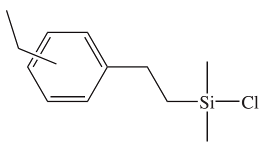
SIE4895.0
3-ETHYLHEPTAMETHYLTRISILOXANE
$C_9H_{26}O_2Si_3$ 250.56 172° (< -60°) 0.828 1.394
Viscosity, 20°: 1.3 cSt
Flashpoint: 45°C (113°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[17861-60-8] TSCA HMIS: 1-3-0-X 100g ¥11,100



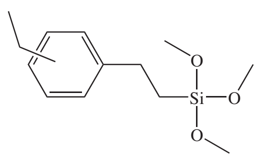
SIE4896.0
ETHYLMETHYLDICHLOROSILANE
$C_3H_8Cl_2Si$ 143.09 100° 1.0630 1.4197
Dipole moment: 2.32 debye
Flashpoint: 2°C (36°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4525-44-4] (既) 2-2041 TSCA EC 224-860-3 HMIS: 3-4-1-X 25g ¥16,200 100g ¥44,800



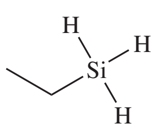
SIE4897.0
(ETHYLMETHYLKETOXIMINO)TRIMETHYLSILANE, 95%
O-(TRIMETHYLSILYL)OXIME-2-BUTANONE
$C_7H_{17}NOSi$ 159.30 65° / 75 0.826^{25} 1.4125^{25}
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[37843-14-4] HMIS: 2-3-1-X 10g ¥16,200



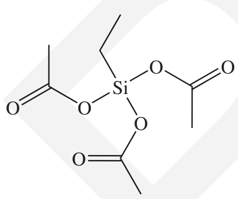
SIE4897.2
m,p-ETHYLPHENETHYLDIMETHYLCHLOROSILANE, tech-95
$C_{12}H_{19}ClSi$ 226.82 100° / 0.4 1.00 1.520
Mixed isomers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[253279-88-8] HMIS: 3-2-1-X 5g ¥24,100



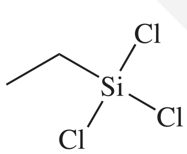
SIE4897.5
m,p-ETHYLPHENETHYLTRIMETHOXYSILANE, tech-95
$C_{13}H_{22}O_3Si$ 254.40 93-6° / 4 0.996 1.4776^{25}
Mixed isomers
Flashpoint: 102°C (216°F)
Component in optical hard coating resins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[259818-29-6] TSCA HMIS: 3-2-1-X 25g ¥30,500



SIE4898.0
ETHYLSILANE
C_2H_8Si 60.17 -14° (-180°) 0.6396^{-14}
CAUTION: MAY FORM EXPLOSIVE MIXTURES WITH AIR
ΔHcomb: -2,696 kJ/mole
Dipole moment: 0.81 debye
ΔHform: -84 kJ/mole
ΔHvap: 22.2 kJ/mole
HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required
[2814-79-1] HMIS: 3-4-1-X 50g inquire
** includes gas dispensing cylinder zCYL-G-0325*

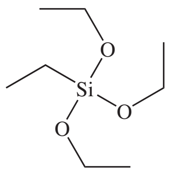


SIE4899.0
ETHYLTRIACETOXYSILANE
$C_8H_{14}O_6Si$ 243.28 107-8° / 8 (7-9°) 1.143 1.4123
Flashpoint: 106°C (223°F)
TOXICITY: oral rat, LD50: 1,462 mg/kg
Liquid cross-linker for silicone RTVs
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17689-77-9] (既) 9-1939 TSCA EC 241-677-4 HMIS: 3-1-1-X 25g ¥3,400 2kg ¥48,000 18kg ¥200,000
COMMERCIAL

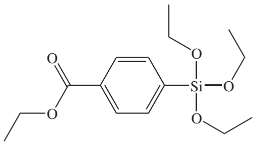


SIE4901.0
ETHYLTRICHLOROSILANE
$C_2H_5Cl_3Si$ 163.51 100-1° (-106°) 1.237 1.4260
Viscosity: 0.48 cSt
Flashpoint: 27°C (81°F)
ΔHcomb: -2,696 kJ/mole
TOXICITY: oral rat, LD50: 1,330 mg/kg
ΔHform: -84 kJ/mole
Vapor pressure, 20°: 26 mm
ΔHvap: 37.7 kJ/mole
Vapor pressure, 30.4˚: 66 mm
ΔHfus: 7.0 kJ/mole
Critical temperature: 287˚C
Dipole moment: 2.1
Coefficient of thermal expansion: 1.5×10^{-3}
Employed in the cobalt-catalyzed Diels-Alder approach to 1,3-disubstituted and 1,2,3-trisubstituted benzenes.[1]
1. Hilt, G.; Danz, M. *Synthesis* **2008**, 2257.
F&F: Vol. 16, p 98.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[115-21-9] (既) 2-2041 TSCA EC 204-072-6 HMIS: 3-3-1-X 25g ¥3,400 1kg ¥32,000 20kg ¥258,000
COMMERCIAL

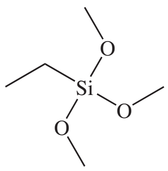
Name | Mw | bp °C/mm | (mp °C) | D_4^{20} | n_D^{20}



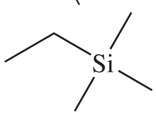
SIE4901.2
ETHYLTRIETHOXYSILANE
$C_8H_{20}O_3Si$ 192.33 158-9° (-78°) 0.896 1.3955
Viscosity: 0.70 cSt
ΔHvap: 32.6 kJ/mole
γc of treated surfaces: 26.3 mN/m
Flashpoint: 40°C (104°F)
TOXICITY: oral rat, LD50: 13,720 mg/kg
Autoignition temperature: 235˚C (455˚F)
Vapor pressure, 50°: 10 mm
Critical temperature: 314˚C
Specific heat: 1.80 J/g/˚
Coefficient of thermal expansion: 1.5×10^{-3}
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[78-07-9] (既) 2-2052 TSCA EC 201-080-1 HMIS: 3-2-1-X 100g ¥13,300 500g ¥43,800 16kg ¥324,000
COMMERCIAL



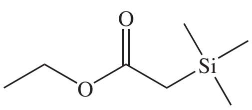
SIE4901.3
ETHYL 4-(TRIETHOXYSILYL)BENZOATE, 90%
$C_{15}H_{24}O_5Si$ 312.44 123-8° / 0.1 1.002
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[197662-64-9] HMIS: 2-2-1-X 2.5g ¥72,400



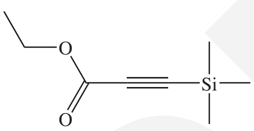
SIE4901.4
ETHYLTRIMETHOXYSILANE
$C_5H_{14}O_3Si$ 150.25 124-5° 0.9488 1.3838
Viscosity: 0.5 cSt
ΔHcomb: 14,336 kJ/mole
Flashpoint: 27°C (81°F)
Develops clear resin coating systems more readily than methyltrimethoxysilane
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5314-55-6] (既) 2-2052 TSCA EC 226-172-9 HMIS: 3-3-1-X 25g ¥3,600 2kg ¥42,000 17kg ¥270,000
COMMERCIAL



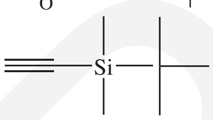
SIE4901.5
ETHYLTRIMETHYLSILANE
$C_5H_{14}Si$ 102.25 63-4° 0.6842 1.3820
[3439-38-1] HMIS: 1-4-0-X 10g ¥24,100



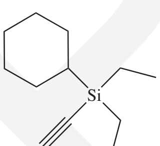
SIE4901.6
ETHYL (2-TRIMETHYLSILYL)ACETATE
$C_7H_{16}O_2Si$ 160.29 157-8° 0.876 1.4149
Flashpoint: 35°C (95°F)
Review of synthetic utility.[1]
In combination with LDA converts ketones to α,β-unsaturated esters.[2]
Promotes the addition of alkylnitriles to imines.[3]
Reagent for conversion of carboxylic acids to β-hydroxyesters.[4]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 297-299.
2. Larson, G. L. et al. *Synth. Commun.* **1999,** *20*, 1095.
3. Poisson, T. et al. *J. Org. Chem.* **2009**, *74*, 3516.
4. Wadhwa, K.; Verkade, J. *J. Org. Chem.* **2009**, *74*, 4368.
F&F: Vol. 7, p 150; Vol. 11, p 234, p 237.
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[4071-88-9] EC 223-783-2 HMIS: 2-3-0-X 5g ¥14,100



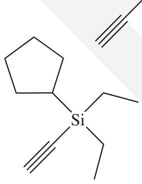
SIE4901.8
ETHYL 3-(TRIMETHYLSILYL)PROPYNOATE
$C_8H_{14}O_2Si$ 170.29 95-9° / 30 0.897 1.4410
Flashpoint: 71°C (160°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[16205-84-8] HMIS: 3-2-0-X 5g ¥29,400



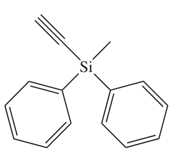
SIE4901.83
ETHYNYL-t-BUTYLDIMETHYLSILANE
t-BUTYLDIMETHYLSILYLACETYLENE
$C_8H_{16}Si$ 140.30 116-7° 0.751^{25} 1.451
Flashpoint: 6°C (43°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[86318-61-8] HMIS: 2-3-0-X 5g ¥59,100



SIE4901.85
ETHYNYLCYCLOHEXYLDIETHYLSILANE
$C_{12}H_{22}Si$ 194.39 74-7° / 3 0.869^{25} 1.4705^{25}
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
HMIS: 2-3-1-X 1.0g ¥59,100



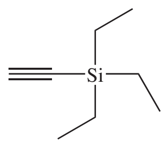
SIE4901.87
ETHYNYLCYCLOPENTYLDIETHYLSILANE
$C_{11}H_{20}Si$ 180.36 82-3° / 8 0.858^{25} $1..4166^{25}$
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
HMIS: 2-3-1-X 1.0g ¥65,800



SIE4901.9
ETHYNYLDIPHENYLMETHYLSILANE
$C_{15}H_{14}Si$ 222.37 86° / 0.5 1.010 1.575
Flashpoint: 113°C (235°F)
See also SIE4901.83
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[17156-65-9] HMIS: 2-2-1-X 2.5g ¥36,300

SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

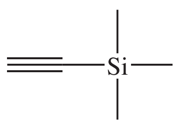


SIE4902.0
ETHYNYLTRIETHYLSILANE
TRIETHYLSILYLACETYLENE
$C_8H_{16}Si$ 140.30 136° 0.783 1.4430
Flashpoint: 17°C (63°F)

Reacts with enol silyl ethers to form α,α-bis-*trans*-β-triethylsilylethenyl ketones.[1]
Useful in Sonogashira cross-coupling reactions w/ more stable silyl group than the trimethylsilyl group.[2]

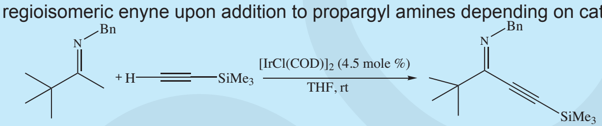
1. Amemiya, R. et al. *Tetrahedron Lett.* **2006**, *47*, 1797.
2. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.

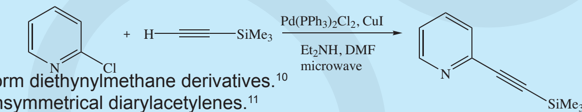
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[1777-03-3] HMIS: 2-4-1-X 5g ¥24,100



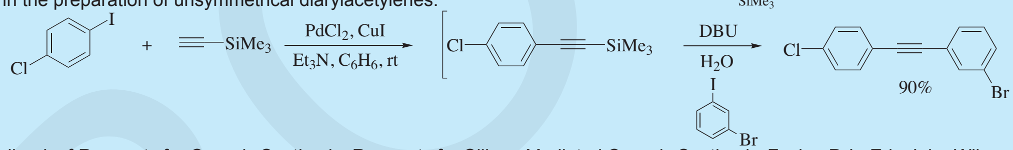
SIE4904.0
ETHYNYLTRIMETHYLSILANE, 98%
TRIMETHYLSILYLACETYLENE
$C_5H_{10}Si$ 98.22 52° 0.709 1.3880
Vapor pressure, 20˚: 214 mm
Flashpoint: -26°C (-15°F)
Autoignition temperature: 310˚C

Doped polymer films are conductive
Review of synthetic utility.[1]
Ethynylates aromatic compounds.[2]
Precursor to trimethylsilylethynyl copper reagent.[3]
Lithiated derivative (n-BuLi treatment) reacts with halotriazines to produce monomers.[4]
Employed in ortho ethenylation of phenols.[5]
Undergoes Diels-Alder reactions with butadienes.[6]
Converts imines to propargyl amines.[7]
Forms propargylic amines from aldehydes and amines in aqueous system.[8]
Regioselectively forms either regioisomeric enyne upon addition to propargyl amines depending on catalyst employed.[9]



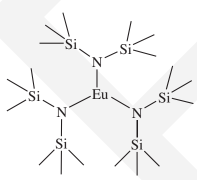


Reacts w/ aryl aldehydes to form diethynylmethane derivatives.[10]
Useful in the preparation of unsymmetrical diarylacetylenes.[11]



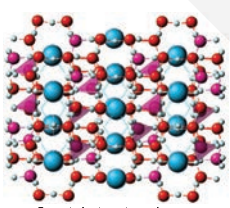
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 569-580.
2. Austin, W. et al. *J. Org. Chem.* **1981,** *46*, 2280.
3. Sakata, H. et al. *Tetrahedron Lett.* **1987,** *28*, 5719.
4. Kouveetakis, J. et al. *Chem. Mater.* **1994,** *6*, 636.
5. Kobayashi, K.; Yamaguchi, M. *Org. Lett.* **2001,** *3*, 241.
6. Paik, S.-J. et al. *Org. Lett.* **1999,** *1*, 2045.
7. Fischer, C.; Carreira, E. M. *Org. Lett.* **2001,** *3*, 4319.
8. Wei, C.; Li, C.-J. *J. Am. Chem. Soc.* **2003**, *125*, 9584.
9. Matsuyama, N. et al. *J. Org. Chem.* **2009**, *74*, 3576.
10. Girard, D. et al. *Tetrahedron Lett.* **2007***, 48*, 6022.
11. Mio, M. et al. *Org. Lett.* **2002***, 4*, 3199.

See also SIT8606.5
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[1066-54-2] (既) 2-3779 TSCA EC 213-919-9 HMIS: 2-4-1-X 5g ¥7,100 25g ¥16,000 1.5kg ¥230,000



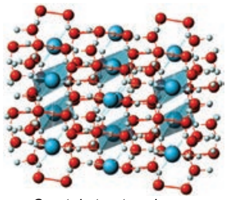
SIE4907.0
EUROPIUM(III) TRIS(HEXAMETHYLDISILAZIDE)
EUROPIUM(III) TRIS[BIS(TRIMETHYLSILYLAMIDE)]
$C_{18}H_{54}EuN_3Si_6$ 633.13 82-4° / 10^{-4} (159-162°)
Color: orange
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[35789-02-7] HMIS: 3-2-1-X 5g ¥59,100

FAUJASITE - see SIM6594.7 MOLECULAR SIEVES, 13X


Crystal structure image courtesy of webmineral.com

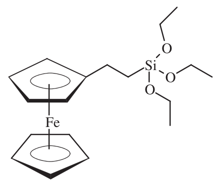
SIF4906.0
FELDSPAR-POTASSIUM
MICROCLINE
$KAlSi_3O_8$ 278.33 2.56 1.52
Particle Size: <24 µm
Typical bulk density, not compacted: 0.45 g/cm³
Mohs Hardness: 6.0
Triclinic pinacoidal
White, gray-white, short prismatic, blocky, massive, granular, translucent
Alumina and alkali source in the manufacture of glass and ceramics
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12168-80-8] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 8kg ¥49,000

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



Crystal structure image courtesy of webmineral.com

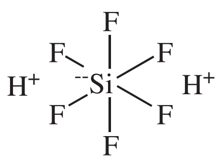
SIF4907.0
FELDSPAR-SODIUM
ALBITE
$NaAlSi_3O_8$ — Mw 262.22 — D_4^{20} 2.62 — n_D^{20} 1.53
Particle Size: <24 µm — Mohs Hardness: 7.0
Typical bulk density, not compacted: 0.62 g/cm³ — Triclinic pinacoidal
Colorless to white, massive, granular, transparent to subtransparent
Alumina and alkali source in the manufacture of glass and ceramics
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[68476-25-5] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 10kg ¥48,000



SIF4908.0
2-FERROCENYLETHYLTRIETHOXYSILANE
$C_{18}H_{28}FeO_3Si$ — Mw 376.36
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-1-1-X 1.0g ¥61,800

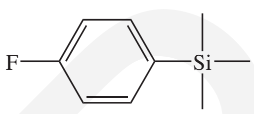
$FeSi_2$

SIF4910.0
FERROSILICON
IRON SILICIDE
$FeSi_2$ — Mw 112.02 — (mp) (1,360°) — D_4^{20} 4.75
Contains 48.5% silicon
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[8049-17-0] HMIS: 1-0-1-X 500g ¥10,900



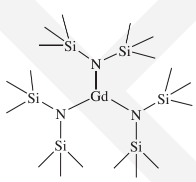
SIF4920.0
FLUOROSILICIC ACID, 22-25% in water
HEXAFLUOROSILICIC ACID
$H_2F_6Si{\cdot}H_2O$ 劇物 — Mw 144.08 / 162.10 — D_4^{20} 1.23 — n_D^{20} 1.35
ΔHform: -2,331 kJ/mole — TOXICITY: scu frog, LDLo: 140 mg/kg
Etchant for glass, silicon dioxide
At low concentrations used as sterilizing agent in bottling plants
Desilylation reagent, selectively removes tBDMS groups in presence of TIPS groups.[1]
1. Mascarenas, J. et al. *J. Org. Chem.* **1986**, *51*, 1269.
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[16961-83-4] (既) 1-361 TSCA EC 241-034-8 HMIS: 3-0-0-X 1kg ¥22,900

FLUORESCENT SILANES - see
SIC2058.2 3-CARBAZOLYLPROPYLTRIETHOXYSILANE
SIC2266.8 7-[3-(CHLORODIMETHYLSILYL)PROPOXY-4-METHYLCOUMARIN
SID4352.0 3-(2,4-DINITROPHENYLAMINO)PROPYLTRIETHOXYSILANE
SIM6502.0 O-4-METHYLCOUMARINYL-N-[3-(TRIETHOXYSILYL)PROPYL]CARBAMATE
SIT8186.2 7-TRIETHOXYSILYLPROPOXY-5-HYDROXYFLAVONE
SIT8187.0 N-(TRIETHOXYSILYLPROPYL)DANSYLAMIDE
SIT8192.4 (R)-N-TRIETHOXYSILYLPROPYL-O-QUININEURETHANE
FLUORINATED MONOMERS - see
SIT8366.0 (3,3,3-TRIFLUOROPROPYL)METHYLCYCLOTRISILOXANE
SIV9205.0 VINYL(TRIFLUOROMETHYL)DIMETHYLSILANE
SIV9208.0 VINYL(3,3,3-TRIFLUOROPROPYL)DIMETHYLSILANE

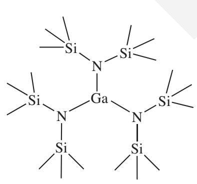


SIF4930.0
4-FLUOROPHENYLTRIMETHYLSILANE
$C_9H_{13}FSi$ — Mw 168.28 — bp 92-3° / 60 — D_4^{20} 0.945 — n_D^{20} 1.474
Flashpoint: 46°C (115°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[455-17-4] HMIS: 2-3-0-X 5g ¥28,900

FLUOROTRIETHOXYSILANE - see SIT8180.0 TRIETHOXYFLUOROSILANE
FLUOROTRIMETHYLSILANE - see SIT8525.0 TRIMETHYLFLUOROSILANE



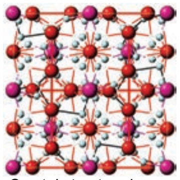
SIG4994.0
GADOLINIUM TRIS(HEXAMETHYLDISILAZIDE)
TRIS[N,N-BIS(TRIMETHYLSILYL)AMINO]GADOLINIUM III
$C_{18}H_{54}N_3GdSi_6$ — Mw 638.41 — (mp) (161-7°)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[35789-03-8] HMIS: 3-2-1-X 5g ¥85,700



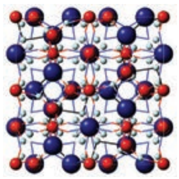
SIG4998.0
GALLIUM TRIS(HEXAMETHYDISILAZIDE)
GALLIUM TRIS[BIS(TRIMETHYLSILYL)AMIDE]
$C_{18}H_{54}GaN_3Si_6$ — Mw 550.88 — bp 120° / 0.5 sub. — (mp) (187°)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[35450-28-3] HMIS: 2-3-1-X 5g ¥77,700

SILICON COMPOUNDS

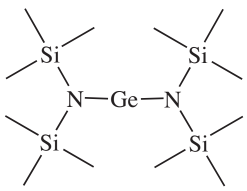
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}


Crystal structure image courtesy of webmineral.com

SIG5100.0
GARNET
ALMANDITE
$Al_2Fe^{++}_3(SiO_4)_3$ — Mw 497.75 — D_4^{20} 4.19 — n_D^{20} 1.83
Particle Size: <150 µm; deep red-brownish black
Mohs Hardness: 7.0-8.0
Isometric hexoctahedral
High modulus, high hardness for coatings
More chemically resistant than Andradite Garnet
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1302-62-1] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 10kg ¥48,000

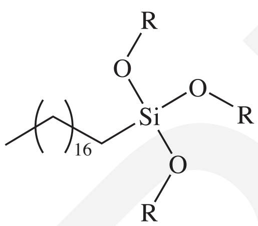

Crystal structure image courtesy of webmineral.com

SIG5105.0
GARNET
ANDRADITE
$Ca_3Fe^{+++}_2(SiO_4)_3$ — Mw 508.18 — D_4^{20} 3.9 — n_D^{20} 1.87
Particle Size: <150 µm
Mohs Hardness: 6.5-7.0
Isometric hexoctahedral
Yellowish green, reddish brown, black
High modulus, high hardness for coatings
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[15078-96-3] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 10kg ¥48,000

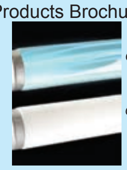


GEB1025
GERMANIUM(II) BIS(HEXAMETHYLDISILAZIDE)
BIS[BIS(TRIMETHYLSILYL)AMINO]GERMANIUM(II)
$C_{12}H_{36}GeN_2Si_4$ — Mw 393.36 — bp 60° / 0.4 — (32-3°)
Color: orange-yellow
Intermediate for germazene.[1]
Forms poly(germanium enolates) by reaction with α,β-unsaturated ketones.[2]
Reacts with carbon dioxide to form silylated isocyanates and carbodiimides.[3]
Forms 3-coordinate complexes with $(Et_3P)_2$Ptacac that reversibly bind CO_2, H_2.[4]
1. Chen, H. et al. *Inorg. Chem.* **1991**, *30*, 3390.
2. Kobayashi, S. et al. *J. Am. Chem. Soc.* **1992,** *114*, 4929.
3. Sita, L. et al. *J. Am. Chem. Soc.* **1996**, *118*, 10912.
4. Litz, K. et al. *Organometallics* **1995**, *14*, 5008.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[55290-25-0] HMIS: 2-1-1-X 2.5g ¥25,500

SIG5210.0
GLASS SPHERES, (SOLID BOROSILICATE) — D_4^{20} 2.5 — n_D^{20} 1.55
Particle size, average: 35 µm
E-glass composition: SiO_2: 52-56%; CaO: 16-25%; $A_{12}O_3$: 12-16%; B_2O_3: 5-10%
[65997-17-3] TSCA HMIS: 1-0-0-X 500g ¥12,200 10kg ¥63,000

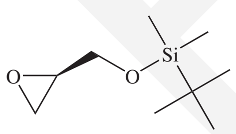


PP1-GC18
GLASSCLAD® 18
Octadecyl functional silane, 20% in t-butanol/diacetone alcohol — D_4^{20} 0.88
γc of treated glass surface: 31 mN/m
Coefficient of friction of treated glass surface: 0.2 - 0.3
Surface resistivity of treated surface: 1.2 x 10^{13} ohms
Flashpoint: 10°C (50°F)
Pour point: 4˚C
Hazy, amber liquid
Water-dispersible hydrophobic surface treatment
For application information see Gelest's Performance Products Brochure

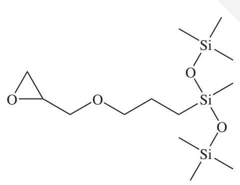


Surface conductivity of glass substrates is reduced by application of Glassclad® 18. Surface arc-tracking is eliminated on fluorescent light bulbs
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
TSCA HMIS: 2-4-1-X 100g ¥8,800 1.5kg ¥51,100 15kg ¥206,000

COMMERCIAL

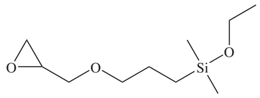


SIG5805.0
(S)-GLYCIDOXY-t-BUTYLDIMETHYLSILANE
$C_9H_{20}O_2Si$ — Mw 188.34 — bp 195-9° — D_4^{20} 0.87 — n_D^{20} 1.431
Flashpoint: 74°C (165°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[123237-62-7] HMIS: 3-2-1-X 5g ¥46,900

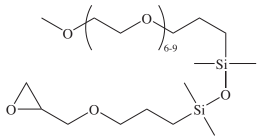


SIG5820.0
(3-GLYCIDOXYPROPYL)BIS(TRIMETHYLSILOXY)METHYLSILANE
$C_{13}H_{32}O_4Si_3$ — Mw 336.65 — bp 96° / 0.5 — D_4^{20} 0.910 — n_D^{20} 1.4206
Viscosity: 4 cSt
Flashpoint: >110°C (>230°F)
Epoxy resin diluent with good dielectric properties
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[7422-52-8] TSCA EC 231-045-6 HMIS: 3-1-1-X 10g ¥13,500 50g ¥43,800

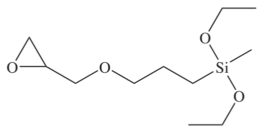
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



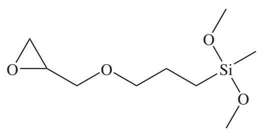
SIG5825.0
(3-GLYCIDOXYPROPYL)DIMETHYLETHOXYSILANE
$C_{10}H_{22}O_3Si$ 218.37 100° / 3 0.950 1.4337^{25}
Flashpoint: 87°C (189°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17963-04-1] (既) 2-2072 TSCA EC 241-889-7 HMIS: 3-2-1-X 10g ¥15,100 50g ¥50,100



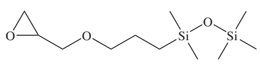
SIG5830.0
1-GLYCIDOXYPROPYL-3-[METHOXY(POLYETHYLENEOXY)$_{6-9}$PROPYL]TETRAMETHYLDISILOXANE
550 - 650
Reactive monomers may be formed by reaction with acrylic acid
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
HMIS: 2-2-1-X 25g ¥49,100



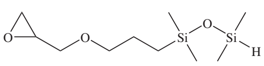
SIG5832.0
(3-GLYCIDOXYPROPYL)METHYLDIETHOXYSILANE
$C_{11}H_{24}O_4Si$ 248.39 122-6° / 5 0.978^{25} 1.431
Viscosity: 3.0 cSt
Flashpoint: 122°C (252°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Employed in scratch resistant coatings for eye glasses
Coupling agent for latex systems with reduced tendancy to gel compared to SIG5840.0
See also SIE4668.0, SIG5836.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2897-60-1] (既) 2-2072 TSCA EC 220-780-8 HMIS: 2-1-1-X 25g ¥10,800 100g ¥28,400 2kg ¥136,000
COMMERCIAL



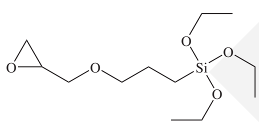
SIG5836.0
(3-GLYCIDOXYPROPYL)METHYLDIMETHOXYSILANE
$C_9H_{20}O_4Si$ 220.34 100° / 4 1.02 1.431^{25}
Flashpoint: 105°C (221°F)
Relative hydrolysis rate vs. SIG5840.0: 7.5:1
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[65799-47-5] TSCA EC 265-929-8 HMIS: 3-1-1-X 25g ¥16,700 100g ¥46,400



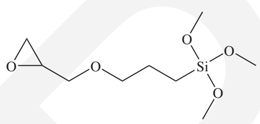
SIG5838.0
(3-GLYCIDOXYPROPYL)PENTAMETHYLDISILOXANE
$C_{11}H_{26}O_3Si_2$ 262.50 81° / 1.5 0.915^{25} 1.4267
Flashpoint: 83°C (181°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18044-44-5] HMIS: 3-2-0-X 5g ¥17,800



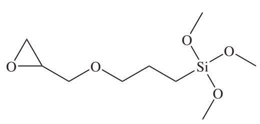
SIG5838.5
(3-GLYCIDOXYPROPYL)-1,1,3,3-TETRAMETHYLDISILOXANE
$C_{10}H_{24}O_3Si_2$ 248.47 92-8° / 0.2 0.901 1.4271^{25}
Monomer for epoxy vinyl-addition silicone hybrid polymers
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[17980-29-9] HMIS: 3-2-1-X 25g ¥21,500



SIG5839.0
(3-GLYCIDOXYPROPYL)TRIETHOXYSILANE
$C_{12}H_{26}O_5Si$ 278.42 124° / 3 1.00 1.425
Viscosity: 3 cSt
Flashpoint: 144°C (291°F)
Autoignition temperature: 225°C
Coupling agent for latex polymers
Primer for aluminum and glass to epoxy coatings and adhesives when applied as a 1-2% solution in solvent
See also SIE4675.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2602-34-8] (既) 2-2071 TSCA EC 220-011-6 HMIS: 3-1-1-X 25g ¥4,300 100g ¥16,100 2kg ¥134,000
COMMERCIAL



SIG5840.0 サイラエース **S510**
(3- GLYCIDOXYPROPYL)TRIMETHOXYSILANE
3-(2,3-EPOXYPROPOXY)PROPYLTRIMETHOXYSILANE
$C_9H_{20}O_5Si$ 236.34 120° / 2 (<-70°) 1.070 1.4290
Viscosity: 3.2 cSt
Surface tension: 38.5 mN/m
Specific wetting surface area: 331 m²/g
Flashpoint: 135°C (276°F)
TOXICITY: oral rat, LD50: 8,400 mg/kg
Autoignition temperature: 231°C
Component in aluminum metal bonding adhesives
Coupling agent for epoxy composites employed in electronic “chip” encapsulation
Component in abrasion resistant coatings for plastic optics
Used to prepare epoxy-containing hybrid organic-inorganic materials.[1]
1. Innocenzi, P. et al. *Chem. Mater.* **1999,** *11*, 1672.
See also SIG5939.0, SIE4670.0, SIE4675.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water サイラエース S510 100g ¥4,900 1kg ¥9,300
[2530-83-8] (既) 2-2071 TSCA EC 219-784-2 HMIS: 3-1-1-X 100g inquire 2kg inquire 18kg inquire
COMMERCIAL

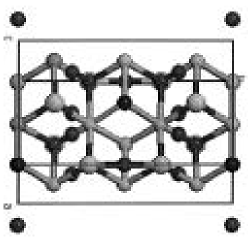


SIG5840.1
(3- GLYCIDOXYPROPYL)TRIMETHOXYSILANE, 99+%
$C_9H_{20}O_5Si$ 236.34 120° / 2 (<-70°) 1.070 1.4290
Flashpoint: 135°C (276°F)
Low fluorescence grade for high-throughput screening
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2530-83-8] (既) 2-2071 TSCA EC 219-784-2 HMIS: 3-1-1-X 25g ¥51,200*
** in fluoropolymer bottle*

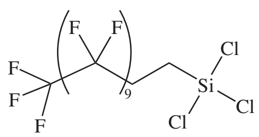
SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

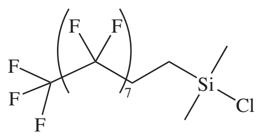
SIH5840.15
HALLOYSITE
KAOLINIC MINERAL
$Al_2Si_2O_5(OH)_4$ 258.16 2.59 1.56
Particle Size: <24 µm — Mohs Hardness: 2.0
Typical bulk density, not compacted: 0.58 g/cm^3 — Monoclinic domatic
White, tubular and ultramicroscopic structure, transparent to translucent
Used in advanced ceramics, refractories
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12298-43-0] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 10kg ¥48,000



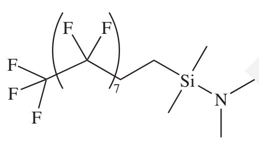
SIH5840.2
HECTORITE
$(Na_{0.67})(Mg,Li)_6Si_8O_{20}(OH,F)_4$ 383.25 2.5 1.49
Particle Size: <24 µm — Mohs hardness: 1.5
Typical bulk density, not compacted: 0.50 g/cm^3 — Monoclinic, prismatic
Internal surface area: ~750 m^2/g
Montmorillonite (smectite) clay mineral-layered, with swelling and intercalation properties.[1]
Substrate for the polymerization of oligonucleotides.[2]
1. Pinnavaia, T. In *Chemically Modified Surfaces in Catalysis*; Miller, J., Ed.; American Chemical Society: Washington, DC, 1982; 192, p 241.
2. Prabahar, K. et al. *J. Am. Chem Soc.* **1994,** *116*, 10914.
See also SIS6985.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12173-47-6] TSCA-E EC 235-340-0 HMIS: 1-0-0-X 2kg ¥23,500



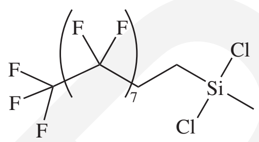
SIH5840.25
HENEICOSAFLUORODODECYLTRICHLOROSILANE
(PERFLUORODECYL)ETHYLTRICHLOROSILANE
$C_{12}H_4Cl_3F_{21}Si$ 681.57 90-2° / 1 (65-90°) 1.7
γc of treated surfaces: 5-7 mN/m
Renders surfaces oleophobic
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[102488-49-3] HMIS: 3-1-1-X 2.5g ¥48,000



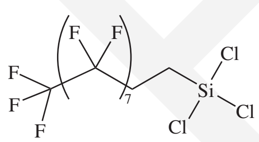
SIH5840.4
(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)DIMETHYLCHLOROSILANE
PERFLUORODECYL-1H,1H,2H,2H-DIMETHYLCHLOROSILANE
$C_{12}H_{10}ClF_{17}Si$ 540.72 197-8° 1.51 1.3410
Packaged over copper powder
Treated onto silica to prepare a fluorinated surface for the embedding of a catalyst for Bonded Fluorous Phase Catalysis (BFPC) used in dehydrogenative silylation of alcohols.[1]
Forms self-assembled monolayer resists that align nanowire arrays[2]
1. Biffis, A.; Zecca, M.; Basato, M. *Green Chemistry*, **2003**, *5*, 170 and Biffis, A.; Braga, M.; Basato, M. *Adv. Synth. Catal.* **2004**, *346*, 451.
2. Takahashi, T. et al. *J. Am. Chem. Soc.* **2009**, *131*, 2102.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[74612-30-9] HMIS: 3-2-1-X 5g ¥15,100 25g ¥50,100



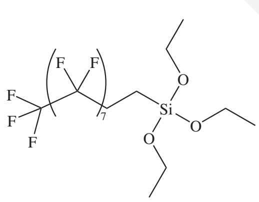
SIH5840.5
(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)DIMETHYL(DIMETHYLAMINO)SILANE
$C_{14}H_{16}F_{17}NSi$ 549.35 92-4° / 3 1.423
Packaged over copper powder
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-3-1-X 5g ¥32,100



SIH5840.6
(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)METHYLDICHLOROSILANE
$C_{11}H_7Cl_2F_{17}Si$ 561.14 205-7° (26-7°) 1.630 1.345
Packaged over copper powder
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[3102-79-2] HMIS: 3-2-1-X 5g ¥17,200 25g ¥58,600

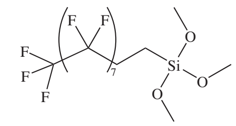


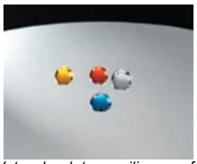
SIH5841.0
(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TRICHLOROSILANE
PERFLUORODECYL-1H,1H,2H,2H-TRICHLOROSILANE
$C_{10}H_4Cl_3F_{17}Si$ 581.56 216-8° 1.703 1.3490
Packaged over copper powder — TOXICITY: oral rat, LD50: >5,000 mg/kg
γc of treated surfaces: 12 mN/m.[1]
1. Brzoska, J. et al. *Langmuir* **1994,** *10*, 4367.
See also SIH5842.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[78560-44-8] TSCA HMIS: 3-2-1-X 5g ¥13,800 25g ¥44,800



SIH5841.2
(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TRIETHOXYSILANE
$C_{16}H_{19}F_{17}O_3Si$ 610.38 103-6° / 3 1.407^{25} 1.3419
Packaged over copper powder
Hydrolysis in combination with polydimethoxysiloxane gives hard hydrophobic coatings.[1]
1. Oota, T. et al. Jpn. Kokai JP 06,293,782, 1993; *Chem. Abstr.* **1995,** 122: 136317d.
See also SIP6720.3
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[101947-16-4] HMIS: 3-2-1-X 5g ¥15,400 25g ¥51,200

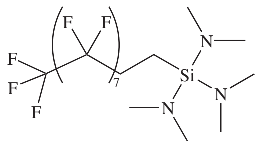
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



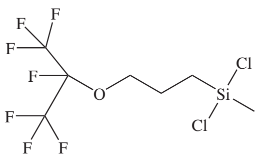


Water droplets on silicon wafer treated with SIH5841.5 exhibit high contact angle

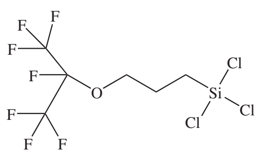
SIH5841.5
(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TRIMETHOXYSILANE
$C_{13}H_{13}F_{17}O_3Si$ 568.30 247° 1.54 1.331^{25}
Packaged over copper powder
Treated surface contact angle, water: 115˚
γc of treated surfaces: 12 mN/m
Surface modification of titanium and silica substrates reduces coefficient of friction
Forms inorganic hybrids with photoinduceable refractive index reduction.[1]
1. Park, J.-U. et al. *J. Mater. Chem.* **2003,** *13*, 738.
See also SIH5842.2, SIN6597.65, SIT8175.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[83048-65-1] TSCA-S HMIS: 3-2-1-X 5g ¥16,800 25g ¥48,000



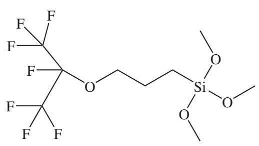
SIH5841.7
(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TRIS(DIMETHYLAMINO)SILANE
$C_{16}H_{22}F_{17}N_3Si$ 607.43 80-8° / 0.15 1.386
Packaged over copper powder
Employed in vapor phase deposition of oleophobic coatings
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[186599-45-1] HMIS: 3-2-1-X 10g ¥75,100



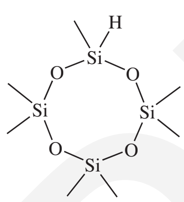
SIH5841.9
(3-HEPTAFLUOROISOPROPOXY)PROPYLMETHYLDICHLOROSILANE
$C_7H_9Cl_2F_7OSi$ 341.13 41-5° / 1
Monomer for low refractive index silicone fluids
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[20006-68-2] TSCA EC 243-461-5 HMIS: 3-3-1-X 10g ¥36,300



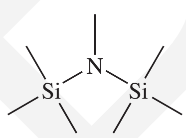
SIH5842.0
(3-HEPTAFLUOROISOPROPOXY)PROPYLTRICHLOROSILANE
$C_6H_6Cl_3F_7OSi$ 361.55 85-7° / 35 1.497 1.3710
Specific wetting surface area: 356 m²/g
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[15538-93-9] EC 239-589-6 HMIS: 3-3-1-X 5g ¥21,700



SIH5842.2
3-(HEPTAFLUOROISOPROPOXY)PROPYLTRIMETHOXYSILANE
$C_9H_{15}F_7O_4Si$ 348.29 39° / 0.5 1.3841
Contact angle, water on treated glass surface: 109-112°
Branched fluoroalkylsilane with low surface energy
Aligns liquid crystals.[1]
1. Jap. Pat. 57177121, 1982
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[19116-61-1] HMIS: 3-2-1-X 10g ¥28,900

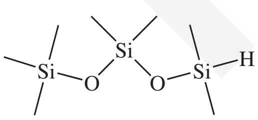


SIH5842.5
HEPTAMETHYLCYCLOTETRASILOXANE, tech-95
D3D'
$C_7H_{22}O_4Si_4$ 282.59 165° (-27°) 0.958 1.3965
Flashpoint: 46°C (115°F)
Derivatizable ring-opening monomer
See also SIA0038.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[15721-05-8] HMIS: 2-3-1-X 10g ¥35,300



SIH5843.0 COMMERCIAL
HEPTAMETHYLDISILAZANE
BIS(TRIMETHYLSILYL)METHYLAMINE
$C_7H_{21}NSi_2$ 175.42 148-50° 0.798 1.418
Dielectric constant: 2.25 Flashpoint: 27°C (81°F)
For GC derivatization
Reaction w/ isocyanates affords unsymmetrical carbodiimides
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[920-68-3] TSCA EC 213-061-5 HMIS: 3-3-1-X 25g ¥11,900 100g ¥31,000 2kg ¥192,000

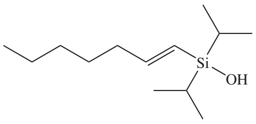
1,1,1,3,5,5,5-HEPTAMETHYL-3-PHENYLTRISILOXANE - see SIP6736.2 3-PHENYLHEPTAMETHYLTRISILOXANE



SIH5844.0
1,1,1,3,3,5,5-HEPTAMETHYLTRISILOXANE, 90%
$C_7H_{22}O_2Si_3$ 222.51 134-5° 0.820
Flashpoint: 21°C (70°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[2895-07-0] EC 220-774-5 HMIS: 2-4-1-X 10g ¥31,000

1,1,1,3,5,5,5-HEPTAMETHYLTRISILOXANE - see SIB1844.0 BIS(TRIMETHYLSILOXY)METHYLSILANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

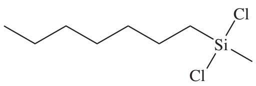


SIH5844.5
(E)-HEPTENYLDIISOPROPYLSILANOL
$C_{13}H_{28}OSi$ — 228.45 — 88° / 0.1 — 0.877 — 1.4640

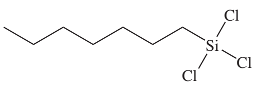
Undergoes Pd-catalyzed cross-coupling with activated aromatic iodides.[1]
Stable silanol for cross-coupling vinylations.[2,3,4]
Vinyl silanols cross-couple w/ aryl triflates and nonaflates.[5]
Potassium salts of silanols cross-couple in absence of fluoride.[6]

1. Denmark, S. et al. *Org. Syn.* **2005,** *81*, 42.
2. Denmark, S. E.; Sweis, R. F. *J. Am. Chem. Soc.* **2001**, *123*, 6439.
3. Denmark, S. E.; Pan, W. *J. Organomet. Chem.* **2002**, *653*, 98.
4. Denmark, S. E.; Wehrli, D. *Org. Lett.* **2000**, *2*, 565.
5. Denmark, S. E.; Sweis, R. F. *Org. Lett.* **2002**, *4*, 3771.
6. Denmark, S. E.; Kallemeyn, J. M. *J. Am. Chem. Soc.* **2006**, *128*, 15958.

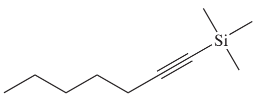
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[261717-41-3] HMIS: 2-2-0-X 2.5g ¥76,400



SIH5845.0
n-HEPTYLMETHYLDICHLOROSILANE
$C_8H_{18}Cl_2Si$ — 213.22 — 207-8° — 0.978 — 1.4396[25]
Flashpoint: 66°C (151°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18395-93-2] (既) 2-2041 TSCA EC 242-274-6 HMIS: 3-2-1-X 25g ¥28,900



SIH5846.0
n-HEPTYLTRICHLOROSILANE
$C_7H_{15}Cl_3Si$ — 233.64 — 211-2° — 1.087 — 1.4439[25]
Flashpoint: 64°C (147°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[871-41-0] (既) 2-2041 TSCA EC 212-807-7 HMIS: 3-2-1-X 25g ¥28,400

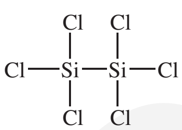


SIH5848.0
1-HEPTYNYLTRIMETHYLSILANE
$C_{10}H_{20}Si$ — 168.35 — 176° — 1.4344
Flashpoint: 42°C (108°F)

Useful in silicon-mediated Sonogashira cross-coupling reactions.[1]

1. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.

HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[15719-56-9] HMIS: 2-2-1-X 10g ¥44,300



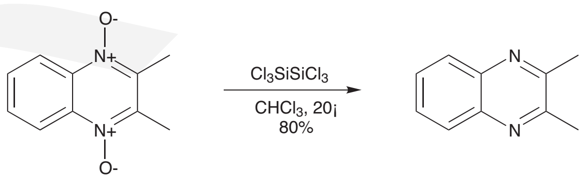
SIH5905.0
HEXACHLORODISILANE
HCDS
Cl_6Si_2 — 268.89 — 144-6° — (-1°) — 1.562 — 1.4750

CAUTION: HYDROLYSIS POLYMERS MAY IGNITE SPONTANEOUSLY, EVEN IN ABSENCE OF OXYGEN

ΔHcomb: -733 kJ/mole
ΔHform: -239 kJ/mole
ΔHvap: 46.5 kJ/mole

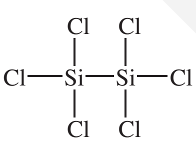
Flashpoint: 78°C (172°F)
Autoignition temperature: 320°C
Vapor pressure, 40°: 12 mm

CVD precursor for SiN
Review of synthetic utility.[1]
Converts phosphine oxides to phosphines with inversion of configuration.[2]
Catalyst for cyclotrimerization of acetylenes.[3]
Deoxygenates amineoxides.[4]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 309-310.
2. Mislow, K. et al. *J. Am. Chem. Soc.* **1969,** *91*, 2788, 7012, 7023.
3. Young, J. et al. *J. Am. Chem. Soc.* **1998,** *120*, 6834.
4. Homaidan, F. R.; Issidorides, C. H. *Heterocycles*, **1981**, *16*, 411.

F&F: Vol. 3, p 148.
See also SIH5905.1, SIO6601.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13465-77-5] TSCA EC 236-704-1 HMIS: 3-3-2-X store <5°C 5g ¥14,100 25g ¥45,900

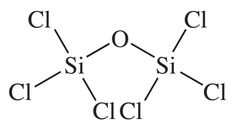


SIH5905.1
HEXACHLORODISILANE, 99.9%
HCDS
Cl_6Si_2 — 268.89 — 144-6° — (-1°) — 1.562 — 1.4750

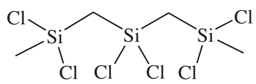
CAUTION: HYDROLYSIS POLYMERS MAY IGNITE SPONTANEOUSLY, EVEN IN ABSENCE OF OXYGEN
Flashpoint: 78°C (172°F)

Precursor for CVD of SiN films
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13465-77-5] TSCA EC 236-704-1 HMIS: 3-3-2-X store <5°C 25g ¥104,200

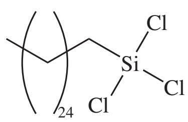
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



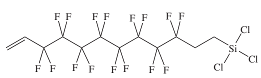
SIH5910.0
HEXACHLORODISILOXANE, 95%
Cl_6OSi_2 — Mw 284.89 — bp 137° — D_4^{20} 1.575 — n_D^{20} 1.4280
ΔHvap: 43.1 kJ/mole — Vapor pressure, 0°: 1.5 mm
See also SIO6605.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[14986-21-1] TSCA EC 239-070-4 HMIS: 3-0-2-X 10g ¥30,600



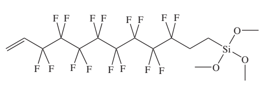
SIH5915.0
2,2,4,4,6,6-HEXACHLORO-2,4,6-TRISILAHEPTANE
BIS(DICHLOROMETHYLSILYLMETHYL)DICHLOROSILANE
$C_4H_{10}Cl_6Si_3$ — Mw 355.10 — bp 97-8° / 1.5
Carbosilane oligomer
Intermediate for disilabutanes.[1]
1. Jung, I. et al. Ger. Off. DE 4219375, 1992; *Chem. Abstr.* 118: 147789.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18243-10-2] HMIS: 3-2-1-X 5g ¥28,400



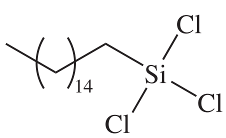
SIH5917.0
HEXACOSYLTRICHLOROSILANE
$C_{26}H_{53}Cl_3Si$ — Mw 500.15 — mp (35-55°)
Blend
Contains C_{24}-C_{30} homologs, a distilled cut product with more reproducible deposition than triacontylsilanes
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[60085-14-5] HMIS: 3-3-1-X 25g ¥21,500



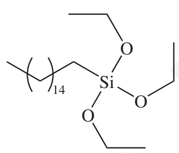
SIH5918.0
HEXADECAFLUORODODEC-11-EN-1-YLTRICHLOROSILANE
$C_{12}H_7Cl_3F_{16}Si$ — Mw 589.61 — bp 94-6° / 0.6 — D_4^{20} 1.626 — n_D^{20} 1.3713
Forms self-assembled monolayers; reagent for immobilization of DNA
See also SID4623.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-1-1-X 1.0g ¥45,900



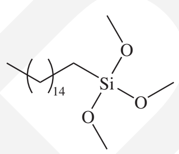
SIH5919.0
HEXADECAFLUORODODEC-11-EN-1-YLTRIMETHOXYSILANE
$C_{15}H_{16}F_{16}O_3Si$ — Mw 576.35 — bp 90° / 0.5 — D_4^{20} 1.4145^{25} — n_D^{20} 1.3526^{25}
Forms self-assembled monolayers; reagent for immobilization of DNA
See also SID4623.6
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-1-1-X 1.0g ¥51,200



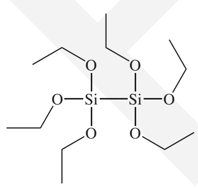
SIH5920.0
HEXADECYLTRICHLOROSILANE, 95%
$C_{16}H_{33}Cl_3Si$ — Mw 359.88 — bp 202° / 10 — D_4^{20} 0.98 — n_D^{20} 1.4592
γc of treated surfaces: 21 mN/m — Flashpoint: 154°C (309°F)
See also SIH5925.0, SIT8162.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[5894-60-0] TSCA EC 227-575-2 HMIS: 3-1-1-X 25g ¥10,900 100g ¥27,600



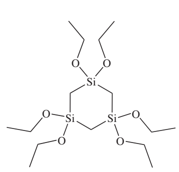
SIH5922.0
HEXADECYLTRIETHOXYSILANE, 95%
$C_{22}H_{48}O_3Si$ — Mw 388.71 — bp 160-1° / 1 — mp (-9°) — D_4^{20} 0.888 — n_D^{20} 1.4370
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[16415-13-7] TSCA EC 240-465-9 HMIS: 2-1-1-X 25g ¥9,500 100g ¥23,300



SIH5925.0 (COMMERCIAL)
HEXADECYLTRIMETHOXYSILANE, 95%
$C_{19}H_{42}O_3Si$ — Mw 346.63 — bp 155° / 0.2 — mp (-1°) — D_4^{20} 0.89 — n_D^{20} 1.4356
Viscosity: 7 cSt
Flashpoint: 122°C (252°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Autoignition temperature: 245˚C
Water scavenger
Employed as rheology modifier for moisture crosslinkable HDPE
Modifier for moisture crosslinkable polyethylene (XLPE)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[16415-12-6] TSCA EC 240-464-3 HMIS: 2-2-1-X 25g ¥5,900 2kg ¥73,000 16kg ¥356,000



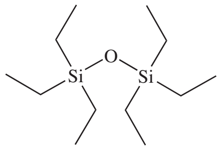
SIH5935.0
HEXAETHOXYDISILANE, tech-95
$C_{12}H_{30}O_6Si_2$ — Mw 326.54 — bp 123° / 15 — D_4^{20} 0.972 — n_D^{20} 1.4134^{14}
Includes other disilanes
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5851-08-1] HMIS: 3-3-1-X 5g ¥31,000



SIH5945.0
1,1,3,3,5,5-HEXAETHOXY-1,3,5-TRISILACYCLOHEXANE
$C_{15}H_{36}O_6Si_3$ — Mw 396.70 — bp 132-3° / 5 — D_4^{20} 1.0152 — n_D^{20} 1.4336
Precursor for low dielectric constant films by CVD
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17955-67-8] HMIS: 2-2-1-X 10g ¥31,600

SILICON COMPOUNDS

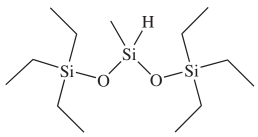
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIH6070.0
HEXAETHYLDISILOXANE
$C_{12}H_{30}OSi_2$ — 245.54 — 231° — (-115°) — 0.8443 — 1.4340

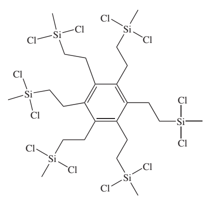
Viscosity, -50°: 85 cSt — Flashpoint: 76°C (169°F)
Viscosity, 20°: 2.35 cSt — Vapor pressure, 60°: 1 mm
ΔHcomb: 9,770 kJ/mole — Dipole moment: 0.66 debye
ΔHform: 984 kJ/mole — Specific heat: 1.84 J/g/°
Surface tension: 21.5 mN/m — Dielectric constant: 2.2
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[994-49-0] (既) 7-476 TSCA EC 213-619-8 HMIS: 1-2-0-X 25g ¥9,500 100g ¥23,300 2kg ¥139,000

COMMERCIAL

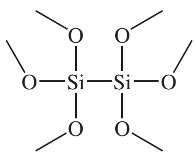


SIH6074.0
1,1,1,5,5,5-HEXAETHYL-3-METHYLTRISILOXANE
$C_{13}H_{34}O_2Si_3$ — 306.67 — 81-2° / 1 — 0.8696 — 1.427
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[13716-38-6] HMIS: 2-2-1-X 10g ¥27,800

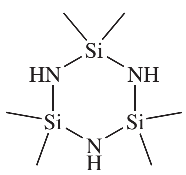
HEXAFLUOROACETYLACETONE, TRIMETHYLSILYLENOL ETHER -
see SIT8571.05 2-TRIMETHYLSILOXY-1,1,1,5,5,5-HEXAFLUOROPENT-2-EN-4-ONE



SIH6080.0
1,2,3,4,5,6-HEXAKIS[2-(METHYLDICHLOROSILYL)ETHYL]BENZENE
$C_{24}H_{42}Cl_{12}Si_6$ — 924.55 — (165-75°)
Core for dendrimer synthesis.
Soluble: toluene
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[194933-15-8] HMIS: 3-2-1-X 5g ¥33,200

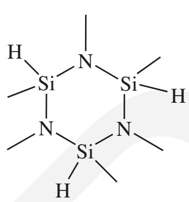


SIH6101.0
HEXAMETHOXYDISILANE, tech-95
$C_6H_{18}O_6Si_2$ — 242.37 — 98° / 20 — 1.095 — 1.4070
ΔHcomb: 4,814 kJ/mole
ΔHform: 1,863 kJ/mole
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5851-07-0] HMIS: 4-4-1-X 5g ¥27,300

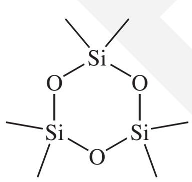


SIH6102.0
1,1,3,3,5,5-HEXAMETHYLCYCLOTRISILAZANE
$C_6H_{21}N_3Si_3$ — 219.51 — 186-8° — (-10°) — 0.922 — 1.4448
Viscosity, 20°: 1.7 cSt — Flashpoint: 61°C (142°F)
ΔHform: 553 kJ/mole — Dipole moment: 0.92 debye
Dielectric constant: 1000Hz: 2.57
Modifies positive resists for O_2 plasma resistance.[1]
Polymerizes to polydimethylsilazane oligomer in presence of Ru/H_2.[2]
Silylation reagent for diols.[3]
1. Babich, E. et al. *Microelectron. Eng.* **1990,** *11*, 503.
2. Blum, Y. et al. U.S. Patent 4,216,383, 1986; U.S. Patent 4,788,309, 1988.
3. Birkofer, L. et al. *J. Organomet. Chem.* **1980,** *187*, 21.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1009-93-4] (既) 5-6044 TSCA EC 213-773-6 HMIS: 2-2-1-X 25g ¥6,200 100g ¥10,400 2kg ¥174,000

COMMERCIAL



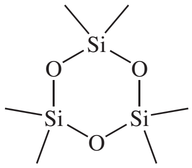
SIH6103.0
1,2,3,4,5,6 HEXAMETHYLCYCLOTRISILAZANE, tech-95
$C_6H_{21}N_3Si_3$ — 219.51 — 56° / 5 — 0.929 — 1.4580
Contains tetramer
Pyrolytic deposition in ammonia yields silicon nitride.[1]
1. Arkles, B. *J. Electrochem. Soc.* **1986,** *133*, 233.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2587-46-4] HMIS: 2-2-1-X 5g ¥15,400 25g ¥51,200



SIH6105.0
HEXAMETHYLCYCLOTRISILOXANE, 95%
D3
$C_6H_{18}O_3Si_3$ — 222.46 — 134° — (64-6°) — 1.02
Contains other cyclics — Flashpoint: 35°C (95°F)
ΔHform: 1,490 kJ/mole — Vapor pressure, 25°: 10 mm
ΔHvap: 39.8 kJ/mole — Dipole moment: 0.0
ΔHfus: 15.5 kJ/mole — Ring strain: 10.5 kJ/mole
ΔHpolym: 6.7 kJ/mole — Surface tension, 74°: 13.3 mN/m
Ea, polym: 73.7 kJ/mole
Undergoes ring-opening anionic polymerization
Review of synthetic utility.[1]
Reacts with three equivalents of an organolithium reagent to give derivatized dimethylsilanols.[2,3]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 310-313.
2. Frye, C. L. et al. *J. Org. Chem.* **1970**, *35*, 1308.
3. Sieburth, S. M.; Fensterbank. L. *J. Org. Chem.* **1993**, *58*, 6314.
See also SIH6105.1, SIT8366.0, SIT8737.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[541-05-9] (既) 7-475 TSCA EC 208-765-4 HMIS: 1-3-0-X 100g ¥8,200 500g ¥29,800 10kg ¥306,000

COMMERCIAL

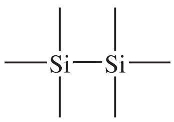
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIH6105.1
HEXAMETHYLCYCLOTRISILOXANE, 98%
D3

$C_6H_{18}O_3Si_3$	222.46	134°	(64-6°)	1.02	

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[541-05-9] (既) 7-475 TSCA EC 208-765-4 HMIS: 1-3-0-X 100g ¥13,000 500g ¥42,700

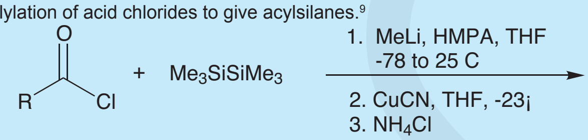


SIH6109.0
HEXAMETHYLDISILANE
HMD

$C_6H_{18}Si_2$	146.38	112-3°	(12-14°)	0.7293	1.4214

Viscosity: 1.0 cSt
ΔHcomb: 5,909 kJ/mole
ΔHform (gas): -494 kJ/mole
ΔHvap: 39.8 kJ/mole
Flashpoint: -1°C (30°F)
Vapor pressure, 20°: 22.9 mm
Ea decomposition at 545°K: 337 kJ/mole
Rotational barrier, Si-Si: 4.40 kJ/mole
Secondary NMR reference: δ = 0.045

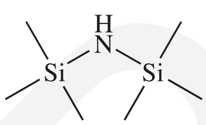
Review of synthetic utility.[1]
Source for trimethylsilyl anion.[2,3]
Replaces aromatic nitriles with TMS groups in presence of $[RhCl(cod)]_2$.[4]
Precursor for CVD of silicon carbide.[5]
Brings about the homocoupling of arenesulfonyl chlorides in the presence of $Pd_2(dba)_3$.[6]
Used as a solvent for the direct borylation of fluoroaromatics.[7]
Reacts with alkynes to form siloles.[8]
Undergoes the silylation of acid chlorides to give acylsilanes.[9]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 278-284.
2. Shippey, M. A. et al. *J. Org. Chem.* **1977,** *42*, 2654.
3. F&F: Vol. 10, p 96; Vol.11, p 253.
4. Tobisu, M. et al. *J. Am. Chem. Soc.* **2006,** *128*, 4152.
5. *Thin Solid Films* **1999**, *252*, 13.
6. Kashiwabara, T.; Tanaka, M. *Tetrahedron Lett.* **2005**, *46*, 7125.
7. Teltewskoi, M. et al. *Angew. Chem., Int. Ed. Engl.* **2010**, *49*, 3947.
8. Akagawa, K. et al. *Synlett* **2011**, *22*, 813.
9. Capperucci, A. et al. *J. Org. Chem.* **1988**, *53*, 3612.

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1450-14-2] (既) 2-3711 TSCA EC 215-911-0 HMIS: 2-4-0-X 25g ¥13,000 100g ¥34,500 1.5kg ¥103,000

COMMERCIAL



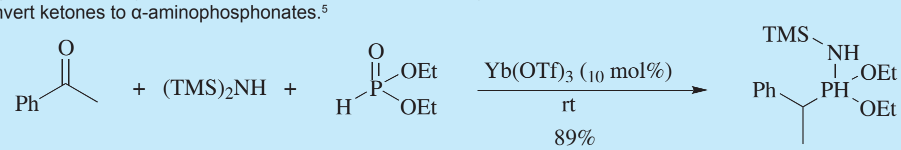
SIH6110.0
1,1,1,3,3,3-HEXAMETHYLDISILAZANE
HMDS, HMDZ

$C_6H_{19}NSi_2$	161.39	126-7°	(<-76°)	0.7742	1.4080

Viscosity: 0.90 cSt
ΔHcomb: 25,332 kJ/mole
ΔHvap: 34.7 kJ/mole
Dipole moment: 0.37 debye
Surface tension: 18.2 mN/m
Specific wetting surface: 485 m^2/g
Flashpoint: 12°C (54°F)
TOXICITY: oral rat, LD50: 850 mg/kg
TOXICITY: ipr mouse, LDLo: 650 mg/kg
Autoignition temperature: 325˚C
Vapor pressure, 50°: 50 mm
pKa: 7.55
Dielectric constant: 1000 Hz: 2.27
Ea, reaction w/SiO_2 surface: 73.7 kJ/mole


Treatment of fumed silica with hexamethyldisilazane renders it hydrophobic

Versatile silylation reagent; creates hydrophobic surfaces
Review of synthetic utility.[1]
Converts acid chlorides and alcohols to amines in a three-component reaction.[2]
Reacts with formamide and ketones to form pyrimidines.[3]
Lithium reagent reacts w/ aryl chlorides or bromides to provide primary anilines.[4]
Used to convert ketones to α-aminophosphonates.[5]



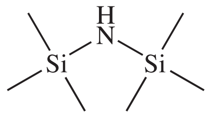
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 317-319.
2. Li, H.-H. et al. *Eur. J. Org. Chem.* **2008**, 3623.
3. Tyagarajan, S.; Chakravarty, P. K. *Tetrahedron Lett.* **2005**, *46*, 7889.
4. Lee, S.; Jorgensen, M.; Hartwig, J. F. *Org. Lett.* **2001***, 3*, 2729.
5. Heo, Y. et al. *Tetrahedron Lett.* **2012**, *53*, 3897.
F&F: Vol. 1, p 427; Vol. 2, p 159; Vol. 5, p 323; Vol. 6, p 273; Vol. 7, p 167; Vol. 8, p 29; Vol. 9, p 234; Vol. 11, p 38; Vol. 12, p 239; Vol. 13, p 141; Vol. 14, p 300.

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMDS-SG (製造元 JNC) 1L ¥8,500
[999-97-3] (既) 9-1324 TSCA EC 213-668-5 HMIS: 2-4-1-X 25g ¥5,600 1.5kg inquire 14kg inquire

COMMERCIAL

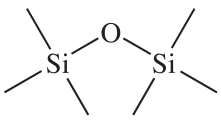
SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIH6110.1
1,1,1,3,3,3-HEXAMETHYLDISILAZANE, 99%
HMDS, HMDZ
$C_6H_{19}NSi_2$ — 161.39 — 126-7° — (<-76°) — 0.7742 — 1.4080
<5 ppm chloride
Photoresist adhesion promoter
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMDS-EG (製造元 JNC) 1L ¥12,500
[999-97-3] (既) 9-1324 TSCA EC 213-668-5 HMIS: 2-4-1-X 25g ¥6,200 1.5kg inquire

COMMERCIAL

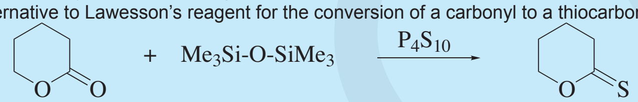


SIH6115.0
HEXAMETHYLDISILOXANE, 98%
MM, HMDSO
$C_6H_{18}OSi_2$ — 162.38 — 99-100° — (-67°) — 0.7636 — 1.3774

Viscosity: 0.65 cSt
ΔHcomb: -5,864 kJ/mole
ΔHvap: 30.1 kJ/mole
Dipole moment: 0.78 debye
Surface tension: 15.9 mN/m
Solubility parameter: 6.8
Solubility in water: 930 ppb

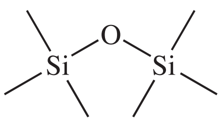
Flashpoint: -1°C (30°F)
TOXICITY: oral gpg LDLo: 32,500 mg/kg
Autoignition temperature: 340°C
Vapor pressure, 30°: 55 mm
Critical temperature: 243°C
Critical pressure: 1.91 mPa
Specific heat: 1.93 J/g/°
Dielectric constant: 2.17
Henry's law constant: 4.5 atm-m³/mole

Review of synthetic utility.[1]
Exhibits high excess electron mobility: 22 cm²/V s.[2]
Plasma polymerization produces hydrophobic coatings on metals.[3]
Provides an excellent alternative to Lawesson's reagent for the conversion of a carbonyl to a thiocarbonyl.[4]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 313-317.
2. Holroyd, R. et al. *Nucl. Instrum. Methods Phys. Res., Sect. A* **1997,** *390*, 233.
3. Bonnar, M. et al. *Chem. Phys. Vac. Dep.* **1997,** *3*, 201.
4. Curphey, T. J. *J. Org. Chem.* **2002**, *67*, 6461.
See also SIH6115.1, SIH6070.0, SIO6703.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[107-46-0] (既) 2-2956 TSCA EC 203-492-7 HMIS: 1-3-0-X 100g ¥4,400 1.5kg ¥23,200 14kg ¥124,000

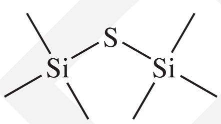
COMMERCIAL



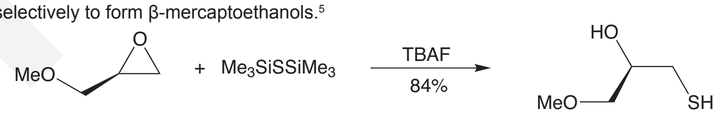
SIH6115.1
HEXAMETHYLDISILOXANE, 99.9%
$C_6H_{18}OSi_2$ — 162.38 — 99-100° — (-67°) — 0.7636 — 1.3774
NMR grade
Plasma polymerization produces hydrophobic coatings on metal.[1]
1. Bonnar, M. et al. *Chem. Phys. Vac. Dep.* **1997,** *3*, 201.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[107-46-0] (既) 2-2956 TSCA EC 203-492-7 HMIS: 1-3-0-X 25g ¥5,100 1.5kg ¥55,000

COMMERCIAL

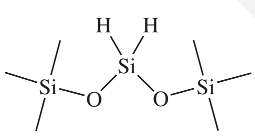
HEXAMETHYLDISILPEROXANE - see SIB1868.0 BIS(TRIMETHYLSILYL)PEROXIDE



SIH6116.0
HEXAMETHYLDISILTHIANE
BIS(TRIMETHYLSILYL)SULFIDE
$C_6H_{18}SSi_2$ — 178.45 — 162-4° — — 0.851 — 1.4598
Stench
Dipole moment: 1.85 debye
Flashpoint: 26°C (79°F)
Reviews.[1,2]
Used in the generation of SAMs of alkanethiolates on noble metal surfaces.[3]
Forms glycosyl sulfides.[4]
Opens epoxides regioselectively to form β-mercaptoethanols.[5]

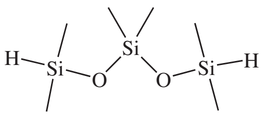


1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 83-84.
2. McGregor, W. et al. *Chem. Soc. Rev.* **1993,** 199.
3. Hu, J.; Fox, M. A. *J. Org. Chem.* **1999,** *64*, 4959.
4. Dere, R. T. et al. *J.Org. Chem.* **2011**, *76*, 7539.
5. Degl'Innocenti, A. et al. *Tetrahedron Lett.* **1993**, *34*, 873.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3385-94-2] TSCA EC 222-201-4 HMIS: 3-3-1-X 5g ¥28,900

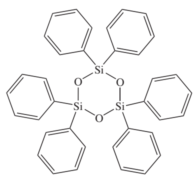


SIH6116.6
1,1,1,5,5,5-HEXAMETHYLTRISILOXANE
$C_6H_{20}O_2Si_3$ — 208.48 — 135° — — 0.819 — 1.3801
Flashpoint: 21°C (70°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[93254-88-7] HMIS: 3-4-1-X 10g ¥20,700

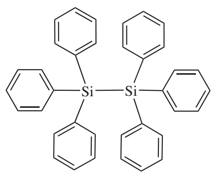
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



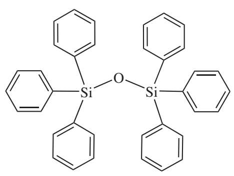
SIH6117.0
1,1,3,3,5,5-HEXAMETHYLTRISILOXANE
M'DM'
$C_6H_{20}O_2Si_3$ | 208.48 | 128° | | 0.8222 | 1.3811
Flashpoint: 20°C (68°F)
Undergoes hydrosilylation reactions
See also SIB1770.0, SIT7546.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[1189-93-1] (既) 7-477 TSCA EC 214-716-8 HMIS: 1-4-1-X 10g ¥8,500 50g ¥23,600 2kg ¥217,000
COMMERCIAL



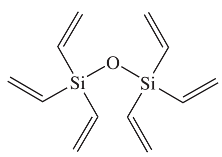
SIH6145.0
HEXAPHENYLCYCLOTRISILOXANE
$C_{36}H_{30}O_3Si_3$ | 594.89 | 300° / 1 | (188°) | 1.23
ΔHcomb: 18,711 kJ/mole
ΔHform: 963 kJ/mole
May be ring opened to diol with water and n-hexylamine.[1]
1. Tachikawa, M. et al. *Chem. Mater.* **1998,** *10*, 4154.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[512-63-0] (既) 7-473 TSCA EC 208-145-3 HMIS: 1-0-0-X 25g ¥25,700 100g ¥75,800



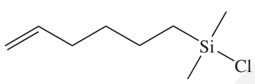
SIH6155.0
HEXAPHENYLDISILANE
$C_{36}H_{30}Si_2$ | 518.80 | | (360-362°)
Si-Si bond cleaved by alkali metals to form triphenylsilyl anion
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1450-23-3] (既) 7-473 TSCA EC 215-913-1 HMIS: 2-1-0-X 5g ¥25,200 25g ¥90,400



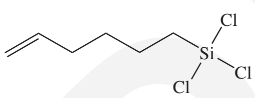
SIH6161.0
HEXAPHENYLDISILOXANE, 95%
$C_{36}H_{30}OSi_2$ | 534.80 | 494° | (224-5°) | | 1.68^{25}
Contains triphenylsilanol
Dipole moment: 1.03 debye
ΔHcomb: 19,979 kJ/mole
Specific heat: 1.26 J/g/°
ΔHform: 224 kJ/mole
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1829-40-9] TSCA EC 217-381-6 HMIS: 1-0-0-X 25g ¥19,900



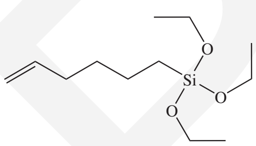
SIH6162.0
HEXAVINYLDISILOXANE, 95%
$C_{12}H_{18}OSi_2$ | 234.45 | 115-6° / 20 | | 0.84 | 1.4667
Flashpoint: 61°C (142°F)
End-capper for silicones
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[75144-60-4] HMIS: 2-2-0-X 5g ¥25,700



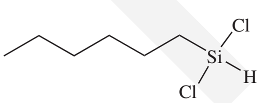
SIH6163.0
5-HEXENYLDIMETHYLCHLOROSILANE, 95%
$C_8H_{17}ClSi$ | 176.76 | 183-4° | | 0.895 | 1.4423
Contains other olefinic isomers
Flashpoint: 48°C (118°F)
Copolymerizes with hexene, hexadiene
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[30102-73-9] HMIS: 3-3-1-X 10g ¥19,900 50g ¥69,200



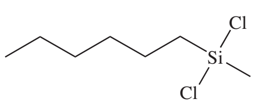
SIH6164.0
5-HEXENYLTRICHLOROSILANE, 95%
$C_6H_{11}Cl_3Si$ | 217.60 | 33-4° / 0.7
Contains other olefinic isomers
Flashpoint: 60°C (140°F)
See also SIO6708.0, SIU9050.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18817-29-3] HMIS: 3-2-1-X 10g ¥19,400



SIH6164.2
5-HEXENYLTRIETHOXYSILANE, 95%
$C_{12}H_{26}O_3Si$ | 246.43 | 97° / 1 | | 0.883 | 1.4185
Primarily α-olefin
Flashpoint: 86°C (187°F)
See also SIO6709.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[52034-14-7] HMIS: 2-1-1-X 10g ¥20,400

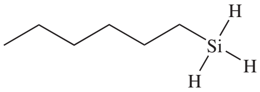


SIH6165.0
HEXYLDICHLOROSILANE
$C_6H_{14}Cl_2Si$ | 185.16 | 172-5° | | 1.021 | 1.4393
Flashpoint: 64°C (147°F)
See also SII6452.3, SIP6725.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[871-64-7] (既) 2-2042 HMIS: 3-2-1-X 5g ¥18,800 25g ¥65,000

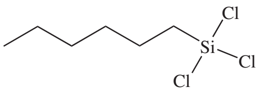


SIH6165.6
HEXYLMETHYLDICHLOROSILANE
$C_7H_{16}Cl_2Si$ | 199.19 | 204-6° | | 0.993 | 1.4393
Flashpoint: 85°C (185°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[14799-94-1] (既) 2-2041 TSCA EC 238-864-8 HMIS: 3-2-1-X 25g ¥13,500

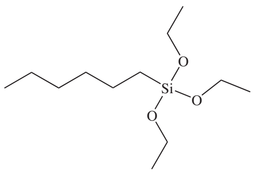
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



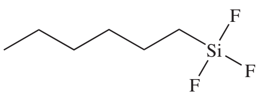
SIH6166.2
HEXYLSILANE
$C_6H_{16}Si$ 116.28 114-5° 0.7182 1.4129
Flashpoint: 12°C (54°F)
Reacts onto a Au surface to form monolayers of long alkyl chains.[1]
1. Owens, T. M. et al. *J. Am. Chem. Soc.* **2002**, *124*, 6800.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[1072-14-6] TSCA EC 214-001-0 HMIS: 2-4-1-X 10g ¥22,000 50g ¥77,700



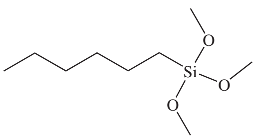
SIH6167.0
HEXYLTRICHLOROSILANE
$C_6H_{13}Cl_3Si$ 219.61 191-2° 1.107 1.3473
Flashpoint: 85°C (185°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[928-65-4] (既) 2-2041 TSCA EC 213-178-1 HMIS: 3-2-1-X 25g ¥9,800 100g ¥24,100



SIH6167.5
HEXYLTRIETHOXYSILANE
$C_{12}H_{28}O_3Si$ 248.44 115° / 18 0.860 1.408^{25}
Viscosity: 3 cSt
Flashpoint: 95°C (203°F)
Employed in so-gel derived stationary phases for capillary electrochromatography.[1]
1. Li, W. et al. *J. Chromatog., A* **2004**, *1044*, 23.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18166-37-5] (既) 2-2052 TSCA HMIS: 2-1-1-X 25g ¥7,200 2kg ¥51,100 15kg ¥221,000
COMMERCIAL

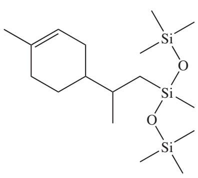


SIH6168.0
HEXYLTRIFLUOROSILANE
$C_6H_{13}F_3Si$ 170.25 88-91° 0.984 1.3515
Flashpoint: -7°C (19°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[96164-66-8] HMIS: 4-4-1-X 5g ¥42,700

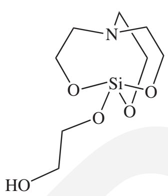


SIH6168.5
HEXYLTRIMETHOXYSILANE
$C_9H_{22}O_3Si$ 206.35 202-3° 0.911^{25} 1.4070
Flashpoint: 62°C (144°F)
Surface modification of TiO_2 pigments improves dispersion
See also SIO6715.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3069-19-0] (既) 2-2052 TSCA EC 221-331-9 HMIS: 3-2-1-X 50g ¥4,400 2kg ¥45,000 16kg ¥350,000
COMMERCIAL

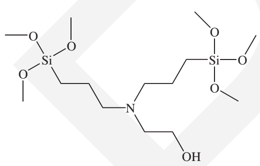
HEXYNYLTRIMETHYLSILANE - see SIT8589.7 1-TRIMETHYSILYL-1-HEXYNE



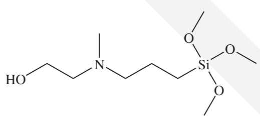
SIH6168.7
4-R-8-HYDRO-9-[BIS(TRIMETHYLSILOXY)METHYLSILYL]LIMONENE
$C_{17}H_{38}O_2Si_3$ 358.74 100° / 0.5 0.880 1.426
Viscosity: 4-5 cSt
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[1263044-00-3]/[1263043-99-7] TSCA HMIS: 1-1-0-X 25g ¥14,100



SIH6171.0
HYDROXYETHOXYSILATRANE
SILATRANE GLYCOL
$C_8H_{17}NO_5Si$ 235.32 (>205° dec.) 1.05
Soluble: water
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[56929-77-2] HMIS: 3-1-0-X 25g ¥14,600

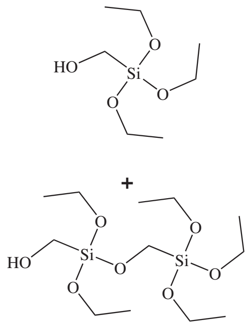


SIH6171.5
N-(HYDROXYETHYL)-N,N-BIS(TRIMETHOXYSILYLPROPYL)AMINE, 65% in methanol
$C_{14}H_{35}NO_7Si_2$ 385.61 0.97
Flashpoint: 15°C (59°F)
Dipodal silane with hydroxyl functionality
See also SIB1142.0, SIB1824.4, SIH6172.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[264128-94-1] TSCA HMIS: 3-4-1-X 10g ¥25,700

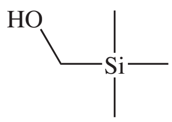


SIH6172.0
N-(HYDROXYETHYL)-N-METHYLAMINOPROPYLTRIMETHOXYSILANE, 75% in methanol
$C_9H_{23}NO_4Si$ 237.37 0.99 1.417
Flashpoint: 11°C (52°F)
See also SIT8567.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[330457-46-0] HMIS: 3-4-1-X 25g ¥18,000 100g ¥50,900

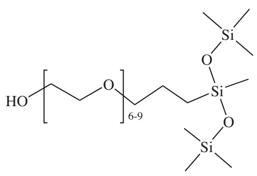
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



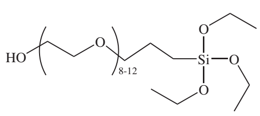
SIH6175.0
HYDROXYMETHYLTRIETHOXYSILANE, 50% in ethanol
TRIETHOXYSILYLMETHANOL
$C_7H_{18}O_4Si$ — Mw 194.31 — D_4^{20} 0.866
Contains equilibrium condensation oligomers — Flashpoint: 15°C (59°F)
Hydrolysis yields analogs of silica-hydroxymethylsilanetriol polymers.[1,]
Cohydrolysates form highly water dispersible nanoparticles.[2]
Functionalizes magnetic particles utilized in nucleic acid separation.[3]
Functionalizes nanoparticles for "stealth therapeutic" biomedical applications.[4]
1. Arkles, B. et al. *Silicon* **2013**, *5*, 187; DOI 10.1007/s12633-013-9146-2
2. Du, H. et al. *J. Colloid Interface Sci.* **2009**, *340*, 202.
3. Templer, D. Eur. Pat. Appl. EP 1748 072 A1, 2007.
4. Neoh, K. G. et al. *Polymer Chemistry* **2011**, *2*, 747.
See also SIB1142.0, SIB1824.2, SIH6172.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[162781-70-6] TSCA-L HMIS: 2-4-0-X 25g ¥28,900



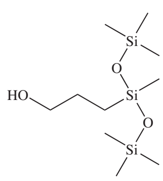
SIH6177.0
HYDROXYMETHYLTRIMETHYLSILANE
TRIMETHYLSILYLMETHANOL
$C_4H_{12}OSi$ — Mw 104.22 — bp 121-2° — D 0.826[25] — n_D 1.4320[25]
Flashpoint: 31°C (88°F)
TOXICITY: ipr mouse, LD50: 1,080 mg/kg
Nucleophilic hydroxymethylation reagent.[1]
1. Katritzky, A. et al. *Tetrahedron Lett.* **1987,** *28*, 1847.
F&F: Vol. 10, p 434; Vol. 14, p 331.
See also SIT8602.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[3219-63-4] TSCA EC 221-746-5 HMIS: 2-3-0-X 5g ¥24,100 25g ¥86,200



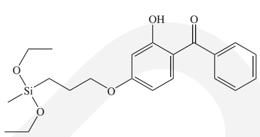
SIH6185.0
3-[HYDROXY(POLYETHYLENEOXY)PROPYL]HEPTAMETHYLTRISILOXANE, 90%
Mw 550 - 650 — mp (-18°) — D 1.02 — n_D 1.4463[25]
Viscosity, 25°: 35 cSt — Flashpoint: 118°C (244°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[67674-67-3] TSCA HMIS: 1-1-0-X 25g ¥8,500 100g ¥19,400



SIH6188.0
[HYDROXY(POLYETHYLENEOXY)PROPYL]TRIETHOXYSILANE, (8-12 EO), 50% in ethanol
Mw 575 - 750 — D 0.889 — n_D 1.401
Flashpoint: 15°C (59°F)
See also SIA0078.0, SIH6185.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-4-1-X 25g ¥26,800



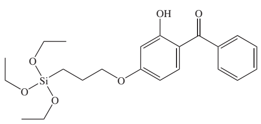
SIH6192.0
3-(3-HYDROXYPROPYL)HEPTAMETHYLTRISILOXANE, 95%
BIS(TRIMETHYLSILOXY)METHYL(HYDROXYPROPYL)SILANE
$C_{10}H_{28}O_3Si_3$ — Mw 280.58 — bp 82-5° / 2 — D 0.905 — n_D 1.4133
Hydrophilic trisiloxane
Forms acrylate esters
See also SIH6185.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17962-67-3] HMIS: 2-2-0-X 25g ¥26,300

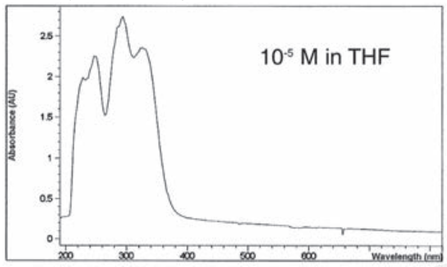


SIH6198.0
2-HYDROXY-4-(3-METHYLDIETHOXYSILYLPROPOXY)DIPHENYLKETONE, tech-90
$C_{21}H_{28}O_5Si$ — Mw 388.54 — D 1.116[25] — n_D 1.5601[25]
Amber liquid
Viscosity: 100-125 cSt
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-1-1-X 25g ¥28,400

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

SIH6200.0
2-HYDROXY-4-(3-TRIETHOXYSILYLPROPOXY)DIPHENYLKETONE, tech-90
$C_{22}H_{30}O_6Si$ — 418.56 — 1.120^{25} — 1.545^{25}
Amber liquid
Viscosity, 25°: 125-150 cSt
UV max: 230, 248, 296(s), 336
Strong UV blocking agent for optically clear coatings, absorbs from 210-420 nm
UV blocking agent.[1]



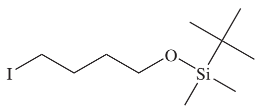


1. Anthony, B. U.S. Patent 4,495,360, 1985.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[79876-59-8] TSCA HMIS: 2-1-1-X 25g ¥20,400 100g ¥58,600

IMIDAZOLE DERIVATIVES - see
SIB1964.0 1-(t-BUTYLDIMETHYLSILYL)IMIDAZOLE
SIT8187.5 N-(3-TRIETHOXYSILYLPROPYL)4,5-DIHYDROIMIDAZOLE
SIT8590.0 N-(TRIMETHYLSILYL)IMIDAZOLE

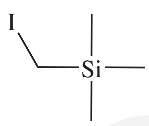
3-(2-IMIDAZOLIN-1-YL)PROPYLTRIETHOXYSILANE -
see SIT8187.5 N-(3-TRIETHOXYSILYLPROPYL)4,5-DIHYDROIMIDAZOLE

SII6400.0
(4-IODOBUTOXY)-t-BUTYLDIMETHYLSILANE
$C_{10}H_{23}IOSi$ — 314.28 — 75° / 0.5 — 1.214 — 1.480
Stabilized with copper
Alkylates acetylenes, allenes, ester enolates.[1,2]

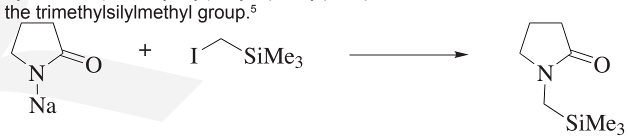


1. Hermitage, S. et al. *Tetrahedron Lett.* **1998**, *39*, 3567.
2. Schostarez, H. et al. *J. Org. Chem.* **1996**, *61*, 8701.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[92511-12-1] TSCA-L HMIS: 2-2-1-X 5g ¥16,200 25g ¥54,400

SII6450.0
IODOMETHYLTRIMETHYLSILANE
$C_4H_{11}ISi$ — 214.12 — 140-2° — 1.441 — 1.4910
Flashpoint: 31°C (88°F)

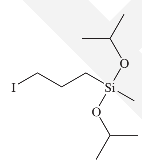


Review of synthetic utility.[1]
Employed in silyl-methylation of alkynes.[2]
Converts aldehydes, ketones, α,β-enones to silyl enol ethers.[3]
Intermediate for allylic silane synthon, 2-(trimethylsilyl)ethyltriphenylphosphonium iodide.[4]
Useful for the introduction of the trimethylsilylmethyl group.[5]

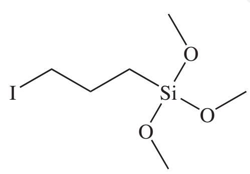


1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 323-336.
2. Schmid, R. et al. *J. Am. Chem. Soc.* **1980,** *102*, 5122.
3. Cazeau, P. et al. *Tetrahedron* **1987**, *43*, 2075, 2089.
4. Fleming, I. et al. *Synthesis* **1979**, 446.
5. Vedejs, E. *J. Org. Chem.* **1985**, *50*, 2170.
F&F: Vol. 14, p 89.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[4206-67-1] TSCA-L EC 224-123-6 HMIS: 2-3-0-X 10g ¥15,400 50g ¥51,200

SII6451.2
(3-IODOPROPYL)METHYLDIISOPROPOXYSILANE
$C_{10}H_{23}IO_2Si$ — 330.27 — 50-3° / 0.3 — 1.257 — 1.4623
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 10g ¥25,700

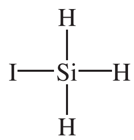


SII6452.0
3-IODOPROPYLTRIMETHOXYSILANE
$C_6H_{15}IO_3Si$ — 290.17 — 79-80° / 2 — 1.475 — 1.4714
Flashpoint: 78°C (172°F)



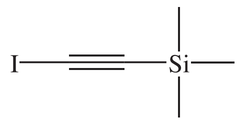
Couples zeolite monolayers to glass.[1]
1. Ha, K. et al. *Adv. Mater.* **2002,** *12(15)*, 1114.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[14867-28-8] TSCA-L HMIS: 3-2-1-X 10g ¥11,900 50g ¥37,400

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



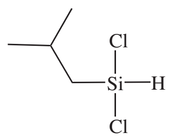
Reference Compound 6
IODOSILANE
H_3ISi 158.00 45-6° (-57°) 2.035
ΔHvap: 29.8 kJ/mole
Synthesis: Ward, L., *Inorg. Synth*., **1968**, *11*, 159.
Reference compound. Data is provided for investigators. Not offered for sale by Gelest.
[13598-42-0] HMIS: 4-4-2-X

IODOTRIMETHYLSILANE - see SIT8564.0 TRIMETHYLIODOSILANE

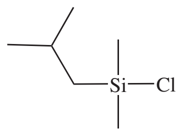


SII6452.2
1-IODO-2-(TRIMETHYLSILYL)ACETYLENE
C_5H_9ISi 224.11 130° 1.46 1.511
Light sensitive
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18163-47-8] HMIS: 2-3-1-X store <5°C 1.0g inquire

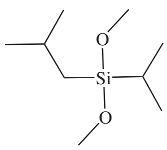
IRON SILICIDE - see SIF4910.0 FERROSILICON



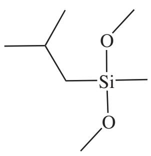
SII6452.3
ISOBUTYLDICHLOROSILANE
$C_4H_{10}Cl_2Si$ 157.11 120-5° 1.0295 1.427
Flashpoint: 10°C (50°F)
See also SIB1933.0, SIH6165.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18236-87-8] HMIS: 3-4-1-X 10g ¥26,300



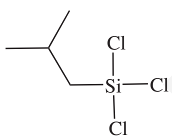
SII6452.5
ISOBUTYLDIMETHYLCHLOROSILANE
$C_6H_{15}ClSi$ 150.72 131-3° 0.863 1.4187^{25}
Flashpoint: 18°C (64°F)
See also SID4065.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[27490-70-6] EC 248-493-3 HMIS: 3-4-1-X 10g ¥11,900



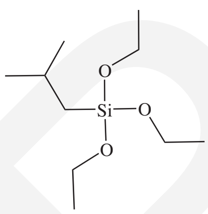
SII6452.6
ISOBUTYLISOPROPYLDIMETHOXYSILANE
$C_9H_{22}O_2Si$ 190.36 178° 0.867 1.4125
Viscosity: 1.2 cSt
Flashpoint: 50°C (122°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[111439-76-0] TSCA HMIS: 3-2-1-X 10g ¥17,800



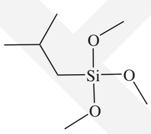
SII6452.8
ISOBUTYLMETHYLDIMETHOXYSILANE
$C_7H_{18}O_2Si$ 162.30 63° / 40 0.851 1.3962
Flashpoint: 38°C (100°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18293-82-8] EC 242-171-6 HMIS: 2-2-1-X 25g ¥18,600



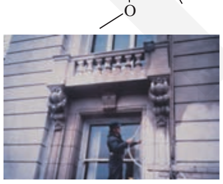
SII6453.0
ISOBUTYLTRICHLOROSILANE
$C_4H_9Cl_3Si$ 191.56 140° 1.162 1.4335
Flashpoint: 37°C (99°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18169-57-8] (既) 2-2041 TSCA EC 242-053-4 HMIS: 3-3-1-X 25g ¥6,600 100g ¥13,800



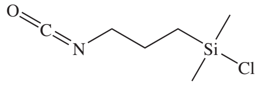
SII6453.5
ISOBUTYLTRIETHOXYSILANE, 98%
$C_{10}H_{24}O_3Si$ 220.38 190-1° 0.9104 1.3908
Flashpoint: 63°C (145°F)
TOXICITY: oral rat, LD50: >5,000 mg/kg
Hydrophobic surface treatment for microporous minerals
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17980-47-1] TSCA EC 402-810-3 HMIS: 2-2-1-X 25g ¥6,100 2kg ¥34,000 16kg ¥197,000
COMMERCIAL



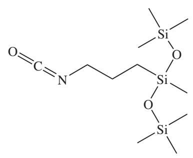
SII6453.7
ISOBUTYLTRIMETHOXYSILANE
TRIMETHOXYSILYL-2-METHYLPROPANE
$C_7H_{18}O_3Si$ 178.30 154° 0.933 1.3960
Viscosity: 0.8 cSt
Flashpoint: 42°C (108°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Branched structure provides hydrophobic surface treatments for architectural coatings
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18395-30-7] (既) 2-2052 TSCA EC 242-272-5 HMIS: 3-2-1-X 50g ¥6,400 2kg ¥37,800 17kg ¥190,000
COMMERCIAL



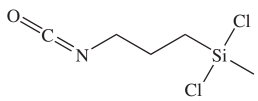
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



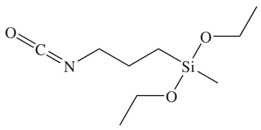
SII6454.0
3-ISOCYANATOPROPYLDIMETHYLCHLOROSILANE
$C_6H_{12}ClNOSi$ 177.71 62-6° / 0.6
Flashpoint: 70°C (158°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17070-70-1] TSCA EC 241-131-5 HMIS: 3-2-1-X 10g ¥35,300



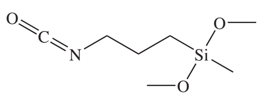
SII6454.3
3-(3-ISOCYANATOPROPYL)HEPTAMETHYLTRISILOXANE, 95%
$C_{11}H_{27}NO_3Si_3$ 305.59
Release additive for urethane prepolymer systems
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[165454-24-0] HMIS: 3-3-1-X 25g ¥28,900



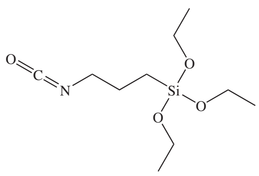
SII6454.4
3-ISOCYANATOPROPYLMETHYLDICHLOROSILANE
$C_5H_9Cl_2NOSi$ 198.12 50° / 0.3 1.1916
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 10g ¥46,900



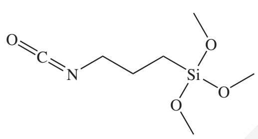
SII6454.45
3-ISOCYANATOPROPYLMETHYLDIETHOXYSILANE, 95%
$C_9H_{19}NO_3Si$ 217.34 110-5° / 10
Reacts rapidly with amine and hydroxyl functional species that can hydrolyze to form siloxane polymers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[33491-28-0] HMIS: 3-2-1-X 10g ¥28,400



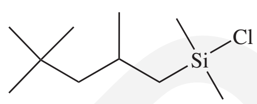
SII6454.5
3-ISOCYANATOPROPYLMETHYLDIMETHOXYSILANE, tech-95
$C_7H_{15}NO_3Si$ 189.29 61° / 1 1.03
Contains isomers
See also SID6454.45
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 10g ¥32,600



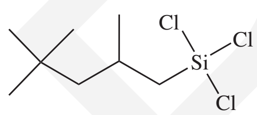
SII6455.0 *COMMERCIAL*
3-ISOCYANATOPROPYLTRIETHOXYSILANE, 95%
$C_{10}H_{21}NO_4Si$ 247.37 130° / 20 0.990 1.4190
Flashpoint: 80°C (176°F)
Component in hybrid organic/inorganic urethanes.[1]
1. Cuney, S. et al. *Better Ceramics Through Chemistry VII (MRS. Symp. Proc.)* **1996,** *435*, 143.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[24801-88-5] (既) 2-3880 TSCA EC 246-467-6 HMIS: 3-2-1-X 25g ¥5,000 100g ¥13,000 2kg ¥95,000



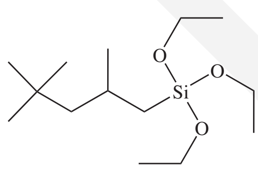
SII6456.0 *COMMERCIAL*
3-ISOCYANOTOPROPYLTRIMETHOXYSILANE, 95%
$C_7H_{15}NO_4Si$ 205.29 95-8° / 10 1.073 1.4219
Viscosity: 1.4 cSt
Flashpoint: 108°C (226°F)
TOXICITY: oral rat, LD50: 878 mg/kg
Autoignition temperature: 265˚C
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[15396-00-6] (既) 2-3887 TSCA EC 239-415-9 HMIS: 3-2-1-X 25g ¥10,900 100g ¥27,600 2kg ¥134,000



SII6456.6
ISOOCTYLDIMETHYLCHLOROSILANE
$C_{10}H_{23}ClSi$ 206.83 83-5° / 10 0.852
See also SID4065.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[79957-95-2] EC 279-358-7 HMIS: 3-3-1-X 25g ¥22,500

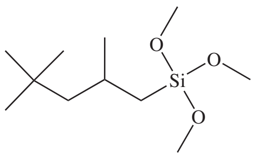


SII6457.0
ISOOCTYLTRICHLOROSILANE
1-TRICHLOROSILYL-2,4,4-TRIMETHYLPENTANE
$C_8H_{17}Cl_3Si$ 247.67 117° / 50 1.0684 1.4510
Contact angle, water on treated silica surface: 105˚
Flashpoint: 85°C (185°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18379-25-4] (既) 2-2041 TSCA EC 242-262-0 HMIS: 3-2-1-X 25g ¥10,300 100g ¥25,700

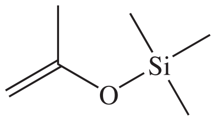


SII6457.5 *COMMERCIAL*
ISOOCTYLTRIETHOXYSILANE
$C_{14}H_{32}O_3Si$ 276.48 236° (<-80°) 0.880 1.4160
Viscosity: 2.1 cSt
Vapor pressure, 112°: 10mm
Flashpoint: >65°C (>150°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Autoignition temperature: 265˚C
Architectural water-repellent
Water scavenger for sealed lubricant systems
See also SII6458.0, SIO6715.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[35435-21-3] TSCA EC 252-558-1 HMIS: 1-2-1-X 50g ¥6,600 2kg ¥48,000 15kg ¥164,000

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

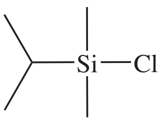


SII6458.0
ISOOCTYLTRIMETHOXYSILANE
$C_{11}H_{26}O_3Si$ | 234.41 | 90° / 10 | | 0.887 | 1.4176
Viscosity: 2 cSt. | Flashpoint: 52°C (126°F)
Autoignition temperature: 310°C
Component in Anti-Graffiti coatings
See also SII6457.5, SIO6715.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[34396-03-7] TSCA EC 251-995-5 HMIS: 3-2-1-X 25g ¥6,600 100g ¥13,800 2kg ¥72,000
COMMERCIAL

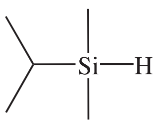


SII6460.0
ISOPROPENOXYTRIMETHYLSILANE, 95%
2-(TRIMETHYLSILOXY)PROPENE
$C_6H_{14}OSi$ | 130.26 | 94-5° | | 0.786 | 1.3960^{26}
Contains hexamethyldisiloxane | Flashpoint: -1°C (30°F)
Reagent for synthesis of cyclic-acetone ketals.[1]
This and other enol silyl ethers add enantioselectively to imines.[2]
1. Larson, G. et al. *J. Org. Chem.* **1973,** *38*, 3935.
2. Fuji, A. et al. *J. Am. Chem. Soc.* **1999**, *121*, 5450.
See also SIC2552.0, SIV9089.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1833-53-0] (既) 2-2960 TSCA EC 217-393-1 HMIS: 2-4-1-X 5g ¥25,700

ISOPROPENYLTRIMETHYLSILANE - see SIP6905.0 2-PROPENYLTRIMETHYLSILANE

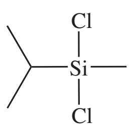


SII6462.0
ISOPROPYLDIMETHYLCHLOROSILANE
$C_5H_{13}ClSi$ | 136.69 | 114° | | 0.873 | 1.4138
Flashpoint: 15°C (59°F)
See also SID4065.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[3634-56-8] (既) 2-2041 TSCA HMIS: 3-4-1-X 25g ¥20,400 100g ¥58,600

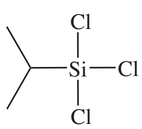


SII6463.1
ISOPROPYLDIMETHYLSILANE
$C_5H_{14}Si$ | 102.25 | 67-8° | | 0.725 | 1.391
Flashpoint: -30°C (-22°F)
Sterically-hindered reducing agent
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18209-61-5] TSCA HMIS: 3-4-1-X 10g ¥28,900

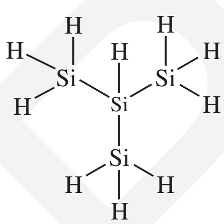
4,4'-ISOPROPYLIDENEBIS(TRIMETHYLSILOXYPHENOL) - see SIB1853.5 BIS(TRIMETHYLSILYL)BISPHENOL A



SII6463.0
ISOPROPYLMETHYLDICHLOROSILANE
$C_4H_{10}Cl_2Si$ | 157.11 | 116-7° | | 1.033^{25} | 1.4250
Flashpoint: 14°C (57°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18236-89-0] (既) 2-2041 HMIS: 3-4-1-X 10g ¥19,900



SII6463.3
ISOPROPYLTRICHLOROSILANE
$C_3H_7Cl_3Si$ | 177.53 | 123° | (-88°) | 1.195 | 1.4319
Flashpoint: 32°C (90°F)
See also SII6453.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4170-46-1] HMIS: 3-4-1-X 10g ¥38,500



SII6463.4
ISOTETRASILANE
(TRISILYL)SILANE
$H_{10}Si_4$ | 122.42 | 101° | (-99°) | 0.793 | 1.5449
PYROPHORIC
AIR TRANSPORT FORBIDDEN
ΔHvap: 32.5 kJ/mole
Precursor for low temp. epitaxy of doped crystalline silicon.[1]
Employed in low temperature CVD of amorphous silicon.[2]
1. Francis, T. et al. US Pat. Appl. 20120003819, 2012.
2. Kanoh, H. et al. *Jpn. J. Appl. Phys.* **1993**, *32*, 2613.
HYDROLYTIC SENSITIVITY: 10: reacts extremely rapidly with moisture and oxygen - pyrophoric - sealed system required
[13597-87-0] TSCA-L HMIS: 3-4-3-X 5g inquire
** includes z-CYL-HPS-0050*

ISOTHIOCYANATOTRIMETHYLSILANE - see SIT8592.0 TRIMETHYLSILYLISOTHIOCYANATE

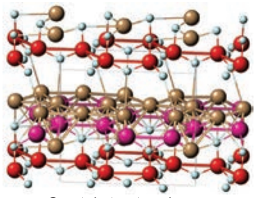
ITACONIC ACID DERVATIVE - see SIB1860.0 BIS(TRIMETHYLSILYL)ITACONATE

$Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$

SIK6463.5
KAOLIN, calcined
ALUMINUM SILICATE
$Al_2O_7Si_2 \cdot 2H_2O$ | 258.16 | | | 2.63 | 1.62
Particle size: 1-1.5 µm | Mohs Hardness: 2-2.5
Typical bulk density, not compacted: 0.17 g/cm³ | γc: 44
Surface tension: 44 mN/m
See also SIH5840.15, SIK6463.6, SIK6463.8
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[1332-58-7] TSCA-E EC 310-194-1 HMIS: 1-0-0-X 500g ¥7,700 3kg ¥26,000

SILICON COMPOUNDS

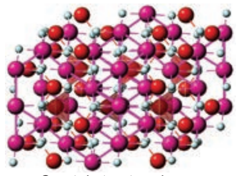
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



Crystal structure image courtesy of webmineral.com

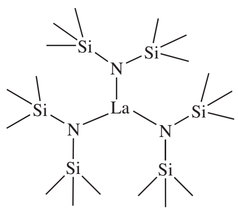
SIK6463.6
KAOLIN, uncalcined
KAOLINITE
$Al_2Si_2O_5(OH)_4$ — Mw 258.16 — D_4^{20} 2.6 — n_D^{20} 1.56
Particle Size: <24 µm — Mohs Hardness: 1.5-2.0
Typical bulk density, not compacted: 0.28 g/cm³ — Triclinic pedial
White, hexagonal platelets, micron and nano sized, transparent to translucent
Widely used as coating pigment in plastics, rubber, inks, adhesives & sealants, refractories, ceramics
See also SIH5840.15, SIK6463.5
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1332-58-7] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 5kg ¥37,000

KARSTEDT'S CATALYSTS - see SIP6830.3, SIP6831.2, SIP6832.2

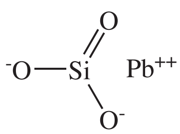


Crystal structure image courtesy of webmineral.com

SIK6463.8
KYANITE
Al_2SiO_5 — Mw 162.05 — D_4^{20} 3.61 — n_D^{20} 1.71
Particle Size: <44 µm — Mohs Hardness: 5.0-7.0
Triclinic pinacoidal
White, long bladed crystals
Alumina & silica source, used in advanced ceramics, refractories
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1302-76-7] TSCA-E HMIS: 1-0-0-X 500g ¥25,800



SIL6464.0
LANTHANUM TRIS(HEXAMETHYLDISILAZIDE)
$C_{18}H_{54}LaN_3Si_6$ — Mw 620.07 — bp 100-2° / 10^{-4} sub. — (145-9°)
Catalyst for Tischenko reaction.[1]
Employed in CVD of lanthanum silicate.[2]
1. Bebenbach, H. et al. *Angew. Chem., Int. Ed. Engl.* **1998,** *37*, 1569.
2. Aspinal, H. C. et al. *Chem. Vap. Deposition* **2003**, *9,* 7.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[35788-99-9] HMIS: 2-1-1-X 5g ¥77,700

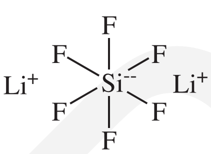


PBL6300
LEAD MONOSILICATE
O_3PbSi 劇物 — Mw 283.28 — (700-730°) — D_4^{20} 6.5 — n_D^{20} 2.01
Equivalent composition: 85% PbO, 15% SiO_2 — Soluble: dil HCl
Typical bulk density, not compacted: 1.69 g/cm³
Coefficient of thermal expansion: 9.3 x 10^{-6}
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[10099-76-0] (既) 1-534 TSCA EC 233-246-4 HMIS: 2-0-0-X 250g ¥12,500

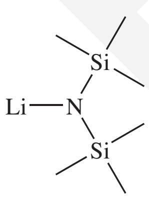
Crystal structure image courtesy of webmineral.com

SIL6465.0
LEPIDOLITE
$K(LiAl)_3(Si,Al)_4O_{10}(F,OH)_2$ — Mw 388.30 — D_4^{20} 2.84 — n_D^{20} 1.53
Particle Size: <74 µm — Mohs Hardness: 2.0-3.0
Monoclinic
White, tubular crystals, cleavable masse,
Source of lithium (3-4%) for glass, ceramics, batteries, lubricants
See also SIS6988.5
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[7439-93-2] TSCA-E HMIS: 1-0-0-X 500g ¥10,900 10kg ¥58,000

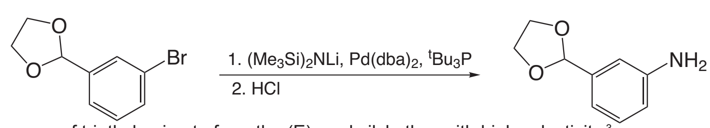
LITHIUM ALUMINUM SILICATE, see - SIS6988.5 SPODUMENE



SIL6466.5
LITHIUM HEXAFLUOROSILICATE, dihydrate
$F_6Li_2Si\cdot 2H_2O$ 劇物 — Mw 155.96 / 191.99 — (100° dehydrates) — D_4^{20} 2.330
Soluble: water, methanol
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[17347-95-4] (既) 1-327 TSCA EC 241-372-6 HMIS: 3-0-0-X 10g ¥20,400

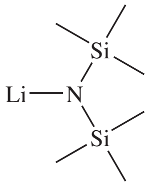


SIL6467.0
LITHIUM HEXAMETHYLDISILAZIDE, 95%
LITHIUM BIS(TRIMETHYLSILYL)AMIDE
$C_6H_{18}LiNSi_2$ — Mw 167.33 — bp 114-6° / 1 — (71-2°)
Sterically-hindered strong base
Degrades slowly at room temperature - solutions exhibit enhanced stability
Review of synthetic utility.[1]
Converts aryl halides to anilines.[2]

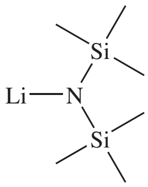


Reacts with ketones and esters in the presence of triethylamine to form the (E)-enol silyl ether with high selectivity.[3]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 356-367.
2. Lee, S. et al. *Org. Lett.* **2001,** *3*, 2729.
3. Godenschwager, P. F.; Collum, D. B. *J. Am. Chem. Soc.* **2008**, *130*, 8726.
F&F: Vol. 4, p 296; Vol. 5, p 393; Vol. 7, p 197; Vol. 12, p 280; Vol. 13, p 165, p 188, p 257; Vol. 14, p 194; Vol. 15, p 207; Vol. 16, p 16, p 357; Vol. 17, p 33; Vol. 21, p 251.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4039-32-1] TSCA EC 223-725-6 HMIS: 3-3-1-X store <5°C 25g ¥11,400 100g ¥29,400

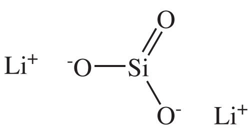
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



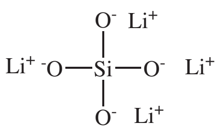
SIL6467.2
LITHIUM HEXAMETHYLDISILAZIDE, 0.85M in hexane
$C_6H_{18}LiNSi_2$ — 167.33 — 0.716
19 - 21 wgt % — Flashpoint: -23°C (-9°F)
Review of synthetic utility.[1]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 356-367.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4039-32-1] TSCA EC 223-725-6 HMIS: 3-4-1-X 100g ¥8,300 2.5kg ¥95,000
COMMERCIAL



SIL6467.4
LITHIUM HEXAMETHYLDISILAZIDE, 1.25M in tetrahydrofuran
$C_6H_{18}LiNSi_2$ — 167.33 — 0.90
23-25 wgt % — Flashpoint: -14°C (7°F)
Review of synthetic utility.[1]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 356-367.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4039-32-1] TSCA EC 223-725-6 HMIS: 3-4-1-X 100g ¥13,500 2kg ¥62,000
COMMERCIAL



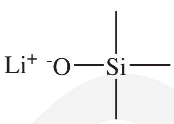
SIL6469.0
LITHIUM METASILICATE
Li_2O_3Si — 89.89 — (1,204°) — 2.52
Solubility in water, 70°: 0.6 g/l
Bulk density: 0.8-0.9 g/cc
See also SIL6469.5
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[10102-24-6] TSCA EC 233-270-5 HMIS: 1-0-0-X 500g ¥26,800



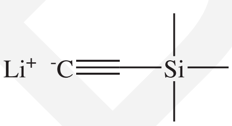
SIL6469.2
LITHIUM ORTHOSILICATE, tech-95
Li_4O_4Si — 119.85 — 2.326
Potential for use as an electrolyte-electrode material.[1]
1. Chang, C. C. *Materials & Design* **2001,** *22*, 617.
HYDROLYTIC SENSITIVITY: 6: forms irreversible hydrate
[13453-84-4] EC 236-634-1 HMIS: 3-1-1-X 25g ¥67,100

SIL6469.5
LITHIUM POLYSILICATE, 20% in water
$Li_2O_{11}Si_5$ — 330.30 — 1.160
pH: 11-12 — TOXICITY: oral rat; LD50: 16,540 mg/kg
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[12627-14-4] TSCA EC 235-730-0 HMIS: 2-0-0-X 100g ¥6,100 1kg ¥12,300 20kg ¥123,000
COMMERCIAL

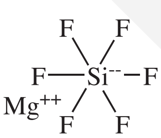
SIL6469.6
LITHIUM SILICIDE
LITHIUM-SILICON ALLOY
$Li_{6\text{-}7}Si_2$ — 97.8 - 104.7
44% Li; -60 - +200 mesh powder
HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required
[68848-64-6] HMIS: 3-3-2-X 25g ¥51,200



SIL6469.7
LITHIUM TRIMETHYLSILANOLATE
C_3H_9LiOSi — 96.13
Employed in light emitting electrochemical cells (LECs)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2004-14-0] HMIS: 3-2-1-X 10g ¥22,500



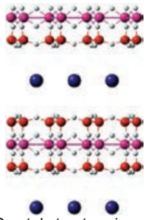
SIL6470.0
LITHIUM (TRIMETHYLSILYL)ACETYLIDE, 0.5M in tetrahydrofuran
C_5H_9LiSi — 104.15 — 0.829
12-13 wgt % — Flashpoint: -14°C (7°F)
Forms conductive anisotropic films on reaction with halotriazines.[1]
Intermediate for synthesis of alkylgalliumacetylides.[2]
1. Kouvetakis, J. *Chem. Mater.* **1994,** *6*, 636.
2. Lee, K. et al. *J. Organomet. Chem.* **1993,** *449*, 53.
See also SIT8594.1
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[54655-07-1] HMIS: 3-4-1-X 25g ¥13,000 100g ¥34,500



SIM6470.5
MAGNESIUM HEXAFLUOROSILICATE
$F_6MgSi{\cdot}6H_2O$ 劇物 — 166.39 / 274.48 — >120 dec. — 1.788
Solubility in water: 1.07 g/l — TOXICITY: oral rat, LD50: 200 mg/kg
Employed in pressure treatment of wood, moth treatment for textiles
See also SIA0705.0
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[16949-65-8] (既) 1-329 TSCA EC 241-022-2 HMIS: 3-0-0-X 500g ¥10,400 10kg ¥81,000

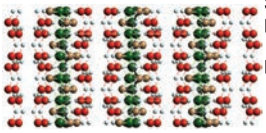
Gelest

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



Crystal structure image courtesy of webmineral.com

SIM6470.7
MAGNESIUM MONTMORILLONATE
SAPONITE
$Ca_{0.1}Na_{0.1}Mg_{2.25}Fe_{0.75}Si_3AlO_{10}(OH)_2 \cdot 4H_2O$ — Mw 480.19 — D_4^{20} 2.3 — n_D^{20} 1.48
Particle Size: <24 µm
Mohs Hardness: 1.5-2.0
Monoclinic prismatic
White, fine-grained, translucent
Moderate cation exchange capacity, translucent
Silane modifications more hydrolytically stable than Bentonite; may be exfoliated
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1319-41-1] TSCA-E EC 215-289-0 HMIS: 1-0-0-X 500g ¥9,600 10kg ¥48,000

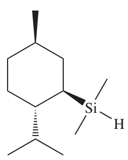


Crystal structure image courtesy of webmineral.com

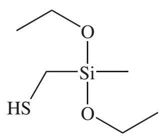
SIM6471.0
MAGNESIUM SILICATE, hydrous
TALC
$Mg_3O_{10}(OH)_2Si_4$ — Mw 379.28 — mp (1,557° dec.) — D_4^{20} 2.75 — n_D^{20} 1.54-1.59
Median particle size: 3-6 µm
Mohs Hardness: 1.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[13376-74-4] TSCA-E HMIS: 1-0-0-X 2.5kg ¥17,700 10kg ¥54,000

Mg_2Si

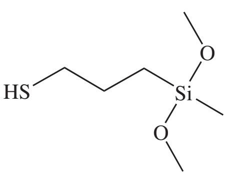
SIM6472.0
MAGNESIUM SILICIDE, powder
Mg_2Si — Mw 76.71 — mp (1,102°) — D_4^{20} 1.94
Specific heat: 836.8 J/kg/°
Thermal conductivity: 7.91 W/m ˚C
Source for disilane, higher silanes.[1]
1. Arkles, B. *Kirk-Othmer Encyclopedia of Chemical Technology;* 1997; 22, p38.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[22831-39-6] TSCA EC 245-254-5 HMIS: 1-3-1-X 25g ¥19,400



SIM6472.7
(-)-MENTHYLDIMETHYLSILANE
$C_{12}H_{26}Si$ — Mw 198.42 — bp 83° / 0.5 — D_4^{20} 0.829 — n_D^{20} 1.5482
Optically active reducing agent
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
HMIS: 3-2-1-X 5g ¥48,500

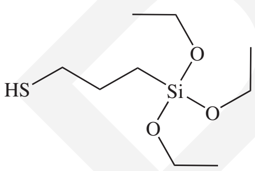


SIM6473.0
(MERCAPTOMETHYL)METHYLDIETHOXYSILANE, 95%
$C_6H_{16}O_2SSi$ — Mw 180.34 — bp 60° / 10 — D_4^{20} 0.975 — n_D^{20} 1.4446
Flashpoint: 58°C (136°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[55161-63-2] HMIS: 3-2-1-X 10g ¥27,300



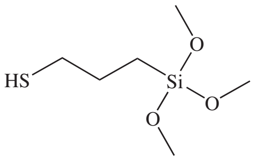
SIM6474.0
3-MERCAPTOPROPYLMETHYLDIMETHOXYSILANE, 96%
$C_6H_{16}O_2SSi$ — Mw 180.34 — bp 96° / 30 — D_4^{20} 1.000 — n_D^{20} 1.4502
Flashpoint: 93°C (199°F)
Intermediate for silicones in thiol-ene UV-cure systems
Adhesion promoter for polysulfide sealants
Used to make thiol-organosilica nanoparticles.[1]
1. Nakamura, M.; Ishimura, K. *Langmuir* **2008**, *24*, 5099.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[31001-77-1] (既) 2-3498 TSCA EC 250-426-8 HMIS: 3-2-1-X 100g ¥9,800 2kg ¥108,000 18kg ¥520,000

COMMERCIAL



SIM6475.0
3-MERCAPTOPROPYLTRIETHOXYSILANE, 95%
$C_9H_{22}O_3SSi$ — Mw 238.42 — bp 210° — D_4^{20} 0.9325 — n_D^{20} 1.4331
Flashpoint: 88°C (190°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
For blocked version see SIO6704.0
Used to make thiol-organosilica nanoparticles.[1]
1. Nakamura, M.; Ishimura, K. *Langmuir* **2008**, *24*, 5099.
See also SIO6704.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[14814-09-6] (既) 2-2045 TSCA EC 238-883-1 HMIS: 2-2-1-X 25g ¥12,700 100g ¥33,700

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



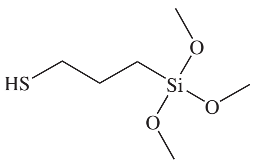
Adhesion promoter for structural polysulfide glass sealants

SIM6476.0 サイラエース **S810**
3-MERCAPTOPROPYLTRIMETHOXYSILANE
$C_6H_{16}O_3SSi$ 196.34 93° / 40 1.051^{25} 1.4502^{25}
Viscosity: 2 cSt
γc of treated surfaces: 41 mN/m
Specific wetting surface: 348 m²/g
Flashpoint: 96°C (205°F)
TOXICITY: oral rat, LD50: 2,380 mg/kg
Primary irritation index: 0.19
Coupling agent for EPDM and mechanical rubber applications
Adhesion promoter for polysulfide adhesives
For enzyme immobilization.[1]
Treatment of mesoporous silica yields highly efficient heavy metal scavenger.[2]
Couples fluorescent biological tags to semiconductor CdS nanoparticles.[3]
Modified mesoporous silica supports Pd in coupling reactions.[4]
Used to make thiol-organosilica nanoparticles.[5]
Forms modified glass and silica surfaces suitable for SILAR fabrication of CdS thin films.[6]

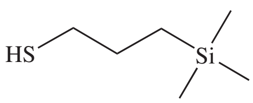
1. Stjernlöf, P. et al. *Tetrahedron Lett.* **1990,** *31*, 5773.
2. Liu, J. et al. *Science* **1997,** *276*, 923.
3. Bruchez, M. et al. *Science* **1998,** *281*, 2013.
4. Crudden, C. et al. *J. Am. Chem. Soc.* **2005,** *127*, 10045.
5. Nakamura, M.; Ishimura, K. *Langmuir* **2008**, *24*, 5099.
6. Sun, H. et al. *J. Dispersion Sci. Technol.* **2005,** *26*, 719.

See also SID3545.0, SIM6476.1, SIM6475.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4420-74-0] (既) 2-2045 TSCA EC 224-588-5 HMIS: 3-2-1-X
サイラエース S810 100g inquire | 100g ¥4,900 | 2kg inquire | 1kg ¥9,300 | 18kg inquire

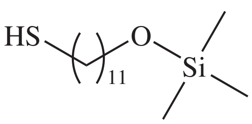
COMMERCIAL



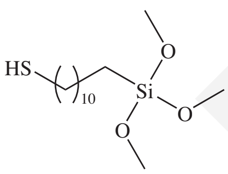
SIM6476.1
3-MERCAPTOPROPYLTRIMETHOXYSILANE, 99+%
$C_6H_{16}O_3SSi$ 196.34 93° / 40 1.051^{25} 1.4502^{25}
Flashpoint: 96°C (205°F)
Low fluorescence grade for high-throughput screening
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4420-74-0] (既) 2-2045 TSCA EC 224-588-5 HMIS: 3-2-1-X 25g ¥27,800*
** in fluoropolymer bottle*



SIM6479.0
3-MERCAPTOPROPYLTRIMETHYLSILANE
$C_6H_{16}SSi$ 148.34 97° / 30 0.8496 1.4539
Forms self-assembled monolayers on gold
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[13399-93-4] HMIS: 3-3-0-X 5g ¥42,700



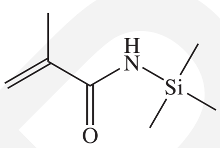
SIM6479.3
11-MERCAPTOUNDECYLOXYTRIMETHYLSILANE
$C_{14}H_{32}OSSi$ 276.55
Forms SAMs with "detachable mushroom heads"
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[394210-97-0] HMIS: 2-2-1-X 1.0g ¥26,000



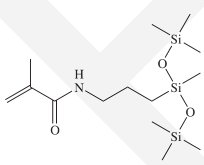
SIM6480.0
11-MERCAPTOUNDECYLTRIMETHOXYSILANE, 95%
$C_{14}H_{32}O_3SSi$ 308.55 150° / 0.5 0.955
Stabilizes ionic liquid drop micro-reactors.[1]

1. Zhang, X. et al. *J. Nanotechnol.* **2012**, *3*, 33.

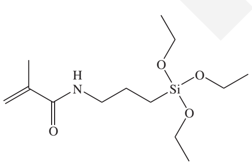
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[877593-17-4] HMIS: 3-2-1-X 2.5g ¥52,200



SIM6480.6
METHACRYLAMIDOTRIMETHYLSILANE, tech-95
TRIMETHYLSILYLMETHACRYLAMIDE
$C_7H_{15}NOSi$ 157.28 60° / 0.5 (65-8°)
Contains N, O tautomers
Readily polymerized in non-polar media; may be deblocked to form hydrophilic polymers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18295-89-1] HMIS: 2-2-1-X store <5°C 10g ¥17,200 50g ¥58,600



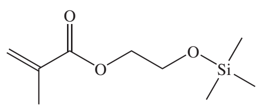
SIM6480.7
(3-METHACRYLAMIDOPROPYL)BIS(TRIMETHYLSILOXY)METHYLSILANE
$C_{14}H_{33}NO_3Si_3$ 347.68
Inhibited with BHT
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
HMIS: 2-2-0-X store <5°C 25g ¥61,800



SIM6480.73
(3-METHACRYLAMIDOPROPYL)TRIETHOXYSILANE, tech-95
$C_{13}H_{27}NO_4Si$ 289.44 1.02^{25}
Contains 3-methacrylamidopropyldiethoxymethoxysilane
Flashpoint: >110°C (>230°F)
Hydrophilic coupling agent
Intermediate for contact lens monomers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[109213-85-6] HMIS: 2-2-1-X store <5°C 25g ¥33,200

SILICON COMPOUNDS

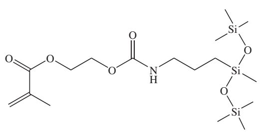
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIM6481.0
METHACRYLOXYETHOXYTRIMETHYLSILANE
2-(TRIMETHYSILOXY)ETHYL METHACRYLATE

$C_9H_{18}O_3Si$	202.32	65° / 0.9		0.928	1.4280

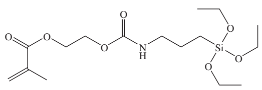
Inhibited with MEHQ — Flashpoint: 76°C (169°F)
Forms copolymers with methyl methacrylate, butyl methacrylate, etc.
Group transfer polymerization yields polymers suitable for contact lenses.[1]
Monomer for synthesis of hydroxyethyl functional methacrylates.[2]
Undergoes anionic polymerization.[3]
1. Seidner, L. et al. U.S. Patent 5,244,981, 1993.
2. Hirao, A. et al. *Macromol.* **1986,** *19*, 1294.
3. Nagasaki, Y. et al. *Polym. Prepr.* **1997,** *38*, 514.
See also SIM6485.9
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17407-09-9] EC 241-432-1 HMIS: 3-2-1-X store <5°C 25g ¥12,500 100g ¥32,600



SIM6481.05
O-(METHACRYLOXYETHYL)-3-[BIS(TRIMETHYLSILOXY)METHYLSILYL]PROPYLCARBAMATE, tech-95

$C_{17}H_{37}NO_6Si_3$	435.74			1.008	1.4453

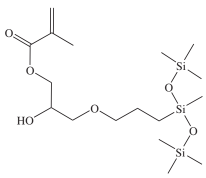
Hydrophilic monomer candidate for contact lens applications
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
HMIS: 2-2-0-X store <5°C 25g ¥104,200



SIM6480.8
O-(METHACRYLOXYETHYL)-N-(TRIETHOXYSILYLPROPYL)CARBAMATE, 90%

$C_{16}H_{31}NO_7Si$	377.51			1.051^{25}	1.446^{25}

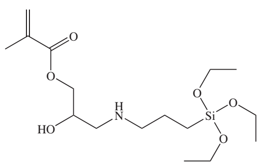
Inhibited with MEHQ
Hydrophilic monomer
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[115396-93-5] HMIS: 3-2-1-X store <5°C 25g ¥15,600 100g ¥43,200



SIM6481.15
3-(3-METHACRYLOXY-2-HYDROXYPROPOXY)PROPYLBIS(TRIMETHYLSILOXY)METHYLSILANE, tech-95
SIGMA

$C_{17}H_{38}O_6Si_3$	422.74				

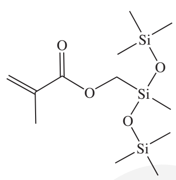
Inhibited with MEHQ — Flashpoint: 180°C (356°F)
Contact lens monomer
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[69861-02-5] HMIS: 2-2-0-X store <5°C 25g ¥38,500



SIM6481.1
N-(3-METHACRYLOXY-2-HYDROXYPROPYL)-3-AMINOPROPYLTRIETHOXYSILANE, 50% in ethanol

$C_{16}H_{33}NO_6Si$	363.53			0.910	1.4084

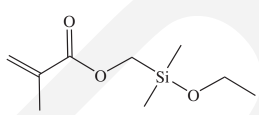
Inhibited with MEHQ — Flashpoint: 11°C (52°F)
Employed in conservation/consolidation of stone.[1]
1. Wheeler, G. In *Ninth Int'l Cong. On Deterioration and Conservation of Stone;* Fassina, Ed.; Elsevier: 2000; Vol. 2, 541.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[96132-98-8] HMIS: 3-4-1-X store <5°C 25g ¥17,200 100g ¥48,300



SIM6481.2
(METHACRYLOXYMETHYL)BIS(TRIMETHYLSILOXY)METHYLSILANE, 95%
METHACRYLOXYMETHYLHEPTAMETHYLTRISILOXANE

$C_{12}H_{28}O_4Si_3$	320.60	90-1° / 2		0.917	1.4150

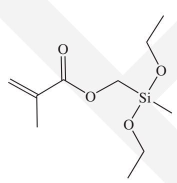
Inhibited with MEHQ
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18166-40-0] HMIS: 3-2-0-X store <5°C 25g ¥28,900



SIM6481.3
(METHACRYLOXYMETHYL)DIMETHYLETHOXYSILANE

$C_9H_{18}O_3Si$	202.32	62-3° / 0.3		0.9447	1.4282^{25}

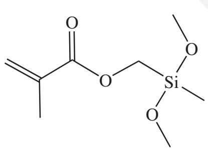
Inhibited with MEHQ
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5577-70-8] HMIS: 3-2-1-X store <5°C 50g ¥55,400



SIM6481.43
(METHACRYLOXYMETHYL)METHYLDIETHOXYSILANE

$C_{10}H_{20}O_4Si$	232.35	221°		0.977	

Inhibited with MEHQ — Flashpoint: 88°C (190°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[121177-93-3] TSCA HMIS: 2-2-1-X store <5°C 25g ¥14,600

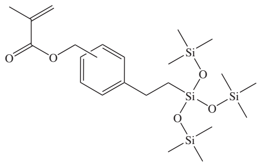


SIM6481.46
(METHACRYLOXYMETHYL)METHYLDIMETHOXYSILANE

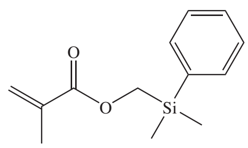
$C_8H_{16}O_4Si$	204.30	205°		1.020	1.4274

Inhibited with MEHQ — Flashpoint: 82°C (180°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Autoignition temperature: 300˚C
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3978-58-3] HMIS: 3-2-1-X store <5°C 25g ¥11,900 100g ¥31,000

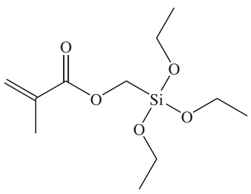
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



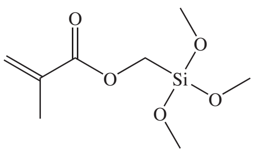
SIM6481.48
METHACRYLOXYMETHYLPHENETHYLTRIS(TRIMETHYLSILOXY)SILANE, mixed isomers
$C_{22}H_{42}O_5Si_4$ — 498.91 — 160-180° / 0.2 — 0.954 — 1.454
Inhibited with MEHQ
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[108587-59-3]/[108587-60-6] HMIS: 2-2-0-X store <5°C 25g ¥46,900



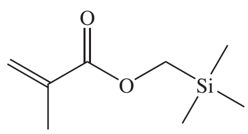
SIM6481.5
(METHACRYLOXYMETHYL)PHENYLDIMETHYLSILANE
(PHENYLDIMETHYLSILYL)METHYL METHACRYLATE
$C_{13}H_{18}O_2Si$ — 234.37 — 106-7° / 1 — 1.003 — 1.5068
Inhibited with MEHQ — Flashpoint: 105°C (221°F)
High refractive index silane monomer
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18052-92-1] TSCA HMIS: 3-1-0-X store <5°C 25g ¥32,600



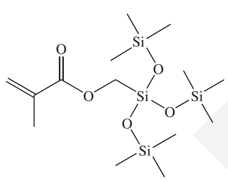
SIM6482.0
METHACRYLOXYMETHYLTRIETHOXYSILANE
$C_{11}H_{22}O_5Si$ — 262.38 — 65-8° / 2 — 1.000 — 1.4225
Inhibited with MEHQ — Flashpoint: 100°C (212°F)
Treatment of fumed silica in acrylic casting compositions accelerates polymerization.[1]
1. Morozova, E. et al. *Chem. Abstr.* 95,98753g; *Plast. Massy* **1981,** 7.
See also SIM6483.0, SIM6487.3
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5577-72-0] TSCA HMIS: 3-2-1-X store <5°C 10g ¥15,600 50g ¥52,200



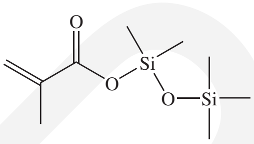
SIM6483.0
METHACRYLOXYMETHYLTRIMETHOXYSILANE
$C_8H_{16}O_5Si$ — 220.30 — 48-50° / 2 — (-44°) — 1.070 — 1.4271
Inhibited with MEHQ — Flashpoint: 92°C (198°F)
Viscosity: 1.5 cSt — TOXICITY: oral rat, LD50: >2,000 mg/kg
Hydrolysis rate > 10 X SIM6487.4 — Autoignition temperature: 285°C
Modification of novolac resin affords bilevel resists having attributes of trilevel resists.[1]
1. Reichmanis, E.; Smolinsky, G. U.S. Patent 4,481,049, 1984.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[54586-78-6] TSCA HMIS: 3-2-1-X store <5°C 10g ¥7,200 50g ¥18,300 2kg ¥206,000



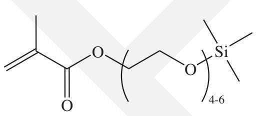
SIM6485.6
METHACRYLOXYMETHYLTRIMETHYLSILANE
$C_8H_{16}O_2Si$ — 172.30 — 98° / 75 — 0.883^{25} — 1.4282^{25}
Inhibited with MEHQ — Flashpoint: 45°C (113°F)
Polymerizeable monomer
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18269-97-1] HMIS: 3-2-0-X store <5°C 10g ¥14,600 50g ¥48,000



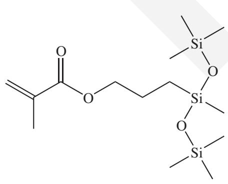
SIM6485.8
METHACRYLOXYMETHYLTRIS(TRIMETHYLSILOXY)SILANE, tech-95
$C_{14}H_{34}O_5Si_4$ — 394.75 — 130-5° / 1 — 0.926 — 1.4150^{22}
Inhibited with MEHQ
Oxygen permeable monomer
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[74681-63-3] HMIS: 3-2-0-X store <5°C 10g ¥13,800 50g ¥44,800



SIM6486.14
METHACRYLOXYPENTAMETHYLDISILOXANE
PENTAMETHYLDISILOXANYL METHACRYLATE
$C_9H_{20}O_3Si_2$ — 232.43 — 45° / 1 — 0.925
Inhibited with MEHQ
Forms oxygen-permeable, wettable contact lenses.[1]
1. Powell, J. U.S. Patent 4,581,184, 1986.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4880-04-0] HMIS: 3-3-1-X store <5°C 25g ¥35,300 100g ¥106,900

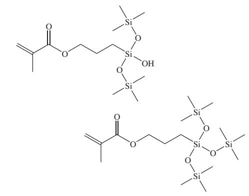


SIM6485.9
O-METHACRYLOXY(POLYETHYLENEOXY)TRIMETHYLSILANE, 95%
$C_{15}H_{30}O_6Si$, $C_{17}H_{34}O_7Si$, $C_{19}H_{38}O_8Si$ — 335 - 425 — 1.022
Average of 4-6 -(OCH_2CH_2)- units
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-3-1-X store <5°C 100g ¥28,900

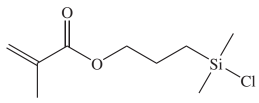


SIM6486.0
3-METHACRYLOXYPROPYLBIS(TRIMETHYLSILOXY)METHYLSILANE, 95%
$C_{14}H_{32}O_4Si_3$ — 348.66 — 83-5° / 1.5 — 0.912
Inhibited with MEHQ — Flashpoint: 147°C (297°F)
Employed in silicone-modified hydroxyl contact lenses.[1]
1. Van der Laan, D. et al. EP 940693 A2, 1999.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[19309-90-1] TSCA EC 242-954-2 HMIS: 3-1-0-X store <5°C 10g ¥17,800

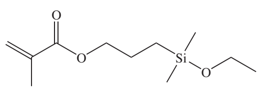
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



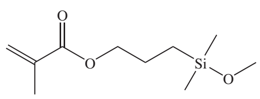
SIM6486.1
METHACRYLOXYPROPYLBIS(TRIMETHYLSILOXY)SILANOL-METHACRYLOXYPROPYLTRIS(TRIMETHYLSILOXY)SILANE, 1:4 blend
$C_{13}H_{30}O_5Si_3$ 350.63 0.94
Inhibited with MEHQ
A stable hydrophilic blend for preparation of rigid gas permeable contact lenses
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[83692-44-8]/[17096-07-0] HMIS: 2-2-0-X store <5°C 25g ¥24,100



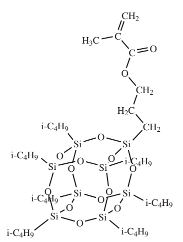
SIM6486.2
3-METHACRYLOXYPROPYLDIMETHYLCHLOROSILANE, tech-95
$C_9H_{17}ClO_2Si$ 220.77 78° / 1 1.012 1.4510
Inhibited with MEHQ, BHT Flashpoint: 85°C (185°F)
Coupling agent for nanocomposites
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[24636-31-5] TSCA EC 246-377-7 HMIS: 3-2-1-X store <5°C 10g ¥21,500



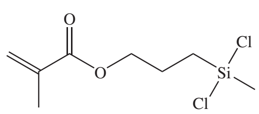
SIM6486.4
METHACRYLOXYPROPYLDIMETHYLETHOXYSILANE, 95%
$C_{11}H_{22}O_3Si$ 230.38 75-6° / 0.4 0.926 1.4371
Inhibited with MEHQ
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13731-98-1] HMIS: 3-2-1-X store <5°C 10g ¥26,800



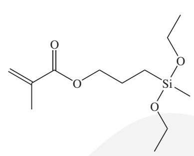
SIM6486.5
METHACRYLOXYPROPYLDIMETHYLMETHOXYSILANE, 95%
$C_{10}H_{20}O_3Si$ 216.35 70-2° / 0.5 0.944 1.4381
Inhibited with MEHQ
Component in positive tone 157 nm resist.[1]
1. Tegou, E. et al. *Chem. Mater.* **2004,** *16*, 2567.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[66753-64-8] EC 266-472-7 HMIS: 3-2-1-X store <5°C 10g ¥16,200 50g ¥54,400



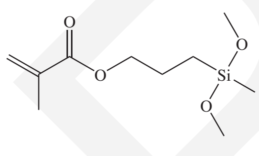
SIM6486.65
METHACRYLOXYPROPYLHEPTAISOBUTYL-T8-SILSESQUIOXANE, tech-95
$C_{35}H_{74}O_{14}Si_8$ 943.64 (108-112°)
Inhibited with MEHQ
High oxygen permeability monomer
Soluble: THF, hexane
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[307531-94-8] HMIS: 1-1-0-X store <5°C 10g ¥28,900



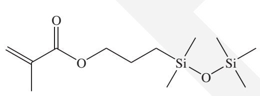
SIM6486.7
METHACRYLOXYPROPYLMETHYLDICHLOROSILANE, 95%
$C_8H_{14}Cl_2O_2Si$ 241.19 75° / 2 1.108^{25} 1.4552
Inhibited with MEHQ, BHT Flashpoint: 92°C (198°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18301-56-9] TSCA EC 242-185-2 HMIS: 3-2-1-X store <5°C 50g ¥46,400



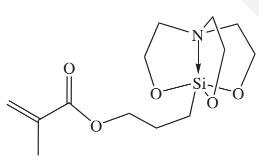
SIM6486.8
METHACRYLOXYPROPYLMETHYLDIETHOXYSILANE, 95%
$C_{12}H_{24}O_4Si$ 260.40 95° / 1 0.965 1.4330
Inhibited with MEHQ Flashpoint: 136°C (277°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[65100-04-1] (既) 2-2075 HMIS: 3-1-1-X store <5°C 10g ¥15,100 50g ¥50,100



SIM6486.9
METHACRYLOXYPROPYLMETHYLDIMETHOXYSILANE, 95%
$C_{10}H_{20}O_4Si$ 235.69 65° / 0.35 1.000 1.4355
Inhibited with MEHQ Flashpoint: 115°C (239°F)
Monomer for hybrid inorganic-organic composites.[1]
1. Taylor-Smith, R. *Polym. Mater. Sci. Eng., Preprints* **1997,** *77*, 503.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[14513-34-9] (既) 2-2075 EC 238-518-6 HMIS: 3-1-1-X store <5°C 25g ¥15,400 100g ¥42,200



SIM6487.0
METHACRYLOXYPROPYLPENTAMETHYLDISILOXANE, 95%
$C_{12}H_{26}O_3Si_2$ 274.51 120-5° / 1 0.901^{25} 1.4340
Inhibited with MEHQ Flashpoint: 110°C (230°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18151-85-4] TSCA EC 242-037-7 HMIS: 3-1-0-X store <5°C 10g ¥17,800 50g ¥60,700

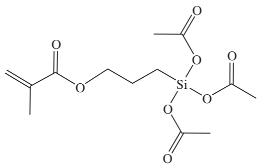


SIM6487.1
METHACRYLOXYPROPYLSILATRANE, 95%
$C_{13}H_{23}NO_5Si$ 301.41 1.170^{25}
Inhibited with MEHQ; contains methanol, viscous liquid or solid
Component in marine bio-fouling resistant coatings
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[27692-57-5] HMIS: 3-1-0-X store <5°C 10g ¥13,500 50g ¥43,800

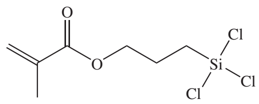
METHACRYLOXYPROPYLSILOXANE MACROMER - see MCR-M11 in polymer section

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

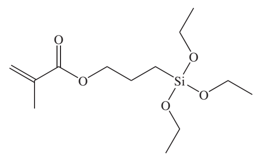
METHACRYLOXYPROPYL TERMINATED POLYDIMETHYLSILOXANE - see DMS-R05



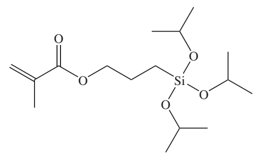
SIM6487.17
3-METHACRYLOXYPROPYLTRIACETOXYSILANE, tech-90
$C_{13}H_{20}O_8Si$ — Mw 332.38 — bp 140-5° / 0.7 — D_4^{20} 1.16
Inhibited with BHT/MEHQ — Flashpoint: >135°C (>275°F)
Viscosity: 15-25 cSt
Contains methacryloxypropylacetoxysiloxane oligomers
Adhesion promoter for silicone and acrylate resins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[51772-85-1] TSCA HMIS: 3-1-1-X store <5°C 25g ¥35,300



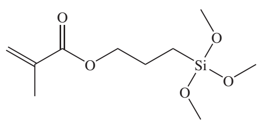
SIM6487.2
METHACRYLOXYPROPYLTRICHLOROSILANE, tech-95
$C_7H_{11}Cl_3O_2Si$ — Mw 261.61 — bp 96-8° / 1 — D_4^{20} 1.251 — n_D^{20} 1.4650
Inhibited with MEHQ, BHT — Flashpoint: >94°C (>200°F)
Employed as adhesion promotor for acrylates in microcontact printing.[1]
Used in facilitating polymer brush growth on silica.[2]
1. Carter, K. et al. *Polym. Preprints* **2002,** *43(1)*, 403.
2. Beinhoff, M. et al. *Chem. Mater.* **2006**, *18*, 3425.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7351-61-3] TSCA EC 230-878-2 HMIS: 3-1-1-X store <5°C 25g ¥18,000 100g ¥50,900



SIM6487.3
METHACRYLOXYPROPYLTRIETHOXYSILANE
$C_{13}H_{26}O_5Si$ — Mw 290.43 — bp 130° / 4 — D_4^{20} 0.985 — n_D^{20} 1.4277
Inhibited with MEHQ — Flashpoint: 128°C (262°F)
See also SIM6482.0, SIM6487.35
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[21142-29-0] (既) 2-2076 TSCA EC 244-239-0 HMIS: 3-1-1-X store <5°C 10g ¥10,900 50g ¥33,200

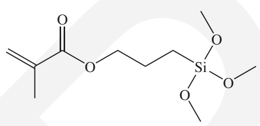


SIM6487.35
METHACRYLOXYPROPYLTRIISOPROPOXYSILANE
$C_{16}H_{32}O_5Si$ — Mw 332.51 — D_4^{20} 0.942 — n_D^{20} 1.4234
Inhibited with MEHQ, HQ — TOXICITY: oral rat, LD50: >5,000 mg/kg
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[80750-05-6] TSCA EC 279-538-5 HMIS: 2-2-1-X store <5°C 25g ¥16,200 100g ¥44,800

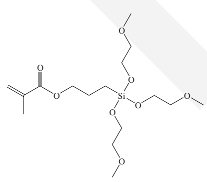


SIM6487.4 サイラエース **S710**
METHACRYLOXYPROPYLTRIMETHOXYSILANE
$C_{10}H_{20}O_5Si$ — Mw 248.35 — bp 78-81° / 1 — mp (-48°) — D_4^{20} 1.045 — n_D^{20} 1.4310
Inhibited with MEHQ, HQ — Flashpoint: 108°C (226°F)
Viscosity: 2 cSt — TOXICITY: oral rat, LD50: 3,000 mg/kg
Copolymerization parameters-e,Q: 0.07, 2.7 — Primary irritation index: 1.19
Specific wetting surface: 314m²/g
Coupling agent for radical cure polymer systems
See SIA0200.0 for acrylate-functional UV cureable analog
Widely used coupling agent for unsaturated polyester-fiberglass composites.[1]
Copolymerized with styrene in formation of sol-gel composites.[2]
Employed in dental polymer composites.[3]
1. Arkles, B. *Chemtech* **1977**, *7*, 713.
2. Wei, Y. et al. *J. Mater. Res.* **1993,** *8*, 1143.
3. Matinlinna, J. et al. *Int. J. Prosthodontics* **2004**, *17*, 157.
See also SIM6483.0, SIM6487.3
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water — サイラエース S710 100g ¥4,900 1kg ¥9,300
[2530-85-0] (既) 2-2076 TSCA EC 219-785-8 HMIS: 3-1-1-X store <5°C 100g inquire 2kg inquire 18kg

COMMERCIAL

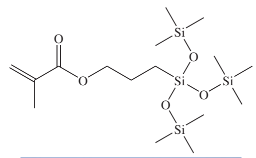


SIM6487.4LI
METHACRYLOXYPROPYLTRIMETHOXYSILANE, low inhibitor grade
$C_{10}H_{20}O_5Si$ — Mw 248.35 — bp 78-81° / 1 — D_4^{20} 1.045 — n_D^{20} 1.4310
Contains <10 ppm BHT, hydroquinones
Employed in dental restorative composites
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2530-85-0] (既) 2-2076 TSCA EC 219-785-8 HMIS: 3-1-1-X store <5°C 25g ¥18,300

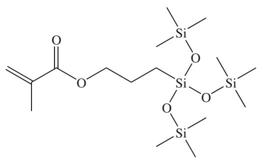


SIM6487.5
METHACRYLOXYPROPYLTRIS(METHOXYETHOXY)SILANE, tech-80
$C_{16}H_{32}O_8Si$ — Mw 380.51 — bp 128° / 10 — D_4^{20} 1.06
Inhibited with MEHQ — Flashpoint: 195°C (383°F)
Contains methacryloxypropylbis(methoxyethoxy)methoxysilane and methacryloxypropyl(methoxyethoxy)dimethoxysilane
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[57069-48-4] (既) 2-2074 TSCA EC 260-537-3 HMIS: 3-1-1-X store <5°C 50g ¥25,700

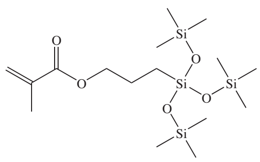
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



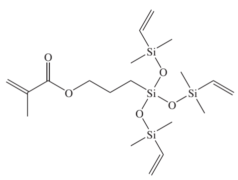
SIM6487.6
METHACRYLOXYPROPYLTRIS(TRIMETHYLSILOXY)SILANE
TRIS(TRIMETHYLSILOXY)PROPYL METHACRYLATE
$C_{16}H_{38}O_5Si_4$ — 422.82 — 139° / 1 — 0.930 — 1.4176^{25}
Inhibited with MEHQ — Flashpoint: 200°C (392°F)
Important monomer in gas permeable contact lens technology.[1,2]
1. Gaylord, N. U.S. Patent 3,808,178, 1974.
2. Arkles, B. *Chemtech* **1983,** *13*, 542.
See also SIM6487.6-06, SIM6481.2, SIA0210.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[17096-07-0] EC 241-165-0 HMIS: 3-1-0-X store <5°C 25g ¥11,400 100g ¥29,400



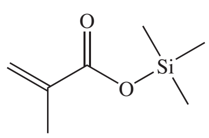
SIM6487.6-06
METHACRYLOXYPROPYLTRIS(TRIMETHYLSILOXY)SILANE, 94%
422.82 — 139° / 1 — 0.930 — 1.4176^{25}
Inhibited with MEHQ — Flashpoint: 200°C (392°F)
Contains 6% difunctional disiloxane SIB1400.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[17096-07-0]/[80722-63-0] HMIS: 3-1-0-X store <5°C 25g ¥11,400 100g ¥29,400



SIM6487.6-20
METHACRYLOXYPROPYLTRIS(TRIMETHYLSILOXY)SILANE, 80%
422.82 — 139° / 1 — 0.930 — 1.4176^{25}
Inhibited with MEHQ — Flashpoint: 200°C (392°F)
Contains 20% difunctional disiloxane SIB1400.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[17096-07-0]/[80722-63-0] HMIS: 3-1-0-X store <5°C 25g ¥11,400 100g ¥29,400

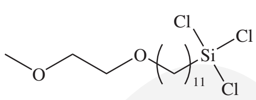


SIM6487.8
METHACRYLOXYPROPYLTRIS(VINYLDIMETHYLSILOXY)SILANE, tech-95
$C_{19}H_{38}O_5Si_4$ — 458.85 — 0.952
Inhibited with MEHQ — Flashpoint: >200°C (>392°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[17096-10-5] HMIS: 3-1-0-X store <5°C 50g ¥44,800

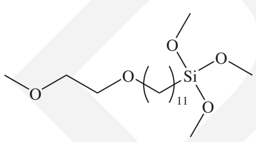


SIM6491.0
METHACRYLOXYTRIMETHYLSILANE
$C_7H_{14}O_2Si$ — 158.27 — 43-58° / 23 — 0.885 — 1.4716
Inhibited with MEHQ — Flashpoint: 32°C (90°F)
Blocked methacrylate which can be deblocked following polymerization.[1]
1. Jarus, A. et al. *Polym. Mater. Sci. Eng.* **1999,** *81*, 509.
See also SIA0320.0, SIB1860.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13688-56-7] HMIS: 3-3-1-X store <5°C 25g ¥14,600 100g ¥39,500

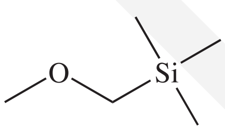
METHALLYLTRIMETHYLSILANE - see SIM6513.0 (2-METHYLPROPENYL)TRIMETHYLSILANE



SIM6491.5
11-(2-METHOXYETHOXY)UNDECYLTRICHLOROSILANE
$C_{14}H_{29}Cl_3O_2Si$ — 363.83 — 145-9° / 1.25 — 1.07
Forms self-assembled monolayers with “hydrophilic tips”
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[943349-49-3] HMIS: 3-2-1-X 5g ¥25,200



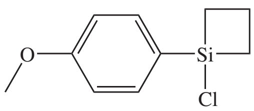
SIM6491.7
11-(2-METHOXYETHOXY)UNDECYLTRIMETHOXYSILANE
$C_{17}H_{38}O_5Si$ — 350.57 — 152-3° / 0.3 — 0.947
Flashpoint: >110°C (>230°F)
See also SIM6493.7
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 5g ¥34,200



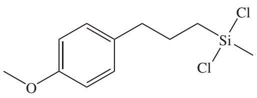
SIM6492.0
METHOXYMETHYLTRIMETHYLSILANE
$C_5H_{14}OSi$ — 118.25 — 83-4° — 0.755 — 1.3915^{25}
Flashpoint: -5°C (23°F)
Employed in the homologation of aldehydes and ketones.[1,2]
1. Magnus, P.; Roy, G. J. *Chem. Soc., Chem. Commun.* **1979**, 822-3.
2. Magnus, P.; Roy, G. *Organometallics* **1982**, *1*, 553-9.
F&F: Vol. 10, p 246; Vol. 11, p 331.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[14704-14-4] HMIS: 2-4-0-X store <5°C 10g ¥31,600

N-(METHOXYMETHYL)-N-(TRIMETHYLSILYLMETHYL)BENZYLAMINE -
see SIB0966.0 N-BENZYL-N-METHOXYMETHYL-N-(TRIMETHYLSILYLMETHYL)AMINE

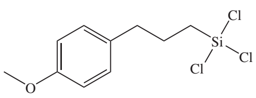
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



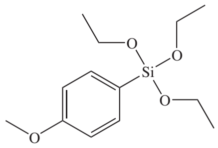
SIM6492.3
1-(4-METHOXYPHENYL)-1-CHLOROSILACYCLOBUTANE
$C_{10}H_{13}ClOSi$ — Mw 212.74 — bp 100° / 0.1 — D_4^{20} 1.12 — n_D^{20} 1.528
Underoes Pd-catalyzed cross-coupling with activated aromatic iodides.[1]
1. Denmark, S. et al. *Org. Lett.* **1999,** *1*, 1495.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[251453-07-3] HMIS: 3-2-1-X 2.5g ¥39,500



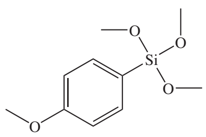
SIM6492.4
3-(p-METHOXYPHENYL)PROPYLMETHYLDICHLOROSILANE
$C_{11}H_{16}Cl_2OSi$ — Mw 263.24 — bp 115-6° / 0.3 — D_4^{20} 1.13
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[134438-26-9] HMIS: 3-1-1-X store <5°C 25g ¥25,200



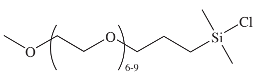
SIM6492.5
3-(p-METHOXYPHENYL)PROPYLTRICHLOROSILANE
$C_{10}H_{13}Cl_3OSi$ — Mw 283.66 — bp 128-9° / 1 — D_4^{20} 1.226
Flashpoint: >110°C (>230°F)
Forms bonded phases for HPLC
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[163155-57-5] HMIS: 3-1-1-X 25g ¥24,100



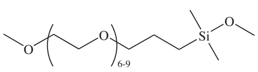
SIM6492.53
p-METHOXYPHENYLTRIETHOXYSILANE
$C_{13}H_{22}O_4Si$ — Mw 270.40 — bp 91-2° / 0.15 — D_4^{20} 1.018[25] — n_D^{20} 1.471
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[21130-91-6] HMIS: 2-2-1-X 5g ¥22,500



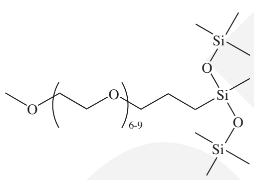
SIM6492.55
p-METHOXYPHENYLTRIMETHOXYSILANE
$C_{10}H_{16}O_4Si$ — Mw 228.32 — bp 85-90° / 0.15 — D_4^{20} 1.094[25] — n_D^{20} 1.4868
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[35692-27-4] HMIS: 3-2-1-X 5g ¥17,200



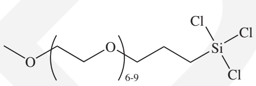
SIM6492.57
2-[METHOXYPOLY(ETHYLENOXY)$_{6-9}$PROPYL]DIMETHYLCHLOROSILANE, tech-90
$CH_3O(CH_2CH_2O)_{6-9}(CH_2)_3(CH_3)_2ClSi$ — Mw 431 - 563 — D_4^{20} 1.05
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X 10g ¥27,800



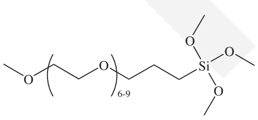
SIM6492.58
2-[METHOXYPOLY(ETHYLENOXY)$_{6-9}$PROPYL]DIMETHYLMETHOXYSILANE, tech-90
$CH_3O(C_2H_4O)_{6-9}(CH_2)_3(CH_3)_2Si(OCH_3)$ — Mw 427 - 559 — D_4^{20} 1.01 — n_D^{20} 1.444[25]
Flashpoint: >65°C (>150°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-2-1-X 5g ¥32,600



SIM6492.6
2-[METHOXY(POLYETHYLENEOXY)$_{6-9}$PROPYL]HEPTAMETHYLTRISILOXANE, tech-90
$CH_3O(CH_2CH_2O)_{6-9}(CH_2)_3(CH_3)[OSi(CH_3)_3]_2Si$ — Mw 559 - 691 — (mp 0°) — D_4^{20} 1.007 — n_D^{20} 1.4416
Viscosity: 22 cSt — Flashpoint: 116°C (241°F)
"Super-wetter" Surface tension of 0.1% aqueous solution: 21-22 mN/m
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[27306-78-1] TSCA HMIS: 2-1-0-X 100g ¥8,500 2kg ¥53,200
COMMERCIAL

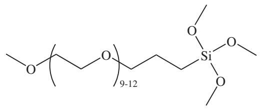


SIM6492.66
2-[METHOXY(POLYETHYLENEOXY)$_{6-9}$PROPYL]TRICHLOROSILANE, tech-90
$CH_3O(C_2H_4O)_{6-9}(CH_2)_3Cl_3Si$ — Mw 472 - 604 — D_4^{20} 1.130
Forms hydrophilic surfaces
Provides protein antifouling surface.[1]
1. Cecchet, F. et al. *Langmuir* **2006**, *22*, 1173.
See also SIM6491.5, SIM6493.2
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[36493-41-1] TSCA HMIS: 3-2-1-X 10g ¥23,600

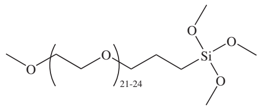


SIM6492.7
2-[METHOXY(POLYETHYLENEOXY)$_{6-9}$PROPYL]TRIMETHOXYSILANE, tech-90
$CH_3O(C_2H_4O)_{6-9}(CH_2)_3Si(OCH_3)_3$ — Mw 459 - 591 — (mp -8°) — D_4^{20} 1.076 — n_D^{20} 1.403
Viscosity: 29 cSt — Flashpoint: 88°C (190°F)
Treated surface contact angle, water: 36°
Reduces non-specific binding of proteins
Forms charge neutral coatings on CdSe quantum dots which conujugate DNA.[1]
1. Parak, W. et al. *Chem. Mater.* **2002,** *14*, 2113.
See also SIA0078.0, SIB1824.84, SIH6188.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[65994-07-2] TSCA HMIS: 2-2-1-X 25g ¥27,600 100g ¥69,000

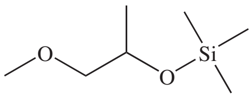
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



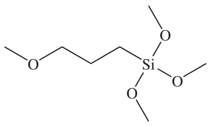
SIM6492.72
2-[METHOXY(POLYETHYLENEOXY)$_{9-12}$PROPYL]TRIMETHOXYSILANE, tech-90
$CH_3(C_2H_4O)_{9-12}(CH_2)_3OSi(OCH_3)_3$ — Mw 591 - 723 — D_4^{20} 1.071 — n_D^{20} 1.451^{25}
Flashpoint: 88°C (190°F)
See also SIM6492.7, SIM6492.73
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[65994-07-2] TSCA HMIS: 2-2-1-X 25g ¥23,600 100g ¥69,000



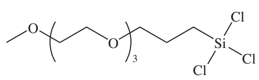
SIM6492.73
2-[METHOXY(POLYETHYLENEOXY)$_{21-24}$PROPYL]TRIMETHOXYSILANE, tech-90
$CH_3O(CH_2CH_2O)_{21-24}(CH_2)_3Si(OCH_3)_3$ — Mw 1,120 - 1,250
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[65994-07-2] HMIS: 2-2-1-X 1.0g ¥25,700



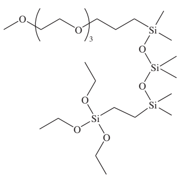
SIM6492.8
(1-METHOXY-2-PROPOXY)TRIMETHYLSILANE
$C_7H_{18}O_2Si$ — Mw 162.30 — bp 132° — mp (-40°) — D_4^{20} 0.83 — n_D^{20} 1.3965
Viscosity: 2 cSt
Flashpoint: 20°C (68°F)
Vapor pressure, 50°: 30 mm
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[55816-62-1] HMIS: 3-4-1-X 25g ¥22,000



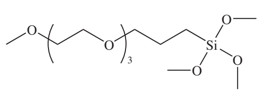
SIM6493.0
3-METHOXYPROPYLTRIMETHOXYSILANE
$C_7H_{18}O_4Si$ — Mw 194.30 — bp 98-9° / 40 — D_4^{20} 0.995
Flashpoint: 53°C (127°F)
Reduces electrostatic forces on substrates used for AFM studies.[1]
1. McNamee, C. et al. *Biophys. J.* **2007**, *93*, 324.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[33580-59-5] HMIS: 3-2-1-X 25g ¥16,200 100g ¥44,800



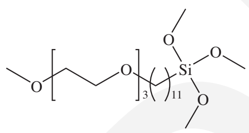
SIM6493.2
METHOXYTRIETHYLENEOXYPROPYLTRICHLOROSILANE
$C_{10}H_{21}Cl_3O_4Si$ — Mw 339.71 — bp 148° / 0.3 — D_4^{20} 1.034
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[228700-87-6] TSCA-L HMIS: 3-2-1-X 10g ¥35,800



SIM6493.3
[METHOXYTRI(ETHYLENEOXY)PROPYL]HEXAMETHYLTRISILOXANYLETHYLTRIETHOXYSILANE, tech-95
$C_{24}H_{58}O_9Si_4$ — Mw 603.06
Reduces protein adsorption on modified substrates
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-1-1-X 10g ¥26,300

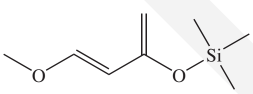


SIM6493.4
METHOXYTRIETHYLENEOXYPROPYLTRIMETHOXYSILANE
$C_{13}H_{30}O_7Si$ — Mw 326.46 — bp 140° / 0.2 — D_4^{20} 1.163 — n_D^{20} 1.4321
Forms polymeric proton-conducting electrolytes.[1]
1. Ritchie, J. et al. *Chem. Mater.* **2006,** *18*,504.
See also SIT7122.6
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[132388-45-5] TSCA-L HMIS: 3-2-1-X 10g ¥37,400

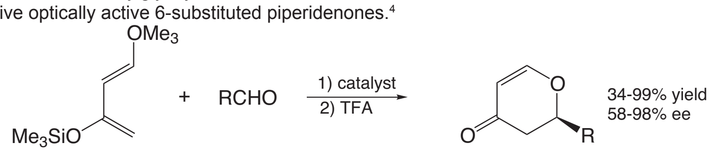


SIM6493.7
METHOXYTRIETHYLENEOXYUNDECYLTRIMETHOXYSILANE
PEG3C11 Silane
$C_{21}H_{46}O_7Si$ — Mw 438.68
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 1.0g ¥25,700

METHOXYTRIMETHYLSILANE - see SIT8566.0 TRIMETHYLMETHOXYSILANE



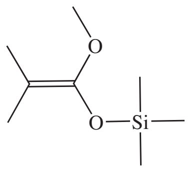
SIM6494.0
1-METHOXY-3-(TRIMETHYLSILOXY)BUTADIENE, 95%
DANISHEFSKY'S DIENE
$C_8H_{16}O_2Si$ — Mw 172.30 — bp 68-9° / 14 — D_4^{20} 0.885 — n_D^{20} 1.4545
Contains trans-4-methoxy-3-buten-2-one
Flashpoint: 45°C (113°F)
Diels-Alder cyclohexenone building block.[1]
Asymmetrically adds to aldehydes.[2]
Cycloadds with high ee values to n-butylglyoxylate.[3]
Reacts with imines to give optically active 6-substituted piperidenones.[4]



1. Danishefsky, S. *Acc. Chem. Res.* **1981,** *14*, 400.
2. Furuno, H. et al. *Org. Lett.* **2000,** *2*, 49.
3. Motoyama, Y. et al. *Tetrahedron* **2001,** *57*, 853.
4. Mancheño, O. G. et al. *J. Am. Chem. Soc.* **2004**, *126*, 456.

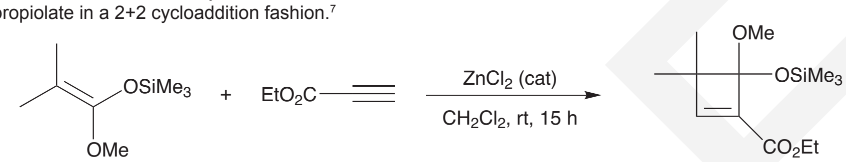
F&F: Vol. 6, p 370; Vol. 7, p 233; Vol. 9, p 303; Vol. 10, p 260; vol. 11, p 332; Vol. 12, p 321; Vol. 13, p 178.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[54125-02-9] HMIS: 2-2-1-X store <5°C 5g ¥42,700

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



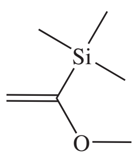
SIM6496.0
1-METHOXY-1-(TRIMETHYLSILOXY)-2-METHYL-1-PROPENE
METHYL(TRIMETHYLSILYL)DIMETHYLKETENE ACETAL
$C_8H_{18}O_2Si$ | 174.31 | 57° / 15 | 0.858 | 1.4150
Flashpoint: 43°C (109°F)

Review of synthetic utility.[1]
Initiator for group transfer polymerization.[2]
With SmI_2 converts ketones and aldehydes to silyl enol ethers.[3]
Cross-couples with aryl bromides.[4]
Undergoes α-arylation to form 2-aryl acetates.[5]
Reacts with fullerenes to form α-fullerenyl esters.[6]
Adds to ethyl propiolate in a 2+2 cycloaddition fashion.[7]

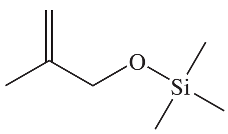


1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 376-380.
2. Webster, O. et al. *Science* **1983,** *222*, 39.
3. Hydrio, J. et al. *Synthesis* **1997,** *68*, 1.
4. Hama, T. et al. *J. Am. Chem. Soc.* **2003**, *125*, 11176.
5. Liu, X.; Hartwig, J. F. *J. Am. Chem. Soc.* **2004**, *126*, 5182.
6. Nakamura, E. et al. *Org. Lett.* **2008**, *10*, 4923.
7. Quendo, A.; Rousseau, *Tetrahedron Lett.* **1988**, *29*, 6443.

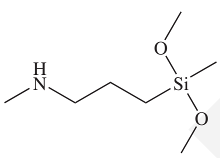
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[31469-15-5] TSCA HMIS: 2-2-1-X 25g ¥28,400 100g ¥84,600



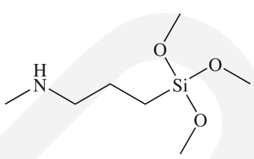
SIM6496.3
(1-METHOXYVINYL)TRIMETHYLSILANE, 95%
$C_6H_{14}OSi$ | 130.26 | 102-4° | 0.803 | 1.4180
Flashpoint: 0°C (32°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[79678-01-6] HMIS: 3-4-0-X 5g ¥32,600



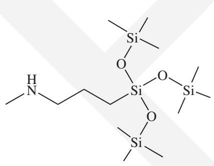
SIM6497.0
(2-METHYLALLYLOXY)TRIMETHYLSILANE, 95%
TRIMETHYL[(2-METHYL-2-PROPEN-1YL)OXY]SILANE
$C_7H_{16}OSi$ | 144.29 | 122° | 0.7961 | 1.4051
Flashpoint: 12°C (54°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[25195-85-1] HMIS: 3-3-1-X 25g ¥31,600



SIM6498.0
N-METHYLAMINOPROPYLMETHYLDIMETHOXYSILANE
$C_7H_{19}NO_2Si$ | 177.32 | 93° / 25 | 0.9173^{25} | 1.4224^{25}
Flashpoint: 80°C (176°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[31024-35-8] EC 250-434-1 HMIS: 3-2-1-X 25g ¥19,600 100g ¥56,000



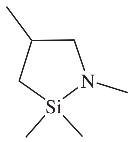
SIM6500.0
N-METHYLAMINOPROPYLTRIMETHOXYSILANE
$C_7H_{19}NO_3Si$ | 193.32 | 106° / 30 | 0.978^{25} | 1.4194
γc of treated surfaces: 31 mN/m
Flashpoint: 82°C (180°F)
pKb^{25} H_2O: 5.18
Orients liquid crystals
Reacts with urethane prepolymers to form moisture-curable resins
See also SIB1932.2, SIB1932.3, SIM6572.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3069-25-8] TSCA EC 221-334-5 HMIS: 3-2-1-X 25g ¥9,500 2kg ¥121,000 15kg ¥580,000
COMMERCIAL



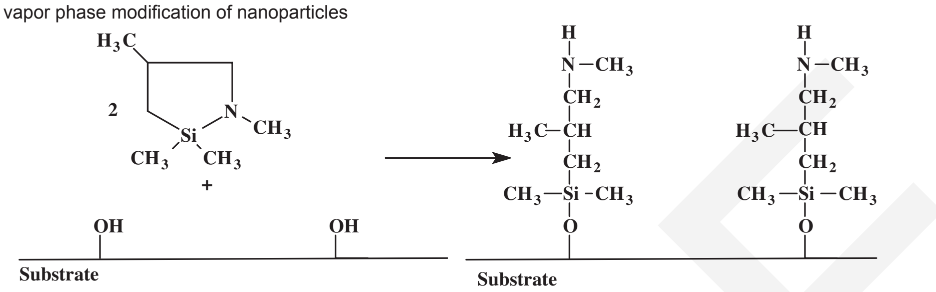
SIM6500.5
N-METHYLAMINOPROPYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{13}H_{37}NO_3Si_4$ | 367.78 | 165° / 50
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[40965-80-8] HMIS: 2-2-0-X 25g ¥53,800

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

SIM6501.4
N-METHYL-AZA-2,2,4-TRIMETHYLSILACYCLOPENTANE
$C_7H_{17}NSi$ 143.30 137° 0.813 1.4308
Flashpoint: 14°C (57°F)

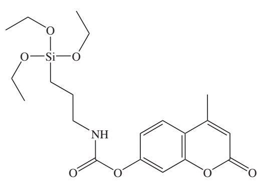


Employed in vapor phase modification of nanoparticles

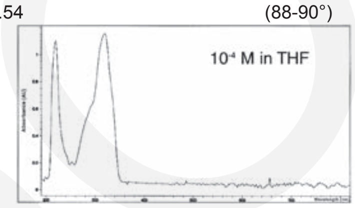


See also SIB1932.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18387-19-4] TSCA HMIS: 3-4-1-X 25g ¥16,200 100g ¥44,800

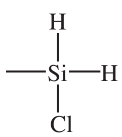
N-METHYL-N-(t-BUTYLDIMETHYLSILYL)TRIFLUOROACETAMIDE -
see SIB1966.0 N-(t-BUTYLDIMETHYLSILYL)-N-METHYLTRIFLUOROACETAMIDE



SIM6502.0
O-4-METHYLCOUMARINYL-N-[3-(TRIETHOXYSILYL)PROPYL]CARBAMATE
$C_{20}H_{29}NO_7Si$ 423.54 (88-90°)
Soluble: THF
UV max: 223, 281, 319.5 (vs)
Immobilizeable fluorescent compound.[1]

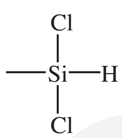


1. Arkles, B. U.S. Patent 4,918,200, 1990.
See also SIC2266.8, SIM6565.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[129119-78-4] HMIS: 2-2-1-X 10g ¥35,300



Reference Compound 7
METHYLCHLOROSILANE
CH_5ClSi 80.59 8-9° (-135°) 0.935^{-80}
ΔHvap: 26.0 kJ/mole
Synthesis: Weyenburg, D., *J. Organomet. Chem.*, **1965**, *3*, 489.
Reference compound. Data is provided for investigators. Not offered for sale by Gelest.
[993-00-0]

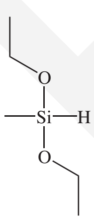
METHYLCYCLOHEXYLDICHLOROSILANE - see SIC2468.0 CYCLOHEXYLMETHYLDICHLOROSILANE



SIM6504.0
METHYLDICHLOROSILANE
CH_4Cl_2Si 115.03 41-2° (-93°) 1.1047 1.4222
Viscosity: 0.60 cSt
ΔHcomb: 163 kJ/mole
ΔHvap: 29.3 kJ/mole
Dipole moment: 1.91 debye
Coefficient of thermal expansion: 1.0×10^{-3}
Specific heat: 0.8 J/g/°
Flashpoint: -28°C (-18°F)
TOXICITY: ihl rat, LCLo: 300 ppm/4H
TOXICITY: ipr rat, LD50: 15 mg/kg
Autoignition temperature: 230°C
Vapor pressure, 24°: 400 mm
Critical temperature: 215-8°C
Critical pressure: 37.7 atm
Undergoes hydrosilylation reactions
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[75-54-7] (既) 2-2041 TSCA EC 200-877-1 HMIS: 4-4-2-X 25g ¥4,300* 2kg ¥78,000* 20kg inquire
** in liquid dispensing cylinder zCYL-L-2400*
*** requires zCYL-S-019 cylinder or zDR-S-019 stainless steel pail*

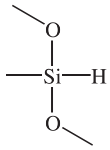
COMMERCIAL

METHYLDICHLOROSILYL(CHLOROMETHYLPHENYL)ETHANE -
see SIC2295.1 ((CHLOROMETHYL)PHENYLETHYL)METHYLDICHLOROSILANE



SIM6506.0
METHYLDIETHOXYSILANE
DEMS
$C_5H_{14}O_2Si$ 134.25 98-9° 0.829 1.3275
ΔHcomb: 3,713 kJ/mole
Flashpoint: 10°C (50°F)
Autoignition temperature: 245˚C
F&F: Vol. 12, p 82.
See also SIP6725.2
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2031-62-1] (既) 2-2052 TSCA EC 217-982-3 HMIS: 3-4-1-X 25g ¥11,400 100g ¥37,900

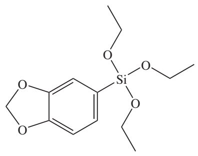
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



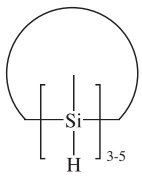
SIM6508.0
METHYLDIMETHOXYSILANE
$C_3H_{10}O_2Si$ | 106.20 | 61° | (-136°) | 0.861 | 1.360
Viscosity: 0.5 cSt — Flashpoint: -17°C (1°F)
Dipole moment: 1.32 debye
See also SIM6506.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[16881-77-9] (既) 2-2052 TSCA EC 240-914-9 HMIS: 4-4-1-X 25g ¥23,600 100g ¥69,000

METHYLDIPHENYLSILANE - see SID4555.0 DIPHENYLMETHYLSILANE

METHYLDODECYLDICHLOROSILANE - see SID4628.0 DODECYLMETHYLDICHLOROSILANE



SIM6509.0
3,4-METHYLENEDIOXYPHENYLTRIETHOXYSILANE
$C_{13}H_{20}O_5Si$ | 284.38
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[376353-50-3] HMIS: 2-2-1-X 2.5g ¥59,100

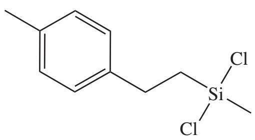


SIM6510.0 COMMERCIAL
METHYLHYDROCYCLOSILOXANES, 95%
$(CH_3HSiO)_{3-5}$ | 180 - 300 | 134-204° | | 0.99 | 1.39
Flashpoint: 31°C (88°F)
Undergoes hydrosilylation reactions
See also SIT7530.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[68037-53-6] TSCA HMIS: 2-3-1-X 25g ¥7,200 250g ¥30,500 3kg ¥154,000

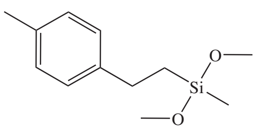
METHYLISOPROPYLDICHLOROSILANE - see SII6463.0 ISOPROPYLMETHYLDICHLOROSILANE

METHYLOCTADECYLDICHLOROSILANE - see SIO6625.0 n-OCTADECYLMETHYLDICHLOROSILANE

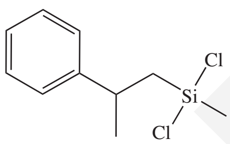
METHYL(PHENETHYL)DICHLOROSILANE - see SIP6721.5 PHENETHYLMETHYLDICHLOROSILANE



SIM6511.0
p-(METHYLPHENETHYL)METHYLDICHLOROSILANE, 95%
(p-TOLYLETHYL)METHYLDICHLOROSILANE
$C_{10}H_{14}Cl_2Si$ | 233.21 | 103-5° / 2 | | 1.10 | 1.5100^{25}
α:β ~ 40:60 — Flashpoint: 95°C (203°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[718635-97-3]/[63126-87-4] TSCA-L HMIS: 3-1-1-X 50g ¥26,800



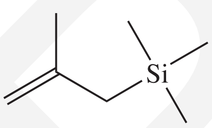
SIM6511.2
(p-METHYLPHENETHYL)METHYLDIMETHOXYSILANE, 95%
(p-TOLYLETHYL)METHYLDIMETHOXYSILANE
$C_{12}H_{20}O_2Si$ | 224.38 | 115° / 3 | | 0.966 | 1.484
Contains isomers
See also SIE4897.2, SIN6597.1
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[722542-79-2]/[722542-80-5] TSCA HMIS: 3-2-1-X 25g ¥7,700 100g ¥17,200



SIM6512.5
(2-METHYL-2-PHENYLETHYL)METHYLDICHLOROSILANE
METHYL(α-METHYLPHENETHYL)DICHLOROSILANE
$C_{10}H_{14}Cl_2Si$ | 233.21 | 104-5° / 9 | | 1.1165 | 1.5152
See also SIP6738.5
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13617-28-2] TSCA EC 237-102-1 HMIS: 3-1-1-X 25g ¥16,400

METHYLPHENYLDICHLOROSILANE - see SIP6738.0 PHENYLMETHYLDICHLOROSILANE

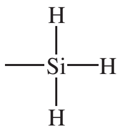
4-METHYLPHENYLTRICHLOROSILANE - see SIT8040.0 p-TOLYLTRICHLOROSILANE



SIM6513.0
(2-METHYL-2-PROPENYL)TRIMETHYLSILANE
METHALLYLTRIMETHYLSILANE
$C_7H_{16}Si$ | 128.29 | 112-4° | | 0.754 | 1.4283
Flashpoint: -6°C (21°F)
Transfers methallyl group
Carbonyls undergo Sakurai catalyzed allylation, yielding methallyl-Me_3SiO- compounds.[1]
1. Hollis, T. et al. *Tetrahedron Lett.* **1993,** *34*, 4309.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[18292-38-1] HMIS: 2-4-1-X 25g ¥25,200 100g ¥74,000

SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIM6515.0
METHYLSILANE
1MS

CH_6Si	46.14	-57°	(-157°)	0.628^{-58}	

CAUTION: CAN FORM EXPLOSIVE MIXTURES WITH AIR

ΔHcomb: -2,612 kJ/mole
ΔHform: -29 kJ/mole
ΔHvap: 19.3 kJ/mole
Dipole moment: 0.73 debye

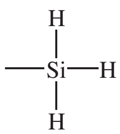
Flashpoint: <-40°C (<-40°F)
Autoignition temperature: 130°C
Vapor pressure, -80°: 241 mm
Vapor pressure, 21°: 14 atm (210 psia)
Critical temperature: 79.3˚C

Plasma polymerization yields dry process photoresist.[1]
Intermediate for poly(methylsilane) precursor to silicon carbide.[2]
Deposits SiC on Si and Ge at 400 - 500˚C.[3]
Source for hydrogenated amorphous silicon carbide films.[4]

1. Dabbagh, G. et al. *J. Photopolym. Sci. Tech.* **1998,** *11*, 651.
2. Fhang, Z. et al. *J. Am. Ceram. Soc.* **1991,** *74*, 670.
3. Takatsuka, T. et al. *Appl. Surf. Sci.* **2000,** *162*, 156.
4. Lee, M. et al. in "*Chemical Aspects of Electronic Ceramics Processing*" Arkles, B. ed., MRS Proc. **1998**, *495*, 153.

HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required

[992-94-9] TSCA EC 213-598-5 HMIS: 3-4-3-X 50g inquire
** includes gas dispensing cylinder zCYL-G-2400*



SIM6515.1
METHYLSILANE, 99.9+%

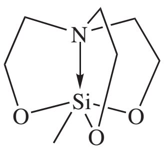
CH_6Si	46.14	-57°	(-157°)	0.628^{-58}	

CAUTION: CAN FORM EXPLOSIVE MIXTURES WITH AIR

Flashpoint: <-40°C (<-40°F)

HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required

[992-94-9] TSCA EC 213-598-5 HMIS: 3-4-3-X 25g inquire
** includes gas dispensing cylinder zCYL-HPS-0420-35*



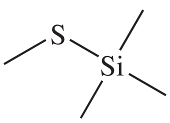
SIM6518.0
METHYLSILATRANE
METHYLTRIPTYCHSILOXAZOLIDINE

$C_7H_{15}NO_3Si$	189.28	174° / 31	(152°)		

Dipole moment: 7.57 debye
TOXICITY: ipr rat, LD50: 5,000 mg/kg

Five-coordinate silicon with physiological activity
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems

[2288-13-3] TSCA EC 218-928-1 HMIS: 2-2-0-X 5g ¥11,900 25g ¥37,400



SIM6518.5
(METHYLTHIO)TRIMETHYLSILANE

$C_4H_{12}SSi$	120.29	110-4°		0.85	1.4510

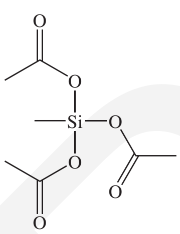
Stench
Flashpoint: 21°C (70°F)

Reagent for thioacetylation of carbonyl compounds.[1]

1. Evans, D. et al. *J. Am. Chem. Soc.* **1977,** *99*, 5009.

See also SIH6116.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water

[3908-55-2] TSCA EC 223-466-9 HMIS: 3-4-1-X 5g ¥73,500



SIM6519.0
METHYLTRIACETOXYSILANE, 95%

$C_7H_{12}O_6Si$	220.25	87-8° / 3	(40°)	1.175	1.4083

Flashpoint: 85°C (185°F)
Vapor pressure, 94°: 9 mm

COMMERCIAL

Most common cross-linker for condensation cure silicone RTVs
For liquid version see blend, SIM6519.2
See also SIE4899.0, SIV9098.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water

[4253-34-3] (既) 9-1939 TSCA EC 224-221-9 HMIS: 3-2-1-X 50g ¥4,000 2kg ¥62,000 18kg ¥224,000

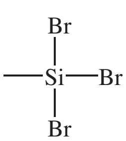
SIM6519.2
METHYLTRIACETOXYSILANE-ETHYLTRIACETOXYSILANE 80:20 Blend

				1.17	

Flashpoint: 85°C (185°F)

Liquid crosslinker for silicone RTVs
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water

[4253-34-3] TSCA EC 224-221-9 HMIS: 3-2-1-X 100g ¥10,100 1kg ¥53,100



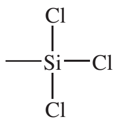
Reference Compound 8
METHYLTRIBROMOSILANE

CH_3Br_3Si	282.82	131-2°	(-28°)	2.213^{25}	1.5152^{25}

Synthesis: McCusker, P. *J. Am. Chem. Soc.* **1953**, *75*, 1583.
Reference compound. Data is provided for investigators. Not offered for sale by Gelest.

[4095-09-4]

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



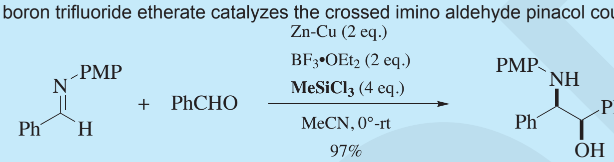
SIM6520.0
METHYLTRICHLOROSILANE, 98%

CH_3Cl_3Si	149.48	66.4°	(-78°)	1.275	1.4110

Viscosity: 0.46 cSt
ΔHvap: 31.0 kJ/mole
Surface tension: 20.3 mN/m
Ionization potential: 11.36 eV
Specific heat: 0.92 J/g/°

Flashpoint: -15°C (5°F)
TOXICITY: ihl rat, LDLo: 450 ppm/4H
Autoignition temperature: 395°C
Vapor pressure, 13.5°: 100 mm
Critical temperature: 243˚C
Critical pressure: 39 atm
Coefficient of thermal expansion: 1.3×10^{-3}

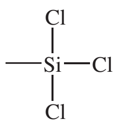
Fundamental builing-block for silicone resins
Forms silicon carbide by pyrolysis
Review of synthetic utility.[1]
In a synergistic fashion with boron trifluoride etherate catalyzes the crossed imino aldehyde pinacol coupling.[2]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 389-393.
2. Shimizu, M. et al. *Synlett.* **2002**, 1538.

HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[75-79-6] (既) 2-2041 TSCA EC 200-902-6 HMIS: 3-4-2-X 25g ¥3,400 500g ¥8,000 20kg inquire
** does not include container. zDR-S-019 or zCYL-S-019 required*

COMMERCIAL

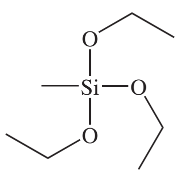


SIM6520.1
METHYLTRICHLOROSILANE, 99%

CH_3Cl_3Si	149.48	66.4°	(-78°)	1.275	1.4110

In combination with H_2 forms SiC by CVD.[1]
1. Josiek, A. et al. *Chem. Vap. Dep.* **1996,** 2, 17.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[75-79-6] (既) 2-2041 TSCA EC 200-902-6 HMIS: 3-4-2-X 25g ¥13,000 500g ¥71,400

METHYL (3-TRICHLOROSILYL)PROPIONATE - see SIC2070.0 2-(CARBOMETHOXY)ETHYLTRICHLOROSILANE



SIM6555.0
METHYLTRIETHOXYSILANE

$C_7H_{18}O_3Si$	178.30	142°		0.8948	1.3832

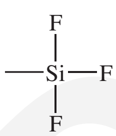
Viscosity: 0.6 cSt
Dipole moment: 1.72 debye

Flashpoint: 30°C (86°F)
TOXICITY: oral rat, LD50: 12,500 mg/kg
Autoignition temperature: 225˚C (437˚F)
Vapor pressure, 25°: 6 mm

Low cost hydrophobic surface treatment
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2031-67-6] (既) 2-2052 TSCA EC 217-983-9 HMIS: 1-3-1-X 25g ¥3,400 2kg ¥35,000 15kg ¥146,000

COMMERCIAL

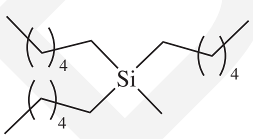
METHYL(TRIFLUOROPROPYL)DICHLOROSILANE -
see SIT8369.0 (3,3,3-TRIFLUOROPROPYL)METHYLDICHLOROSILANE



SIM6558.0
METHYLTRIFLUOROSILANE

CH_3F_3Si	100.11	-30°	(-73°)		

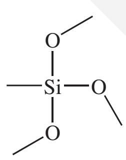
AIR TRANSPORT FORBIDDEN
Dipole moment: 2.80 debye
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[373-74-0] TSCA EC 206-770-6 HMIS: 3-2-1-X 50g inquire
** includes gas dispensing cylinder zCYL-G-0900*



SIM6559.0
METHYLTRI-n-HEXYLSILANE

$C_{19}H_{42}Si$	298.63	140° / 0.25		0.809^{25}	1.4445^{25}

Viscosity, -40˚: 150 cSt
Viscosity, 25˚: 6 cSt
Silahydrocarbon with excellent low temperature lubricating characteristics
See also SIM6577.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[3429-60-5] HMIS: 1-2-0-X 100g ¥45,900



SIM6560.0
METHYLTRIMETHOXYSILANE

$C_4H_{12}O_3Si$	136.22	102-3°	(-78°)	0.955	1.3696

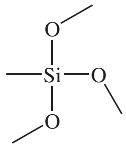
Viscosity: 0.50 cSt
ΔHcomb: 4,780 kJ/mole
Dipole moment: 1.60 debye

Flashpoint: 8°C (46°F)
TOXICITY: oral rat, LD50: 12,500 mg/kg
Autoignition temperature: 255°C

Intermediate for coating resins
See also SIM6560.1, SIM6560.2
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1185-55-3] (既) 2-2052 TSCA EC 214-685-0 HMIS: 3-4-1-X 25g ¥3,400 2kg ¥22,000 17kg ¥140,000

COMMERCIAL

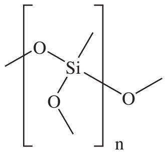
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIM6560.1
METHYLTRIMETHOXYSILANE, 99%

$C_4H_{12}O_3Si$	136.22	102-3°	(-78°)	0.955	1.3696
		Flashpoint: 8°C (46°F)			

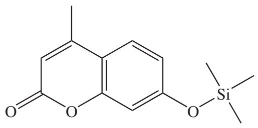
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1185-55-3] TSCA EC 214-685-0 HMIS: 3-4-1-X 100g ¥15,100 500g ¥60,000



SIM6560.2
METHYLTRIMETHOXYSILANE, oligomeric hydrolysate

	700 - 1,000			1.143	1.402

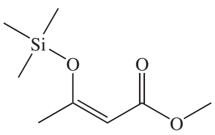
25-30 wgt % methoxy groups
Viscosity: 20-25 cSt
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[181186-37-8] TSCA HMIS: 2-2-1-X 100g ¥8,300



SIM6565.0
4-METHYL-7-TRIMETHYLSILOXYCOUMARIN

$C_{13}H_{16}O_3Si$	248.35		(54-66°)		1.575^{25}

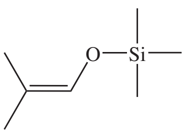
Fluorescent compound
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[67909-31-3] HMIS: 2-1-1-X 10g ¥30,000



SIM6570.0
METHYL-3-(TRIMETHYLSILOXY)CROTONATE
METHYL 3-TRIMETHYLSILOXY-2-BUTENOATE

$C_8H_{16}O_3Si$	188.29	57-9° / 9		0.939	1.4435
		Flashpoint: 63°C (145°F)			

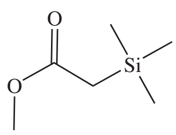
80-90% trans isomer
Equivalent of methylacetoacetate dianion.[1]
1. Chan, T. et al. *J. Chem. Soc., Chem. Commun*. **1979,** 578.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[62269-44-7] EC 263-483-9 HMIS: 2-2-1-X 10g ¥28,400



SIM6571.0
2-METHYL-1-(TRIMETHYLSILOXY)-1-PROPENE

$C_7H_{16}OSi$	144.29	82-6° / 100		0.785	1.4090
		Flashpoint: 14°C (57°F)			

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[6651-34-9] HMIS: 2-4-1-X 10g ¥25,200

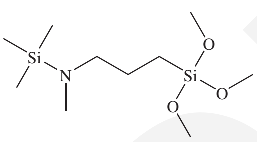


SIM6571.5
METHYL TRIMETHYLSILYLACETATE

$C_6H_{14}O_2Si$	146.26	62-4° / 50		0.890	1.4140
		Flashpoint: 15°C (59°F)			

Employed in synthesis of α,β-unsaturated esters.[1]
1. Larcheveque, M. et al. *J. Chem. Soc., Chem. Commun*. **1981,** 877.
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[2916-76-9] EC 220-845-0 HMIS: 2-4-0-X 10g ¥27,300

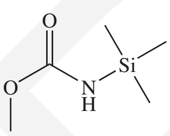
METHYL(TRIMETHYLSILYL)DIMETHYLKETENE ACETAL -
see SIM6496.0 1-METHOXY-1-(TRIMETHYLSILOXY)-2-METHYL-1-PROPENE



SIM6572.0
N-METHYL-N-TRIMETHYLSILYL-3-AMINOPROPYLTRIMETHOXYSILANE, 95%

$C_{10}H_{27}NO_3Si_2$	265.50				

Contains N-methylaminopropyltrimethoxysilane
See also SID4068.9
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X 10g ¥40,600



SIM6574.0
METHYL N-TRIMETHYLSILYLCARBAMATE

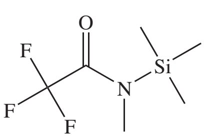
$C_5H_{13}NO_2Si$	147.25	66-7° / 15		0.963^{25}	1.4267
		Flashpoint: 32°C (90°F)			

Blocking agent employed in preparation of cephalosporins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18147-09-6] HMIS: 3-3-1-X 25g ¥25,700

SIM6575.0
METHYL 3-TRIMETHYLSILYLPROPYNOATE

$C_7H_{12}O_2Si$	156.26	65-70° / 10			1.4460

HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[42201-71-8] HMIS: 3-3-1-X 5g ¥51,700

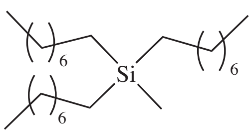


SIM6576.0
N-METHYL-N-TRIMETHYLSILYLTRIFLUOROACETAMIDE, 96%
MSTFA

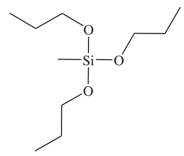
$C_6H_{12}F_3NOSi$	199.25	131-2°		1.074	1.3800
		Flashpoint: 26°C (79°F)			
		TOXICITY: ipr mouse, LDLo, 1,000 mg/kg			

Silylation reagent with volatile byproducts.[1]
1. Donike, M. *J. Chromatogr.* **1969,** *42*, 103.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[24589-78-4] TSCA EC 246-331-6 HMIS: 3-4-1-X 25g ¥22,500 100g ¥65,500

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

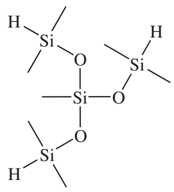


SIM6577.0
METHYLTRI-n-OCTYLSILANE
$C_{25}H_{54}Si$ 382.79 210° / 5 0.813 1.4520
Viscosity, -54°: 1,500 cSt
Viscosity, 25°: 19 cSt
Flashpoint: >110°C (>230°F)
Sila-hydrocarbon lubricant.[1]
1. Tamborski, C. et al. *Ind. Eng. Chem.* **1983,** *22*, 172.
See also SIM6559.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[3510-72-3] TSCA HMIS: 1-1-0-X 100g ¥35,300

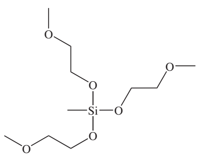


SIM6579.0
METHYLTRI-n-PROPOXYSILANE
$C_{10}H_{24}O_3Si$ 220.38 83-4° / 13 0.878 1.4085
Flashpoint: 60°C (140°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5581-66-8] (既) 2-2052 TSCA EC 226-978-0 HMIS: 2-2-1-X 25g ¥22,500

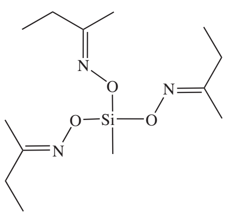
METHYLTRIS(CYCLOHEXYLAMINO)SILANE - see SIT8710.0 TRIS(CYCLOHEXYLAMINO)METHYLSILANE



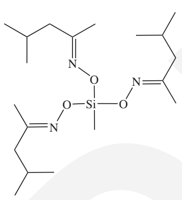
SIM6582.0
METHYLTRIS(DIMETHYLSILOXY)SILANE
$C_7H_{24}O_3Si_4$ 268.61 164° (-155°) 0.8612 1.3852
Flashpoint: 63°C (145°F)
Vapor pressure, 60°: 19 mm
Crosslinker for silicone RTVs
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[17082-46-1] EC 241-136-2 HMIS: 2-2-1-X 25g ¥17,200 100g ¥48,300



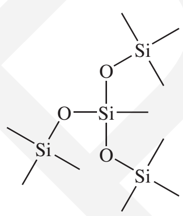
SIM6585.0
METHYLTRIS(METHOXYETHOXY)SILANE
$C_{10}H_{24}O_6Si$ 268.38 145° / 15 1.045 1.4178
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17980-64-2] TSCA EC 241-906-8 HMIS: 3-1-0-X 25g ¥14,600



SIM6590.0
METHYLTRIS(METHYLETHYLKETOXIMINO)SILANE, tech-95
METHYLTRIS(2-BUTANONEOXIME)SILANE
$C_{13}H_{27}N_3O_3Si$ 301.46 110-1° / 2 (-22°) 0.982 1.4548^{25}
Flashpoint: 90°C (194°F)
TOXICITY: oral rat, LD50: 2,000-3,000 mg/kg
Neutral cross-linker for condensation cure silicones
See also SIV9280.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[22984-54-9] (既) 2-2039 TSCA EC 245-366-4 HMIS: 2-2-1-X 100g ¥7,700 2kg ¥48,500 16kg ¥174,000
COMMERCIAL



SIM6590.2
METHYLTRIS(METHYLISOBUTYLKETOXIMINO)SILANE, tech-95
$C_{19}H_{39}N_3O_3Si$ 385.61 0.93 1.4513
Low toxicity neutral cross-linker for moisture cure silicone RTVs
See also SIM6590.0, SIV9081.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[37859-57-7] HMIS: 2-1-1-X 100g ¥10,900



SIM6592.0
METHYLTRIS(TRIMETHYLSILOXY)SILANE
M3T
$C_{10}H_{30}O_3Si_4$ 310.69 60° / 6 (-74°) 0.8497 1.3880
Viscosity: 1.57 cSt
Dipole moment: 1.11 debye
Flashpoint: 64°C (147°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Vapor pressure, 100°: 40 mm
Cosmetic vehicle
See also SIB1735.0, SID2650.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[17928-28-8] TSCA EC 241-867-7 HMIS: 1-2-0-X 100g ¥8,500 1kg ¥40,900 10kg ¥279,000
COMMERCIAL

METHYLVINYLDICHLOROSILANE - see SIV9084.0 VINYLMETHYLDICHLOROSILANE

Face of cubic array of truncated octahedra with alternating Si and Al atoms at vertices

SIM6593.0
MOLECULAR SIEVES, 3A, powder
$K_9Na_3[(AlO_2)_{12}(SiO_2)_{12}]\cdot 27H_2O$
Nominal pore diameter: 3Å
Typical bulk density, not compacted: 0.48 g/cm³
Equilibrium water absorption, 55% RH: 22%
Adsorbs water and ammonia, excludes ethane
Dries polar liquids such as methanol, ethanol, propylene
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[63231-69-6] TSCA HMIS: 1-0-0-X 1kg ¥28,200

SILICON COMPOUNDS

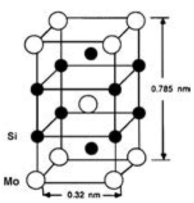
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

SIM6594.0
MOLECULAR SIEVES, 4A, powder
ZEOLITE A
$Na_{12}[(AlO_2)_{12}(SiO_2)_{12}]\cdot 27H_2O$
Nominal pore diameter: 4Å
Typical bulk density, not compacted: 0.37 g/cm³
Equilibrium water absorption, 55% RH: 22%
Adsorbs di-n-butylamine, excludes tri-n-butylamine
Dries liquids such as acetone, DMF, DMSO, pyridine
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[70955-01-0] TSCA HMIS: 1-0-0-X 1kg ¥28,200

SIM6594.2
MOLECULAR SIEVES, 4A, beads
$Na_{12}[(AlO_2)_{12}(SiO_2)_{12}]\cdot 27H_2O$
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[70955-01-0] TSCA HMIS: 1-0-0-X 1kg ¥28,700

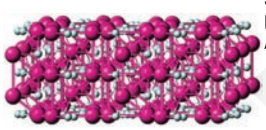
SIM6594.5
MOLECULAR SIEVES, 5A, powder
$Ca_{4.5}Na_3[(AlO_2)_{12}\cdot 30H_2O$
Nominal pore diameter: 5Å
Adsorbs butanol, excludes iso compounds
Efficient drying media for gases
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[69912-79-4] TSCA HMIS: 1-0-0-X 1kg ¥31,900

SIM6594.7
MOLECULAR SIEVES, 13X, powder
FAUJASITE
$Na_{86}[(AlO_2)_{86}(SiO_2)_{106}]\cdot XH_2O$
Nominal pore diameter: 10Å
Equilibrium water absorption, 55% RH: 28%
Removes mercaptans from hydrocarbons
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[12173-28-3] TSCA HMIS: 1-0-0-X 1kg ¥25,000

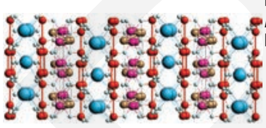


SIM6594.8
MOLYBDENUM DISILICIDE, 99+%
$MoSi_2$ — Mw 152.13 — (mp ~1,930°) — D_4^{20} 6.31
particle size: 5-10 µm
Thermal conductivity: 65 W/m°C
Employed in plasma spray refractory coatings including spacecraft engines
Reacts slowly with HF and HNO_3
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[12136-78-6] TSCA EC 235-231-8 HMIS: 2-2-0-X 100g ¥25,700

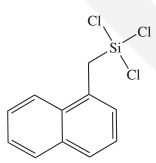
MSTFA - see SIM6576.0 N-METHYL-N-TRIMETHYLSILYLTRIFLUOROACETAMIDE


Crystal structure image courtesy of webmineral.com

SIM6594.85
MULLITE
$Al_6Si_2O_{13}$ — Mw 319.54 — D_4^{20} 3.05 — n_D^{20} 1.64
Particle Size: <44 µm
Typical bulk density, not compacted: 0.74 g/cm³
Mohs Hardness: 6.0-7.0
Orthorhombic dipyramidal
Colorless, remelted or calcined clay
Alumina & silica source, used in refractories, advanced ceramics, metallurgy
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1302-93-8] TSCA-E HMIS: 1-0-0-X 500g ¥10,900 10kg ¥58,000

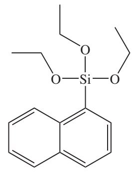

Crystal structure image courtesy of webmineral.com

SIM6594.9
MUSCOVITE
POTASSIUM MICA
$K_2O\cdot 3Al_2O_3\cdot 6SiO_2\cdot 2H_2O$ — Mw 760.62 / 796.65 — D_4^{20} 2.77-2.88 — n_D^{20} 1.55-1.61
Particle Size: 50 µm median
Typical bulk density, not compacted: 0.25 g/cm³
Dielectric constant: 6.0-6.6
Mohs Hardness: 2.5-3.0
Monoclinic prismatic
White, monoclinic, fine, platy crystals, transparent
Forms composites or, after exfoliation, nanocomposites
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12001-26-2] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 4kg ¥36,000

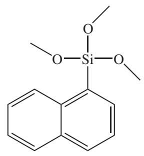


SIN6596.0
(1-NAPHTHYLMETHYL)TRICHLOROSILANE
$C_{11}H_9Cl_3Si$ — Mw 275.64 — bp 150-1° / 7 — D_4^{20} 1.3112 — n_D^{20} 1.5974
Intermediate for high refractive index resins
See also SID4553.5
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17998-59-3] HMIS: 3-2-1-X 10g ¥34,200

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

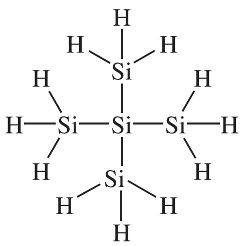


SIN6596.8
1-NAPHTHYLTRIETHOXYSILANE
$C_{16}H_{22}O_3Si$ 290.43 121-3° / 0.1 1.0476[25] 1.5273
Flashpoint: >110°C (>230°F)
See also SIP6720.77
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17938-06-6] HMIS: 2-1-1-X 5g ¥53,300

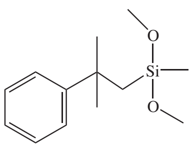


SIN6597.0
1-NAPHTHYLTRIMETHOXYSILANE
$C_{13}H_{16}O_3Si$ 248.35 150° / 2 (33-5°) 1.5562
Employed in high refractive index surface modification
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18052-76-1] HMIS: 3-2-1-X 5g ¥53,300

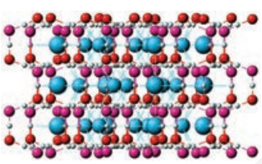
NEOHEXYLDIMETHYLCHLOROSILANE - see SID4065.0 (3,3-DIMETHYLBUTYL)DIMETHYLCHLOROSILANE



SIN6597.07
NEOPENTASILANE
$H_{12}Si_5$ 152.52 132-4°
PYROPHORIC
Dipole moment: 0.0 debye
Vapor pressure, 25°: 15 mm
Vapor pressure, 67°: 50 mm
Employed in CVD epitaxy of silicon.[1,2,3]
Forms silicon nanowires by gold nanoparticle catalyzed deposition.[4]
1. Sturm, J. et al. *ECS Transactions*, **2008**, *16*, 799.
2. Chung, K. et al. *Appl. Phys. Lett.* **2008**, *92*, 113506.
3. Singh, K. et al. U.S. Patent 7,645,339, 2010.
4. Kampken, B. et al. *Beilstein J. Nanotech.* **2012**, *3*, 535.
See also SII6463.4, SIT8709.6
HYDROLYTIC SENSITIVITY: 10: reacts extremely rapidly with moisture and oxygen - pyrophoric - sealed system required
[15947-57-6] HMIS: 3-4-3-X 5g ¥209,000*
** includes zCYL-HPS-0050 cylinder*



SIN6597.1
NEOPHYLMETHYLDIMETHOXYSILANE
$C_{13}H_{22}O_2Si$ 238.40 0.976 1.4843
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[157223-33-1] HMIS: 3-2-1-X 10g ¥39,300

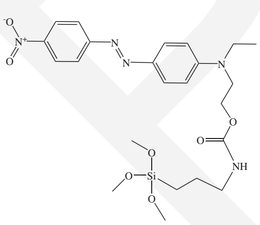


Crystal structure image courtesy of webmineral.com

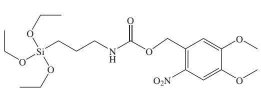
SIN6597.23
NEPHELINE
SYENITE-K
$(Na,K)AlSiO_4$ 146.08 2.59 1.53
Particle Size: <24 µm
Mohs Hardness: 6.0
Hexagonal pyramidal
White, hexagonal prismatic, rough faces
Source of AL K. Flux for advanced ceramics
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[37244-96-5] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 10kg ¥53,900

$NbSi_2$

SIN6597.2
NIOBIUM DISILICIDE, 99+%
$NbSi_2$ 149.08 (1,950°) 5.7
-325 mesh powder
Conductivity: 6.3 mohm-cm
Component in ultrahigh temperature composites for jet engines.[1]
1. Bewlay, B. et al. *MRS Bull.* **2003,** *28(9)*, 646.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[12034-80-9] TSCA EC 234-812-3 HMIS: 1-0-0-X 25g ¥31,600

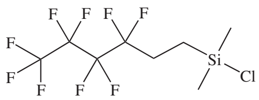


SIN6597.24
4-NITRO-4'(N-ETHYL-N-TRIMETHOXYSILYLCARBAMATO)AMINOAZOBENZENE, tech-95
DISPERSE RED SILANE
$C_{23}H_{33}N_5O_7Si$ 519.62 (78-85°)
UV max: 474 nm
Soluble: THF, DMF
Chromophoric silane- forms hybrid organic-inorganic materials w/ second-order nonlinear optics.[1]
1. Cui, Y. et al. *Dyes & Pigments,* **2004,** *62*, 43.
See also SIN6597.25
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[675129-70-1] HMIS: 3-1-1-X 1.0g ¥42,700

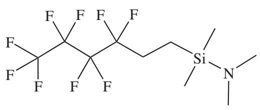


SIN6597.25
NITROVERATRYLOXYCARBONYLAMIDOPROPYLTRIETHOXYSILANE, 10% in tetrahydrofuran
N-TRIETHOXYSILYLPROPYL-O-4,5-DIMETHOXY-2-NITROBENZYLCARBAMATE
$C_{19}H_{32}N_2O_9Si$ 460.56
UV max: 365 nm
Flashpoint: -14°C (7°F)
Photosensitive silane for lithography.[1]
1. del Campo, A. et al. *Angew. Chem.* **2005**, *44*, 4707
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[188541-09-5] HMIS: 3-4-1-X 1.0g ¥77,700

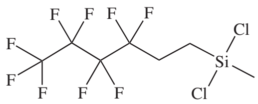
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



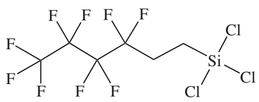
SIN6597.3
NONAFLUOROHEXYLDIMETHYLCHLOROSILANE
$C_8H_{10}ClF_9Si$ — Mw 340.69 — bp 162-4° — D_4^{20} 1.3422
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[119386-82-2] HMIS: 3-3-1-X 10g ¥15,400



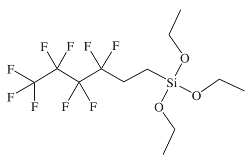
SIN6597.4
NONAFLUOROHEXYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_{10}H_{16}F_9NSi$ — Mw 349.31 — bp 86-8° / 35 — D_4^{20} 1.214
Flashpoint: 42°C (108°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-3-1-X 10g ¥26,800



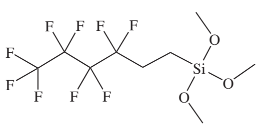
SIN6597.5
NONAFLUOROHEXYLMETHYLDICHLOROSILANE
$C_7H_7Cl_2F_9Si$ — Mw 361.11 — bp 112-3° / 120 — D_4^{20} 1.454
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[38436-16-7] (既) 2-2047 TSCA-L EC 253-930-6 HMIS: 3-3-1-X 10g ¥15,400



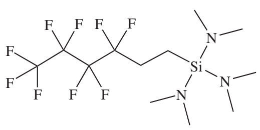
SIN6597.6
NONAFLUOROHEXYLTRICHLOROSILANE
$C_6H_4Cl_3F_9Si$ — Mw 381.53 — bp 70-2° / 15 — D_4^{20} 1.542
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[78560-47-1] TSCA-L HMIS: 3-2-1-X 10g ¥10,600 50g ¥32,100



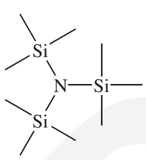
SIN6597.65 *COMMERCIAL*
NONAFLUOROHEXYLTRIETHOXYSILANE
$C_{12}H_{19}F_9O_3Si$ — Mw 410.35 — bp 96° / 15 — D_4^{20} 1.201 — n_D^{20} 1.3502
Critical surface tension, treated surface: 23 mN/m
Oleophobic, hydrophobic surface treatment
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[102390-98-7] TSCA-L HMIS: 2-2-1-X 25g ¥25,200 100g ¥63,500 2.5kg ¥348,000



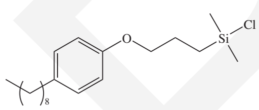
SIN6597.7
NONAFLUOROHEXYLTRIMETHOXYSILANE
$C_9H_{13}F_9O_3Si$ — Mw 368.27 — bp 68-9° / 15 — D_4^{20} 1.335 — n_D^{20} 1.3376
Flashpoint: 71°C (160°F)
Viscosity: 2 cSt
Improves hydrolytic stability of dental composites.[1]
1. Nikei, S. et al. *J. Dent. Res.* **2002**, *81(7)*, 482.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[85877-79-8] TSCA-L HMIS: 3-2-1-X 10g ¥14,400 50g ¥37,400



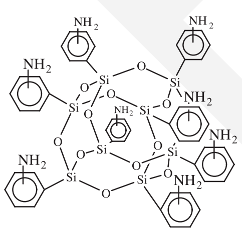
SIN6597.8
NONAFLUOROHEXYLTRIS(DIMETHYLAMINO)SILANE
$C_{12}H_{22}F_9N_3Si$ — Mw 407.40 — bp 82-4° / 5 — D_4^{20} 1.200
Flashpoint: 42°C (108°F)
Forms low surface energy films by vapor phase deposition
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[186599-46-2] TSCA-L HMIS: 3-3-1-X 10g ¥45,900



SIN6597.9
NONAMETHYLTRISILAZANE
NITRILOTRIS(TRIMETHYLSILANE)
$C_9H_{27}NSi_3$ — Mw 233.58 — bp 76° / 12 — (mp 70°) — D_4^{20} 0.863 — n_D^{20} 1.455
Flashpoint: 67°C (153°F)
pKa: 4.70
Reagent for the preparation of TMS nitrido-metal complexes from metal halides.[1]
Used in the trifluoromethylation of ketones with HCF_3.[2]
1. Rhiel, M. et al. *Angew. Chem.* **1994,** *106*, 599.
2. Lange, S. et al. *J. Org. Chem.* **2000,** *65*, 8848.
See also SIT8715.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1586-73-8] TSCA EC 216-445-0 HMIS: 2-2-1-X 50g ¥26,800

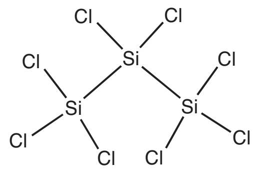


SIN6598.0
p-NONYLPHENOXYPROPYLDIMETHYLCHLOROSILANE, tech-95
$C_{20}H_{35}ClOSi$ — Mw 355.04 — bp 181° / 0.75 — D_4^{20} 0.963 — n_D^{20} 1.4925
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-1-1-X 10g ¥34,200



SIO6600.0
OCTA(AMINOPHENYL)-T8-SILSESQUIOXANE
$C_{48}H_{48}N_8O_{12}Si_8$ — Mw 1153.64
Mixture of 1 and 2 regio isomers, exo and endo
Component in low density organic aerogels for aerospace applications
Building block for polyimide nanocomposites.[1]
1. Tamaki, R. et al. *Chem. Mater.* **2003,** *15*, 793.
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[518359-82-5] HMIS: 2-1-0-X 5g ¥55,400

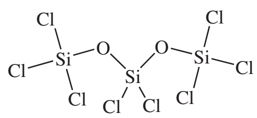
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIO6601.0
OCTACHLOROTRISILANE, 96%

Cl_8Si_3	367.88	213-5°	(-67°)	1.61	1.513

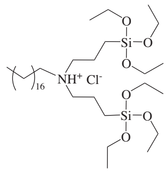
Contains homologs — Flashpoint: 78°C (172°F)
ΔHvap: 51 kJ/mole — Autoignition temperature: 320°C
Vapor pressure, 90°: 10 mm
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13596-23-1] EC 237-041-0 HMIS: 3-2-1-X 10g ¥77,700



SIO6605.0
OCTACHLOROTRISILOXANE, 95%

$Cl_8O_2Si_3$	399.88	184°	(-47°)	1.36	1.4585

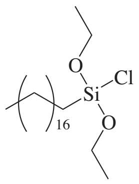
Vapor pressure, 0°: 1.5 mm
Forms self-assembled monolayers with orientation normal to substrate
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[31323-44-1] TSCA EC 250-570-1 HMIS: 3-0-2-X 10g ¥51,200



SIO6606.0
OCTADECYLBIS(TRIETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 50% in ethanol

$C_{36}H_{80}ClNO_6Si_2$	714.66			0.894	1.424^{25}

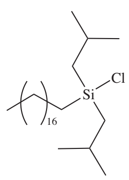
Contains 4-6% bis(triethoxysilylpropyl)amine — Flashpoint: 15°C (59°F)
Dipodal quat, immobilizable phase transfer catalyst
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-4-1-X 25g ¥22,500



SIO6607.0
OCTADECYLDIETHOXYCHLOROSILANE, tech-95

$C_{22}H_{47}ClO_2Si$	407.15	164° / 2		0.90	

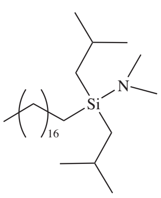
Contains ethoxydichlorosilane analog
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[33734-79-1] HMIS: 3-2-1-X 25g ¥25,200



SIO6608.0
n-OCTADECYLDIISOBUTYLCHLOROSILANE, 95%

$C_{26}H_{55}ClSi$	431.27	196-8° / 0.2		0.856	1.459

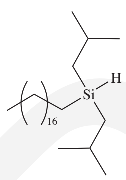
Forms hydrolytically stable monolayers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[162578-86-1] HMIS: 3-2-1-X 25g ¥55,400



SIO6610.0
n-OCTADECYLDIISOBUTYL(DIMETHYLAMINO)SILANE, 95%

$C_{28}H_{61}NSi$	439.89	214-220° / 0.4		0.828	1.459

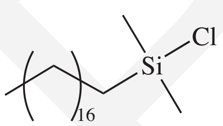
Contains non-functional silahydrocarbons — Flashpoint: >110°C (>230°F)
Provides highly stable C_{18} stationary phases for LC.[1]
1. Kirkland, J. et al. *LC-GC Int'l.* **1993**, *6*, 436.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[151613-23-9] HMIS: 2-1-0-X 5g ¥26,300



SIO6611.0
n-OCTADECYLDIISOBUTYLSILANE

$C_{26}H_{56}Si$	396.62	170-9° / 0.4		0.783^{25}	

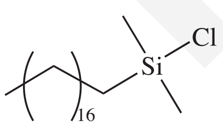
Flashpoint: >110°C (>230°F)
Sterically hindered, oleophilic reducing agent
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
HMIS: 2-2-1-X 1.0g ¥26,000



SIO6615.0
n-OCTADECYLDIMETHYLCHLOROSILANE
DIMETHYL-n-OCTADECYLCHLOROSILANE

$C_{20}H_{43}ClSi$	347.10	159° / 0.1	(28-30°)	0.856^{29}	1.4498^{29}

Contains 5-10% C_{18} isomers — Flashpoint: 201°C (394°F)
Employed in bonded HPLC reverse phases.[1]
1. Wise, S. et al. In *Silanes Surfaces & Interfaces;* Leyden, D., Ed.; Gordon & Breach: 1986; p349.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18643-08-8] (既) 2-2041 TSCA EC 242-472-2 HMIS: 3-1-1-X 25g ¥9,100 2kg ¥118,000
COMMERCIAL

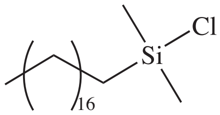


SIO6615.1
n-OCTADECYLDIMETHYLCHLOROSILANE, 97%
DIMETHYL-n-OCTADECYLCHLOROSILANE

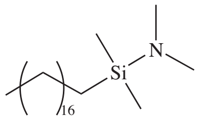
$C_{20}H_{43}ClSi$	347.10	159° / 0.1	(28-30°)	0.856^{29}	1.4998^{29}

Contains <5% C_{18} isomers — Flashpoint: 201°C (394°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18643-08-8] (既) 2-2041 TSCA EC 242-472-2 HMIS: 3-1-1-X 25g ¥13,700 100g ¥36,500

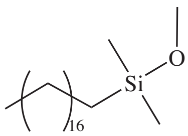
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



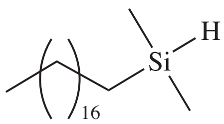
SIO6615.2 — *COMMERCIAL*
n-OCTADECYLDIMETHYLCHLOROSILANE, 70% in toluene
$C_{20}H_{43}ClSi$ 347.10 159° / 0.1 0.854
Contains 5-10% C_{18} isomers Flashpoint: 24°C (75°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18643-08-8] (既) 2-2041 TSCA EC 242-472-2 HMIS: 3-4-1-X 25g ¥9,800 750g ¥53,000



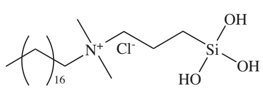
SIO6617.0
n-OCTADECYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_{22}H_{49}NSi$ 355.72 160° / 0.1 0.8175 1.4512
Contains 5-10% C_{18} isomers
Forms bonded phases for HPLC
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[76328-77-3] TSCA HMIS: 3-3-1-X 10g ¥16,400 50g ¥55,400



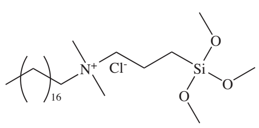
SIO6618.0
n-OCTADECYLDIMETHYLMETHOXYSILANE
$C_{21}H_{46}OSi$ 342.68 184-6° / 0.2 0.83^{25} 1.444
Contains 5-10% C_{18} isomers
Employed in SAM resist.[1]
1. Oh, T. et al. *Mol. Cryst. Liq. Cryst. Sci. Technol., Sect. A* **1999,** *337*, 7.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[71808-65-6] TSCA EC 276-039-4 HMIS: 2-1-0-X 25g ¥17,200 100g ¥48,300



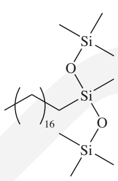
SIO6619.0
n-OCTADECYLDIMETHYLSILANE
$C_{20}H_{44}Si$ 312.66 150-5° / 0.4 0.789 1.448
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[32395-58-7] HMIS: 2-2-1-X 5g ¥15,100 25g ¥50,700



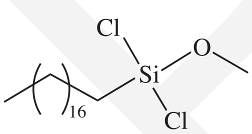
SIO6619.5
OCTADECYLDIMETHYL(3-TRIHYDROXYSILYLPROPYL)AMMONIUM CHLORIDE, 5% in water
$C_{23}H_{52}ClNO_3Si$ 454.2 0.988
pH: 6.1-6.3
Anti-static compound
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
HMIS: 1-0-0-X 100g ¥9,800 2kg ¥41,000



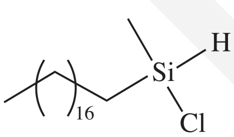
SIO6620.0 — *COMMERCIAL*
OCTADECYLDIMETHYL(3-TRIMETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 60% in methanol
$C_{26}H_{58}ClNO_3Si$ 496.29 0.89
Contains 3-5% $Cl(CH_2)_3Si(OMe)_3$ Flashpoint: 15°C (59°F)
Autoignition temperature: 230°C
Employed as a glass lubricant
Orients liquid crystals
Provides an antistatic surface coating
Dispersion/coupling agent for high density magnetic recording media.[1]
Application as immobilizable antimicrobial reported.[2]
1. Vincent, H. In *Chemically Modified Oxide Surfaces;* D. Leyden, D., Ed.; Gordon & Breach: 1990; p.305.
2. White, W. et al. In *Silanes, Surfaces & Interfaces;* Leyden, D., Ed.; Gordon & Breach: 1986; p.107.
See also SID3392.0, SIO6606.0, SID6619.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[27668-52-6] (既) 2-2095 TSCA EC 248-595-8 HMIS: 3-4-0-X 25g ¥10,800 2kg ¥73,000 16kg ¥272,000



SIO6622.0
3-OCTADECYLHEPTAMETHYLTRISILOXANE, 95%
STEARYL TRIMETHICONE
$C_{25}H_{58}O_2Si_3$ 474.99 0.825 1.4334
Viscosity: 13 cSt
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[167160-55-6] HMIS: 1-1-0-X 100g ¥26,300

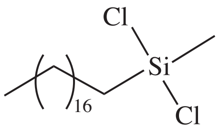


SIO6624.0
n-OCTADECYLMETHOXYDICHLOROSILANE, tech-95
$C_{19}H_{40}Cl_2OSi$ 383.51 144-7° / 1.5 0.94^{25} 1.452
Contains 5-10% C_{18} isomers
Maintains reactivity of octadecyltrichlorosilane, but with reduced HCl byproduct
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[211934-50-8] HMIS: 3-1-1-X 25g ¥13,800 100g ¥37,100

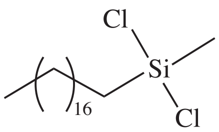


SIO6624.4
OCTADECYLMETHYLCHLOROSILANE
$C_{19}H_{41}ClSi$ 333.07 175-7° / 0.5 (18-19°) 0.862 1.4533
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[124694-97-9] TSCA-L HMIS: 3-1-1-X 10g ¥22,500

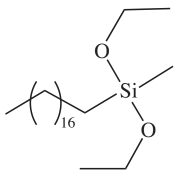
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



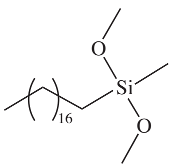
SIO6625.0
n-OCTADECYLMETHYLDICHLOROSILANE
$C_{19}H_{40}Cl_2Si$ 367.52 185° / 2.5 (24-6°) 0.930
Contains 5-10% C_{18} isomers — Flashpoint: 185°C (365°F)
Viscosity: 7 cSt — TOXICITY: oral rat, LD50: 200-2,000 mg/kg
Autoignition temperature: 230°C
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[5157-75-5] (既) 2-2041 TSCA EC 225-931-1 HMIS: 3-1-1-X 25g ¥11,100 500g ¥74,000



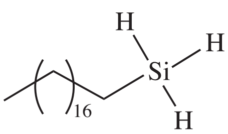
SIO6625.1
n-OCTADECYLMETHYLDICHLOROSILANE
$C_{19}H_{40}Cl_2Si$ 367.52 185° / 2.5 (24-6°) 0.930
Contains <5% C_{18} isomers
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[5157-75-5] TSCA EC 225-931-1 HMIS: 3-1-1-X 25g ¥19,400



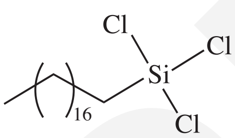
SIO6627.0
n-OCTADECYLMETHYLDIETHOXYSILANE
$C_{23}H_{50}O_2Si$ 386.73 197° / 2 0.852 1.4407
Contains 5-10% C_{18} isomers — Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[67859-75-0] TSCA EC 267-423-2 HMIS: 2-1-0-X 25g ¥13,500



SIO6629.0
n-OCTADECYLMETHYLDIMETHOXYSILANE
$C_{21}H_{46}O_2Si$ 358.68 190° / 3 (12-18°) 0.85 1.4427
Contains 5-10% C_{18} isomers — Flashpoint: >110°C (>230°F)
Autoignition temperature: 225°C
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[70851-50-2] TSCA EC 274-936-5 HMIS: 3-1-0-X 25g ¥17,200 100g ¥48,300

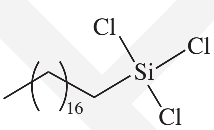


SIO6635.0
n-OCTADECYLSILANE
$C_{18}H_{40}Si$ 284.60 195° / 15 (29°) 0.794
Contains 4-6% C_{18} isomers — Flashpoint: >110°C (>230°F)
Forms self-assembled monolayers on titanium.[1]
Reacts onto a gold surface to form monolayers of long alkyl chains.[2]
Forms SAMs on titanium, gold and silicon surfaces.[3]
1. Fadea, A. et al. *J. Am. Chem. Soc.* **1989,** *121*, 12184.
2. Owens, T. M. et al. *J. Am. Chem. Soc.* **2002**, *124*, 6800.
3. Arkles, B. et al. *J. Adhes. Sci. Technol.* **2012**, *26*, 41.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18623-11-5] TSCA EC 242-453-9 HMIS: 2-1-1-X 25g ¥15,600 100g ¥43,200

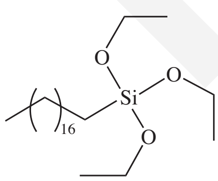


SIO6640.0
n-OCTADECYLTRICHLOROSILANE, 95%
OTS
$C_{18}H_{37}Cl_3Si$ 387.93 160-2° / 3 (22°) 0.950^{22} 1.4602
Contains 5-10% C_{18} isomers — Flashpoint: 189°C (372°F)
Provides lipophilic surface coatings
Employed in patterning and printing of electroactive molecular films.[1,2]
Immobilizes physiologically active cell organelles.[3]
Treated substrates increase electron transport of pentacene films.[4]
1. Huan, Z. et al. *Synth. Met.* **1997,** *85*, 1375.
2. Jeon, J. et al. *Langmuir* **1997,** *13*, 3382.
3. Arkles, B. et al. *J. Biol. Chem.* **1976,** *250*, 8856.
4. Skankar, K. et al. *J. Mater. Res.* **2004,** *19*, 2003.
See also SIO6624.0 for reduced chloride version; SIB1813.7 for dipodal version; SID4472.0 for embedded hydrophilicity version
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[112-04-9] (既) 2-2041 TSCA EC 203-930-7 HMIS: 3-1-1-X 25g ¥3,900 750g ¥48,000 15kg ¥298,000

COMMERCIAL

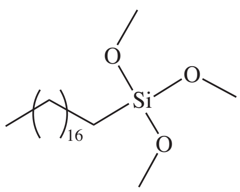


SIO6640.1
n-OCTADECYLTRICHLOROSILANE
$C_{18}H_{37}Cl_3Si$ 387.93 160-2° / 3 (22°) 0.950^{22} 1.4602
Contains <5% C_{18} isomers
Highest concentration of terminal silane substitution
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[112-04-9] (既) 2-2041 TSCA EC 203-930-7 HMIS: 3-1-1-X 25g ¥6,400 100g ¥15,100



SIO6642.0
n-OCTADECYLTRIETHOXYSILANE, 95%
$C_{24}H_{52}O_3Si$ 416.76 165-9° / 2 (10-12°) 0.87 1.4386
Contains 5-10% C_{18} isomers — Flashpoint: >150°C (>302°F)
Forms hydrophobic, oleophilic coatings
See also SIB1974.2, SIH5922.0, SIS6952.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[7399-00-0] EC 230-995-9 HMIS: 2-1-0-X 25g ¥11,400 100g ¥28,900

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



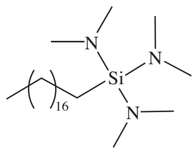
SIO6645.0
n-OCTADECYLTRIMETHOXYSILANE, 95%

$C_{21}H_{46}O_3Si$	374.68	170° / 0.1	(13-17°)	0.885	1.439

Contains 5-10% C_{18} isomers
Flashpoint: 140°C (284°F)
TOXICITY: oral rat, LD50: >5,000 mg/kg

Forms hydrophobic, oleophilic coatings
Forms clear, ordered films with tetramethoxysilane.[1]
Undergoes oscillatory adsorption to form SAMs.[2]
1. Shimjima, A. et al. *J. Am. Chem. Soc.* **1998,** *120*, 4528.
2. Thomsen, L. et al. *Surf. & Interface Analysis* **2005,** *37*, 472.
See also SIS6952.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3069-42-9] TSCA EC 221-339-2 HMIS: 2-1-1-X 25g ¥6,800 2kg ¥136,000 15kg ¥400,000

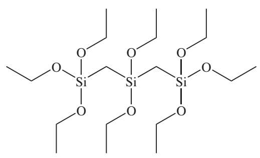
COMMERCIAL



SIO6648.0
n-OCTADECYLTRIS(DIMETHYLAMINO)SILANE

$C_{24}H_{55}N_3Si$	413.82	220-230° / 0.1		0.857	

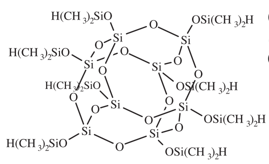
Forms SAMs by MOCVD
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X 5g ¥26,300



SIO6660.0
OCTAETHOXY-1,3,5-TRISILAPENTANE

$C_{18}H_{44}O_8Si_3$	472.80	125° / 4		0.9886	1.4184

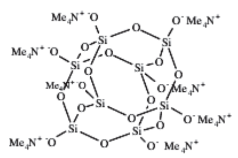
Forms periodic mesoporous particles by sol-gel.[1]
1. Mohanty, P. et al. *Nanoscale Res. Lett.* **2009**, *4*, 169.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1263429-91-9] HMIS: 3-2-1-X 10g ¥20,400



SIO6696.5
OCTAKIS(DIMETHYLSILOXY)-T8-SILSESQUIOXANE
OCTAKIS(DIMETHYLSILOXY)OCTAPRISMOSILSESQUIOXANE

$C_{16}H_{56}O_{20}Si_{16}$	1017.98		(>300° dec.)		

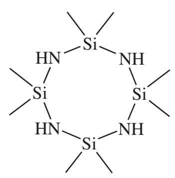
Soluble: hexane, methylene chloride
Forms derivatives suitable for composite dental materials.[1]
1. Sellinger, A. et al. *Chem. Mater.* **1996,** *8*, 1592.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[125756-69-6] HMIS: 2-1-1-X 2.5g ¥13,800 10g ¥36,900



SIO6696.9
OCTAKIS(TETRAMETHYLAMMONIUM)-T8-SILSESQUIOXANE, hydrate

$C_{32}H_{96}N_8O_{20}Si_8 \cdot XH_2O$	1137.85		(135-143°)		

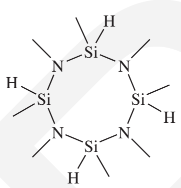
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[69667-29-4] HMIS: 3-1-0-X 10g ¥16,200 50g ¥54,400



SIO6698.0
1,1,3,3,5,5,7,7-OCTAMETHYLCYCLOTETRASILAZANE
OCTAMETHYLSILANETETRAMINE

$C_8H_{28}N_4Si_4$	292.68	225°	(97°)	0.950^{22}	1.458^{25}

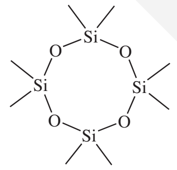
ΔHform: 787 kJ/mole
Flashpoint: 66°C (151°F)
Forms α-Si_3N_4 by ammonia thermal synthesis.[1]
1. Schaible, S. et al. *Applied Organomet. Chem.* **1993,** *7*, 53.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1020-84-4] TSCA EC 213-817-4 HMIS: 2-2-1-X 25g ¥13,000 100g ¥34,500



SIO6699.0
1,2,3,4,5,6,7,8-OCTAMETHYLCYCLOTETRASILAZANE, 95%

$C_8H_{28}N_4Si_4$	292.68	104-5° / 3.5		0.97	1.4800^{25}

See also SIH6103.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2587-47-5] HMIS: 2-2-1-X 10g ¥15,900 50g ¥53,300



SIO6700.0
OCTAMETHYLCYCLOTETRASILOXANE, 98%
D4

$C_8H_{24}O_4Si_4$	296.61	175-6°	(17.4°)	0.956	1.3968

Viscosity: 2.3 cSt
ΔHfus: 18.4 kJ/mole
ΔHvap: 45.6 kJ/mole
Dipole moment: 1.09 debye
Dielectric constant: 2.39
Ring strain: 1.00 kJ/mole
Surface tension, 20°: 17.9 mN/m
Octanol/water partition coefficient, log K_{ow}: 5.1

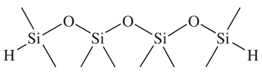
Flashpoint: 51°C (124°F)
Autoignition temperature: 400°C
Vapor pressure, 23°: 1 mm
Critical temperature: 314°C
Critical pressure: 1.03 mPa
Specific heat: 502 J/g/°
Coefficient of thermal expansion: 0.8 x 10^{-3}
Cryoscopic constant: 11.2
Henry's law constant, Hc: 3.4 ± 1.7
Ea, polym: 79 kJ/mole

Solubility, water: 50 μg/l
Basic building block for silicones by ring-opening polymerization
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[556-67-2] (既) 7-475 TSCA EC 209-136-7 HMIS: 1-2-0-X 100g ¥4,500 2kg ¥24,000 15kg ¥137,000

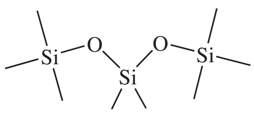
COMMERCIAL

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

3H,5H-OCTAMETHYLTETRASILOXANE - see SIB1838.0 1,3-BIS(TRIMETHYLSILOXY)-1,3-DIMETHYLDISILOXANE

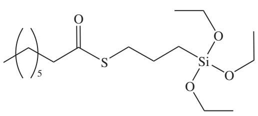


SIO6702.0
1,1,3,3,5,5,7,7-OCTAMETHYLTETRASILOXANE, 80% in octamethylcyclotetrasiloxane
(1,7 H)-OCTAMETHYLTETRASILOXANE, M'DDM'
$C_8H_{26}O_3Si_4$ — 282.63 — 169-70° — 0.863 — 1.3875
See also SIH6117.0, DMS-HO3 in polymer section
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[1000-05-1] TSCA EC 213-669-0 HMIS: 2-2-1-X 25g ¥19,400

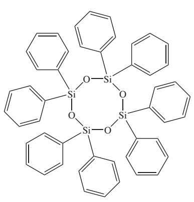


SIO6703.0
OCTAMETHYLTRISILOXANE
MDM
$C_8H_{24}O_2Si_3$ — 236.53 — 152-3° — (-86°) — 0.820 — 1.3848
Viscosity, -70°: 20 cSt
Viscosity, 20°: 1.0 cSt
ΔHcomb: -7,786 kJ/mole
ΔHvap: 169.1 kJ/mole
Dipole moment: 0.80 debye
Dielectric constant: 2.30
Solubility parameter: 7.0
Solubility, water: 34 ppb
Surface tension: 17.4 mN/m
Flashpoint: 39°C (102°F)
Autoignition temperature: 418°C
Vapor pressure, 25°: 3.9 mm
Critical temperature: 290°C
Coefficient of thermal expansion: 1.3 x 10^{-3}
Thermal conductivity, 27°: 0.1107 W/m°C
Heat capacity, 27°: 1.546 kJ/kg°C
High purity, non-polar solvent
See also SIE4895.0, SID2655.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[107-51-7] (既) 7-476 TSCA EC 203-497-4 HMIS: 1-3-0-X 25g ¥6,600 500g ¥38,500 2.5kg ¥93,000

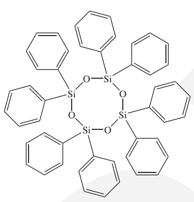
COMMERCIAL



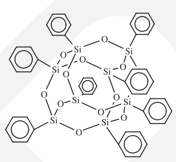
SIO6704.0
S-(OCTANOYL)MERCAPTOPROPYLTRIETHOXYSILANE
$C_{17}H_{36}O_4SSi$ — 364.62 — 0.9686 — 1.4515
Flashpoint: 176°C (349°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Masked mercaptan - deblocked with alcohols
Latent coupling agent for butadiene rubber
See also SID3545.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[220727-26-4] TSCA HMIS: 2-1-1-X 25g ¥10,300 100g ¥25,700



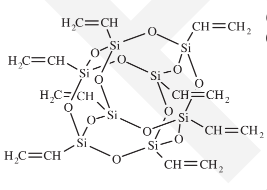
SIO6705.0
OCTAPHENYLCYCLOTETRASILOXANE, 95%
$C_{48}H_{40}O_4Si_4$ — 793.18 — 332° / 1 — (197-9°) — 1.185 — 1.62
ΔHcomb: 26,909 kJ/mole
ΔHform: -13,307 kJ/mole
Employed in preparation of diphenylsiloxane copolymers
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[546-56-5] (既) 7-473 TSCA EC 208-904-9 HMIS: 1-1-0-X 25g ¥8,800 500g ¥65,000



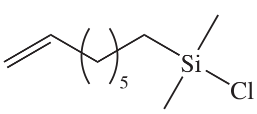
SIO6705.1
OCTAPHENYLCYCLOTETRASILOXANE, 98%
$C_{48}H_{40}O_4Si_4$ — 793.18 — 332° / 1 — (197-9°) — 1.185 — 1.62
Phenylsiloxanes can be employed as anti-stiction coatings for MEMS.[1]
1. Martin, J. In *Nanotribology;* S. Hsu, Kluwer Academic, 2001.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[546-56-5] (既) 7-473 TSCA EC 208-904-9 HMIS: 1-1-0-X 500g ¥94,700



SIO6705.5
OCTAPHENYL-T8-SILSESQUIOXANE
$C_{48}H_{40}O_{12}Si_8$ — 1033.52 — (350°)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[5256-79-1] TSCA HMIS: 2-1-0-X 10g ¥22,500



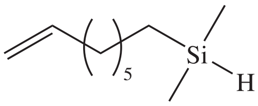
SIO6706.0
OCTAVINYL-T8-SILSESQUIOXANE
$C_{16}H_{24}O_{12}Si_8$ — 633.04 — (273° dec.)
UV absorption, max: 264 nm; emission 287 nm
Soluble: THF, chloroform, hexane
Undergoes hydrosilylation reactions with monomers and polymers.[1,2]
1. Weidner, R. et al. U.S. Patent 5,047,492, 1997.
2. Kobayashi, T. et al. *Chem. Lett.* **1998,** 763.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[69655-76-1] HMIS: 1-1-0-X 5g ¥50,100



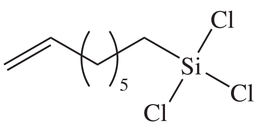
SIO6707.0
7-OCTENYLDIMETHYLCHLOROSILANE, tech-95
$C_{10}H_{21}ClSi$ — 204.81 — 98° / 11 — 0.80 — 1.4455
Contains 10-15% internal olefin isomers
Flashpoint: 95°C (203°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17196-12-2] TSCA EC 241-236-6 HMIS: 3-1-1-X 25g ¥18,300

SILICON COMPOUNDS

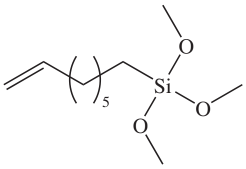
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



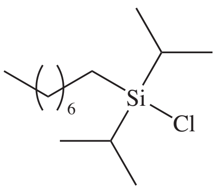
SIO6707.5
7-OCTENYLDIMETHYLSILANE, tech-95
$C_{10}H_{22}Si$ — Mw 170.36 — bp 55-7° / 6 — D_4^{20} 0.760
Contains 10-15% internal olefin isomers
Polymerizes w/ Pt catalyst
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[52770-61-3] HMIS: 2-2-1-X 5g ¥27,800



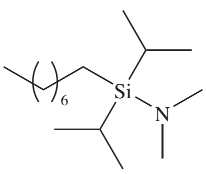
SIO6708.0
7-OCTENYLTRICHLOROSILANE, tech-95
$C_8H_{15}Cl_3Si$ — Mw 245.65 — bp 223-4° — D_4^{20} 1.07 — n_D^{20} 1.4578
Contains 10-15% internal olefin isomers — Flashpoint: 94°C (201°F)
Immobilizes DNA at terminus.[1]
1. Bensimon, A. et al. *Science* **1994,** *265*, 2096.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[52217-52-4] TSCA EC 257-747-2 HMIS: 3-2-1-X 10g ¥13,300 50g ¥42,700



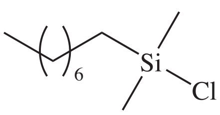
SIO6709.0
7-OCTENYLTRIMETHOXYSILANE, tech-95
$C_{11}H_{24}O_3Si$ — Mw 232.39 — bp 48-9° / 0.1 — D_4^{20} 0.94 — n_D^{20} 1.4305
Contains 10-15% internal olefin isomers — Flashpoint: 95°C (203°F)
Coupling agent for "in situ" polymerization of acrylamide for capillary electrophoresis.[1]
Employed in stretched DNA fibers for FISH (**F**luorescent **I**n **S**itu **H**ybridization) mapping.[2]
Surface treatment for FISH and replication mapping on DNA fibers.[3]
1. Cifuentes, A. et al. *J. Chromatogr., A* **1999,** *830(2)*, 423.
2. Labit, H. et al. *BioTechniques* **2008**, *45*, 649.
3. Labit, H. et al. *Biotechniques Protocol Guide* **2010** (48) doi 10.2144/000113255.
See also SIA0489.0, SIU9049.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[52217-57-9] TSCA HMIS: 3-1-1-X 5g ¥13,800 25g ¥44,800



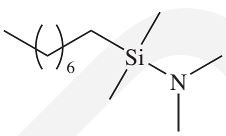
SIO6710.5
n-OCTYLDIISOPROPYLCHLOROSILANE
$C_{14}H_{31}ClSi$ — Mw 262.94 — bp 95-9° / 0.5 — D_4^{20} 0.875 — n_D^{20} 1.4550
Flashpoint: >110°C (>230°F)
Reagent for preparation of HPLC stationary phases with high stability and efficiency.[1]
1. Kirkland, J. et al. *J. Chromatogr. Sci.* **1994,** *32*, 473.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[117559-37-2] HMIS: 3-1-1-X 10g ¥26,300



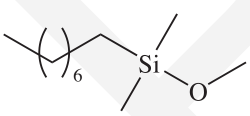
SIO6710.7
n-OCTYLDIISOPROPYL(DIMETHYLAMINO)SILANE
$C_{16}H_{37}NSi$ — Mw 271.57 — bp 105° / 0.7 — D_4^{20} 0.833 — n_D^{20} 1.4560
Reagent for HPLC bonded phases without acidic byproducts
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[151613-25-1] TSCA HMIS: 3-2-1-X 25g ¥76,100



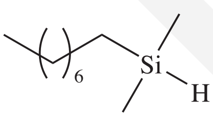
SIO6711.0
n-OCTYLDIMETHYLCHLOROSILANE
$C_{10}H_{23}ClSi$ — Mw 206.83 — bp 222-5° — D_4^{20} 0.873 — n_D^{20} 1.4328^{25}
Flashpoint: 97°C (207°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18162-84-0] (既) 2-2041 TSCA EC 242-044-5 HMIS: 3-1-1-X 25g ¥13,500 100g ¥29,400



SIO6711.3
n-OCTYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_{12}H_{29}NSi$ — Mw 215.45 — bp 94-6° / 10 — D_4^{20} 0.80^{25} — n_D^{20} 1.4347
Flashpoint: 69°C (156°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[110348-62-4] HMIS: 3-2-1-X 25g ¥26,300

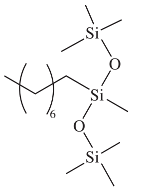


SIO6711.1
n-OCTYLDIMETHYLMETHOXYSILANE
$C_{11}H_{26}OSi$ — Mw 202.42 — bp 221-223° — D_4^{20} 0.813 — n_D^{20} 1.4230
Flashpoint: 82°C (180°F)
See also SIO6711.3
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[93804-29-6] EC 298-404-7 HMIS: 3-2-1-X 25g ¥25,700

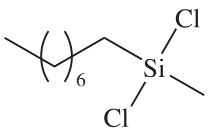


SIO6711.4
n-OCTYLDIMETHYLSILANE
$C_{10}H_{24}Si$ — Mw 172.39 — bp 50° / 2 — D_4^{20} 0.753 — n_D^{20} 1.4262
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[40934-68-7] HMIS: 2-3-1-X 10g ¥20,400

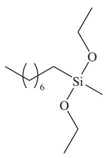
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



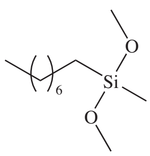
SIO6711.5
3-OCTYLHEPTAMETHYLTRISILOXANE
CAPRYLYL METHICONE
$C_{15}H_{38}O_2Si_3$ — 334.72 — 84° / 0.3 — (-62°) — 0.819 — 1.4128
Viscosity: 3 cSt — Flashpoint: 69°C (156°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[17955-88-3] TSCA-L EC 241-881-3 HMIS: 2-2-0-X — 25g ¥9,000 — 100g ¥21,500 — 2kg ¥136,000
COMMERCIAL



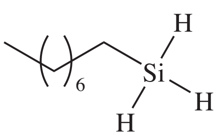
SIO6712.0
n-OCTYLMETHYLDICHLOROSILANE
$C_9H_{20}Cl_2Si$ — 227.25 — 94° / 6 — 0.9761 — 1.4440
Flashpoint: 98°C (208°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[14799-93-0] (既) 2-2041 TSCA EC 238-863-2 HMIS: 3-2-1-X — 25g ¥10,300 — 500g ¥49,600



SIO6712.2
n-OCTYLMETHYLDIETHOXYSILANE
$C_{13}H_{30}O_2Si$ — 246.47 — 80-2° / 2 — 0.8478 — 1.4190
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2652-38-2] HMIS: 2-1-0-X — 25g ¥10,100 — 100g ¥24,900

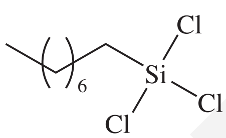


SIO6712.4
n-OCTYLMETHYLDIMETHOXYSILANE
$C_{11}H_{26}O_2Si$ — 218.42 — 87-9° / 5 — 0.858 — 1.4190
Flashpoint: 94°C (201°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[85712-15-8] EC 288-374-3 HMIS: 3-2-1-X — 25g ¥11,400 — 100g ¥29,400

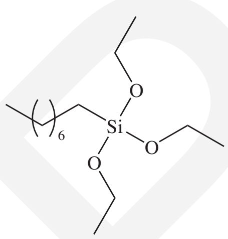


SIO6712.5
n-OCTYLSILANE
$C_8H_{20}Si$ — 144.33 — 162-3° — 0.746 — 1.425
Flashpoint: 36°C (97°F)
Fugitive inhibitor of hydrosilylation.[1]
Forms SAMs on titanium, gold and silicon surfaces.[2]
1. Lewis, K. et al. U.S. Patent 5,534,609, 1989.
2. Arkles, B. et al. *J. Adhes. Sci. Technol.* **2012**, *26*, 41.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[871-92-1] TSCA EC 212-817-1 HMIS: 3-3-1-X — 10g ¥17,800 — 50g ¥60,700

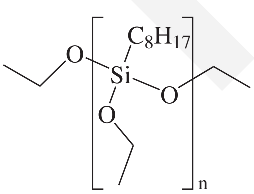
iso-OCTYLTRICHLOROSILANE - see SII6457.0 ISOOCTYLTRICHLOROSILANE



SIO6713.0
n-OCTYLTRICHLOROSILANE
$C_8H_{17}Cl_3Si$ — 247.67 — 224-6° — (<-50°) — 1.0744 — 1.4490
Flashpoint: 96°C (205°F)
Vapor pressure, 125°: 1 mm
SiO_2 surface modification improves pentacene organic electronic performance.[1]
1. Tiwari, S. H. et al. *Organic Electronics,* **2012**, *13*, 18.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[5283-66-9] (既) 2-2041 TSCA EC 226-112-1 HMIS: 3-1-1-X — 25g ¥4,500 — 750g ¥32,000 — 18kg ¥286,000
COMMERCIAL



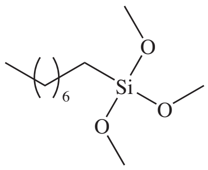
SIO6715.0
n-OCTYLTRIETHOXYSILANE
$C_{14}H_{32}O_3Si$ — 276.48 — 98-9° / 2 — (<-40°) — 0.875 — 1.4160
Viscosity: 1.9 cSt — Flashpoint: 109°C (228°F)
TOXICITY: oral rat, LD50: >5,110 mg/kg
Vapor pressure, 75°: 1 mm
Widely used in architectural hydrophobation
Surface treatment for pigments in cosmetic vehicles and composites
May be formulated to stable water emulsions.[1]
Suppresses nucleation behavior in ZnO-polylactic acid composites.[2]
1. Depasquale, R. et al. U.S. Patent 4,648,904, 1987.
2. Bussiere, P. et al. *Phys. Chem. Chem. Phys.* **2012**, *14*, 12301.
See also SIO6715.2
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2943-75-1] (既) 2-3784 TSCA EC 220-941-2 HMIS: 2-1-0-X — 50g ¥3,600 — 2kg ¥41,000 — 15kg ¥190,000
COMMERCIAL



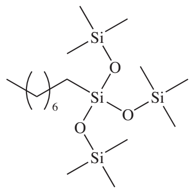
SIO6715.2
OCTYLTRIETHOXYSILANE, oligomeric hydrolysate
0.979 — 1.454
Viscosity: 400-600 cSt
Reactive hydrophobic surface treatment with reduced volatile by-products
See also SIP6917.2
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1385031-14-0] HMIS: 2-2-1-X — 100g ¥9,900

SILICON COMPOUNDS

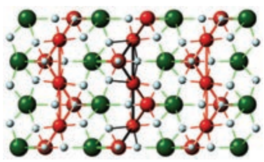
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



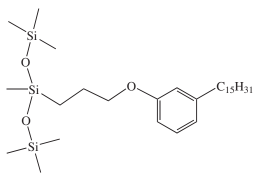
SIO6715.5
n-OCTYLTRIMETHOXYSILANE
$C_{11}H_{26}O_3Si$ — 234.41 — 191-2° — 0.907 — 1.417
Viscosity: 1.0 cSt
Flashpoint: 68°C (154°F)
Vapor pressure, 75°: 0.1 mm
Treatment for particles used in non-aqueous liquid dispersions
See also SID4635.0, SII6458.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3069-40-7] TSCA EC 221-338-7 HMIS: 3-1-1-X 25g ¥3,800 2kg ¥60,000 15kg ¥284,000
COMMERCIAL



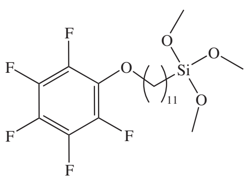
SIO6715.7
n-OCTYLTRIS(TRIMETHYLSILOXY)SILANE, 95%
CAPRYLYL TRIMETHICONE
$C_{17}H_{44}O_3Si_4$ — 408.88 — 90° / 1 — (<-40°) — 0.857 — 1.411
Viscosity: 3-4 cSt
Flashpoint: 106°C (223°F)
See also SIO6711.5
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[187592-85-4] HMIS: 1-1-0-X 100g ¥11,100 1kg ¥37,000 10kg ¥353,000


Crystal structure image courtesy of webmineral.com

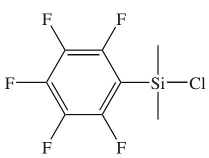
SIO6715.9
OLIVINE
(Mg-FORSTERITE, Fe-FAYALITE)2·SiO4
$Mg_2Fe_2SiO_4$ — 153.31 — 3.32 — 1.63
Particle Size: <400 μm
Mohs Hardness: 6.5-7.0
Orthorhombic dipyramidal
Yellowish-green, isomorphous, thick tubular crystals
Used in metallurgy, refractories, abrasives
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[19086-72-7] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 10kg ¥48,000



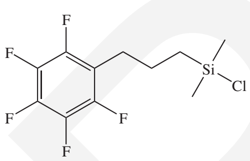
SIP6715.55
3-(m-PENTADECYLPHENOXYPROPYL)HEPTAMETHYLTRISILOXANE, tech-90
$C_{31}H_{62}O_3Si_3$ — 567.09
Flashpoint: >110°C (>230°F)
Cashew nut oil modified silicone
See also SIT8011.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
HMIS: 1-1-0-X 25g ¥45,900



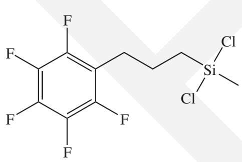
SIP6716.0
PENTAFLUOROPHENOXYUNDECYLTRIMETHOXYSILANE
$C_{20}H_{31}F_5O_4Si$ — 458.54
For non-covalent immobilization of proteins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[944721-47-5] HMIS: 3-2-1-X 5g ¥67,100



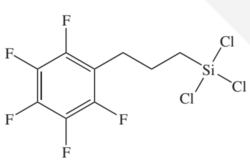
SIP6716.1
PENTAFLUOROPHENYLDIMETHYLCHLOROSILANE
FLOPHEMESYL CHLORIDE
$C_8H_6ClF_5Si$ — 260.67 — 88-90° / 10 — 1.367^{25} — 1.4470
Flashpoint: 95°C (203°F)
Derivatizing agent for electron capture detection (ECD)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[20082-71-7] TSCA EC 243-506-9 HMIS: 3-2-1-X 5g ¥46,400



SIP6716.2
PENTAFLUOROPHENYLPROPYLDIMETHYLCHLOROSILANE
$C_{11}H_{12}ClF_5Si$ — 302.74 — 73° / 0.4 — 1.3325 — 1.4493
Flashpoint: >110°C (>230°F)
Bonded phase employed in taxol analysis.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[157499-19-9] TSCA HMIS: 3-1-1-X 5g ¥25,700

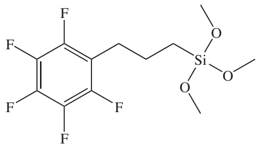


SIP6716.3
PENTAFLUOROPHENYLPROPYLMETHYLDICHLOROSILANE
$C_{10}H_9Cl_2F_5Si$ — 323.16 — 128-9° / 20 — 1.378
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1220126-66-8] HMIS: 3-2-1-X 5g ¥28,400

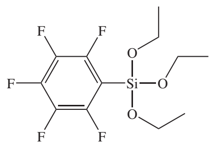


SIP6716.4
PENTAFLUOROPHENYLPROPYLTRICHLOROSILANE
$C_9H_6Cl_3F_5Si$ — 343.58 — 99° / 0.75 — (27-30°) — 1.495 — 1.4620
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[78900-02-4] HMIS: 3-1-1-X 2.5g ¥20,400

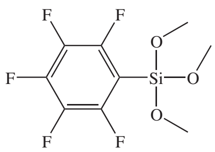
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



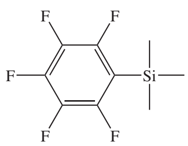
SIP6716.6
PENTAFLUOROPHENYLPROPYLTRIMETHOXYSILANE
$C_{12}H_{15}F_5O_3Si$ — 330.33 — 97° / 0.75 — 1.27 — 1.4273
See also SIP6716.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[303191-26-6] HMIS: 2-1-1-X 2.5g ¥23,600



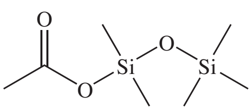
SIP6716.7
PENTAFLUOROPHENYLTRIETHOXYSILANE
$C_{12}H_{15}F_5O_3Si$ — 330.33 — 130° / 10 — 1.24 — 1.4180
Flashpoint: 104°C (219°F)
Forms hydrogen-free silicone resins useful in optical coatings
See also SIB1710.0, SIT8345.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[20083-34-5] HMIS: 2-2-1-X 5g ¥26,800 25g ¥96,800



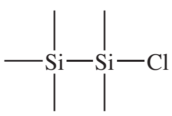
SIP6716.73
PENTAFLUOROPHENYLTRIMETHOXYSILANE
$C_9H_9F_5O_3Si$ — 288.24 — 210-215°
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[223668-64-2] HMIS: 3-2-1-X 2.5g ¥52,200



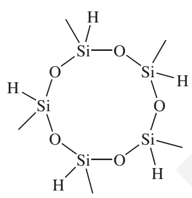
SIP6716.8
PENTAFLUOROPHENYLTRIMETHYLSILANE
$C_9H_9F_5Si$ — 240.25 — 170-2° — 1.261 — 1.4330
Flashpoint: 54°C (129°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1206-46-8] HMIS: 2-2-0-X 10g ¥20,400



SIP6717.0
1,1,1,3,3-PENTAMETHYL-3-ACETOXYDISILOXANE
$C_7H_{18}O_3Si_2$ — 206.39 — 149-50° — 0.90 — 1.3887^{25}
Flashpoint: 40°C (104°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[70693-47-9] TSCA EC 274-767-7 HMIS: 2-2-1-X 10g ¥13,000

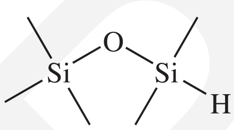


SIP6717.5
PENTAMETHYLCHLORODISILANE
$C_5H_{15}ClSi_2$ — 166.80 — 134-5° — 0.8684 — 1.4430
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1560-28-7] TSCA EC 216-330-5 HMIS: 3-3-1-X 10g ¥23,600

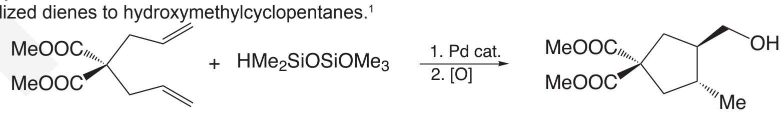


SIP6718.0
1,3,5,7,9-PENTAMETHYLCYCLOPENTASILOXANE, 90%
$C_5H_{20}O_5Si_5$ — 300.64 — 168° — (-108°) — 0.998 — 1.3912
Contains other cyclic homologs
Flashpoint: 39°C (102°F)
ΔHvap: 47.3 kJ/mole
See also SIM6510.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[6166-86-5] (既) 7-477 TSCA EC 228-204-7 HMIS: 3-2-1-X 25g ¥13,800 100g ¥36,900

SIP6719.0
PENTAMETHYLDISILOXANE
$C_5H_{16}OSi_2$ — 148.35 — 86-7° — 0.758 — 1.3740
Flashpoint: -4°C (25°F)

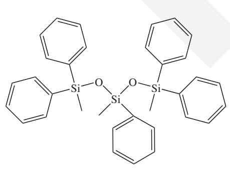


Undergoes hydrosilylation reactions
Converts functionalized dienes to hydroxymethylcyclopentanes.[1]



1. Pei, T.; Widenhoefer, R. A. *Org. Lett.* **2000,** *2*, 1469.
See also SIB1977.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[1438-82-0] (既) 7-477 TSCA EC 215-873-5 HMIS: 2-4-1-X 25g ¥12,500 100g ¥32,600

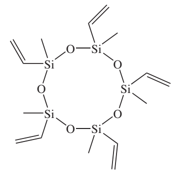
1,1,3,5,5-PENTAMETHYL-1,5-DIVINYL-3-PHENYLTRISILOXANE -
see SID4610.5 1,5-DIVINYL-3-PHENYLPENTAMETHYLTRISILOXANE



SIP6719.5
1,1,3,5,5-PENTAPHENYL-1,3,5-TRIMETHYLTRISILOXANE
$C_{33}H_{34}O_2Si_3$ — 546.89 — 240-5° / 0.5 — (-25°) — 1.093 — 1.5797
Viscosity: 175 cSt
Flashpoint: 243°C (470°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[3390-61-2] (既) 7-474 TSCA EC 222-222-9 HMIS: 1-1-0-X 25g ¥20,400

SILICON COMPOUNDS

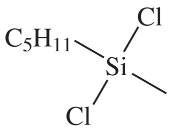
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIP6719.7
PENTAVINYLPENTAMETHYLCYCLOPENTASILOXANE, 95%

$C_{15}H_{30}O_5Si_5$	430.82	261-2°	(-140°)	0.9943	1.4373

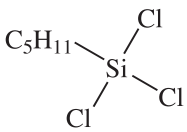
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[17704-22-2] TSCA EC 241-712-3 HMIS: 2-1-0-X 10g ¥11,400 50g ¥35,300



SIP6719.9
PENTYLMETHYLDICHLOROSILANE

$C_6H_{14}Cl_2Si$	185.17	170°		0.999^{25}	1.4328^{25}

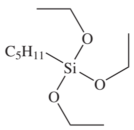
Mixed isomers — Flashpoint: 29°C (84°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13682-99-0] (既) 2-2041 TSCA EC 237-194-3 HMIS: 3-3-1-X 25g ¥20,400



SIP6720.0
PENTYLTRICHLOROSILANE
AMYLTRICHLOROSILANE

$C_5H_{11}Cl_3Si$	209.59	171-2°		1.142	1.4456

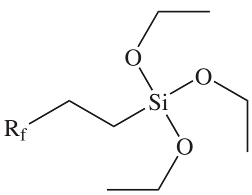
Mixed isomers — Flashpoint: 30°C (86°F)
Viscosity: 1.1 cSt — TOXICITY: oral rat, LD50: 2,430 mg/kg
Specific heat: 1.47 J/g/°
See also SII6453.5
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[107-72-2] (既) 2-2041 TSCA EC 203-515-0 HMIS: 3-3-1-X 25g ¥19,900



SIP6720.2
PENTYLTRIETHOXYSILANE
AMYLTRIETHOXYSILANE

$C_{11}H_{26}O_3Si$	234.41	95-6° / 1.3		0.895	1.4059

Mixed isomers — Flashpoint: 68°C (154°F)
Viscosity: 2.1 cSt — TOXICITY: oral rat, LD50: 20,000 mg/kg
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2761-24-2] (既) 2-2052 TSCA EC 220-429-9 HMIS: 2-2-1-X 25g ¥19,900

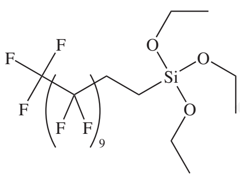


SIP6720.3
PERFLUOROALKYLETHYLTRIETHOXYSILANE

	510.3 - 610.4			1.38-1.39	

Contains (perfluorobutyl)ethyl, (perfluorohexyl)ethyl and (perfluorooctyl) ethyl homologs
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[51851-37-7]/[101947-16-4] TSCA HMIS: 3-2-1-X 10g ¥18,000

PERFLUORODECYL-1H,1H,2H,2H-TRICHLOROSILANE -
see SIH5841.0 (HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TRICHLOROSILANE

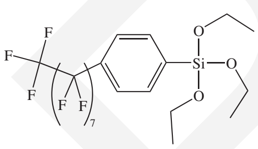


SIP6720.5
PERFLUORODODECYL-1H,1H,2H,2H-TRIETHOXYSILANE-PERFLUOROTETRADECYL-1H,1H,2H,2H-TRIETHOXYSILANE MIXTURE, 80%

	710 - 810	157-198° / 1.5	(25-75°)		

Contains ~ 5% SIH5841.2, balance higher homologs
For the preparation of low surface energy substrates.
See also SIH5840.25
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[885275-56-9]/[853403-04-0] HMIS: 2-1-1-X 5g ¥46,900

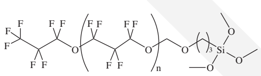
PERFLUOROOCTYL-1H,1H,2H,2H-DIMETHYLCHLOROSILANE -
see SIT8170.0 (TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)DIMETHYLCHLOROSILANE



SIP6720.71
(4-PERFLUOROOCTYLPHENYL)TRIETHOXYSILANE

$C_{20}H_{19}F_{17}O_3Si$	658.50	101-3° / 1		1.448	

Flashpoint: >110°C (>230°F)
Thermally stable to >300°
Contact angle treated glass surface, water: 115°.[1]
1. Kondo, Y. *J. Oleoscience* **2004**, *53*, 143.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-1-1-X 1.0g ¥65,000

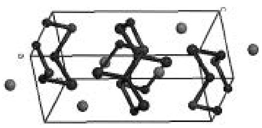


SIP6720.72
[PERFLUORO(POLYPROPYLENEOXY)]METHOXYPROPYLTRIMETHOXYSILANE, 20% in fluorinated hydrocarbon

	4,000 - 8,000			1.5	

Contact angle, water: 112°
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[870998-79-0] TSCA HMIS: 2-0-1-X 10g ¥61,800

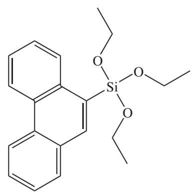
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIP6720.73
PERLITE

$Na_2OK_2OAl_2O_3SiO_2$	318.22			2.3	1.5

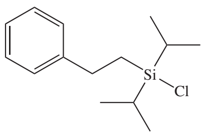
Particle Size: <44 µm
Typical bulk density, not compacted: 0.05 g/cm³
Gray, glassy volcanic rock, concentric fracture, silica source
Used in metallurgy, abrasives, filtration, absorbent, cryogenics
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[93763-70-3] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 10kg ¥63,000



SIP6720.77
9-PHENANTHRENYLTRIETHOXYSILANE

$C_{20}H_{24}O_3Si$	340.48	173-5° / 0.5	(20-30°)	1.1	1.5809^{25}

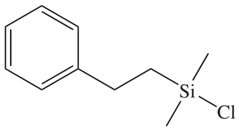
Flashpoint: >110°C (>230°F)
High refractive index monomer
See also SIN6596.8
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[21591-53-7] TSCA-L HMIS: 2-1-0-X 5g ¥30,000



SIP6720.8
PHENETHYLDIISOPROPYLCHLOROSILANE

$C_{14}H_{23}ClSi$	254.86	105-9° / 0.3		0.970	

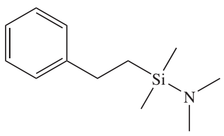
Mixed α-, β- isomers
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[151613-24-0] TSCA HMIS: 3-2-1-X 5g ¥41,100



SIP6721.0
PHENETHYLDIMETHYLCHLOROSILANE

$C_{10}H_{15}ClSi$	198.77	56° / 0.2		0.999	1.5185

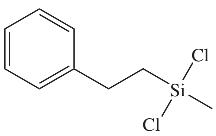
Contains α-, β-isomers — Flashpoint: 70°C (158°F)
See also SIP6724.7
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17146-08-6] TSCA EC 241-207-8 HMIS: 3-2-1-X 50g ¥48,500



SIP6721.2
PHENETHYLDIMETHYL(DIMETHYLAMINO)SILANE

$C_{12}H_{21}NSi$	207.39	109° / 2		0.890	1.4946

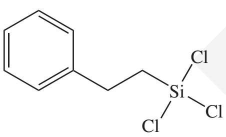
Contains 10-15% α-isomer
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[181231-68-5] TSCA HMIS: 3-2-1-X 10g ¥36,900



SIP6721.5
PHENETHYLMETHYLDICHLOROSILANE
METHYL(PHENETHYL)DICHLOROSILANE

$C_9H_{12}Cl_2Si$	219.19	99° / 6		1.127	1.5120

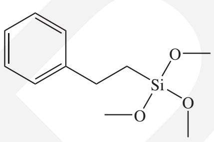
Contains α-, β-isomers — Flashpoint: 80°C (176°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[772-65-6] TSCA EC 212-253-6 HMIS: 3-2-1-X 25g ¥14,600 100g ¥39,500



SIP6722.0
PHENETHYLTRICHLOROSILANE

$C_8H_9Cl_3Si$	239.60	93-6° / 3		1.240	1.5185

Contains α-, β-isomers — Flashpoint: 91°C (196°F)
Treated surface contact angle, water: 88° — TOXICITY: oral rat, LD50: 2,830 mg/kg
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[940-41-0] TSCA EC 213-371-0 HMIS: 3-2-1-X 25g ¥11,400 100g ¥28,900

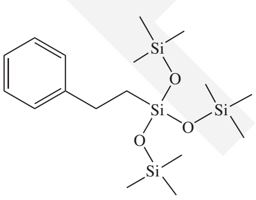


SIP6722.6
PHENETHYLTRIMETHOXYSILANE, tech-95

$C_{11}H_{18}O_3Si$	226.35	95-6° / 2		1.037	1.4753

Contains α-, β-isomers — Flashpoint: 109°C (228°F)
Component in optical coating resins
In combination with TEOS forms hybrid silicalite-1 molecular sieves.[1]
1. Yeong, Y. et al. *Adv. Mater. Res.* **2008**, *47-50*, 238.
See also SIE4897.5, SIM6511.2, SIP6731.8
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[49539-88-0] TSCA EC 256-363-2 HMIS: 3-1-1-X 25g ¥10,600 100g ¥28,900 2kg ¥109,500

COMMERCIAL

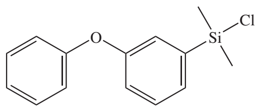


SIP6722.8
PHENETHYLTRIS(TRIMETHYLSILOXY)SILANE

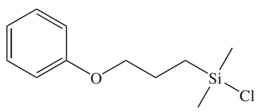
$C_{17}H_{36}O_3Si_4$	400.81	110° / 0.8	(-58°)	0.93	1.440^{25}

Contains α-, β-isomers — Flashpoint: >110°C (>230°F)
Viscosity: 4.4 cSt
Fluid with both silicone and hydrocarbon compatibility
See also SIO6715.7, SIP6826.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[211935-21-6] HMIS: 1-1-0-X 25g ¥11,900 100g ¥31,000

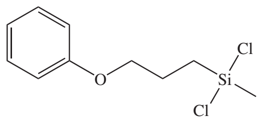
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



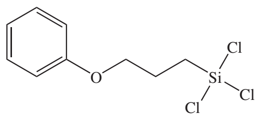
SIP6723.0
3-PHENOXYPHENYLDIMETHYLCHLOROSILANE, 95%
$C_{14}H_{15}ClOSi$ — Mw 262.81 — bp 102-6° / 1 — D 1.11[25] — n_D 1.5603[25]
Contains other isomers
End-capper for low-temperature lubricating fluids.[1]
1. Gardos, M. *ASLE Transactions* **1972,** *18*, 31.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[41318-68-7] HMIS: 3-2-1-X 5g ¥30,500



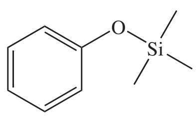
SIP6723.2
3-PHENOXYPROPYLDIMETHYLCHLOROSILANE
$C_{11}H_{17}ClOSi$ — Mw 228.78 — bp 90-2° / 0.25 — D 1.034 — n_D 1.5052
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[69733-73-9] HMIS: 3-2-1-X 25g ¥17,200 100g ¥48,300



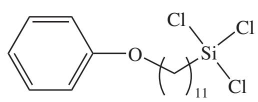
SIP6723.25
3-PHENOXYPROPYLMETHYLDICHLOROSILANE
$C_{10}H_{14}Cl_2OSi$ — Mw 249.21 — bp 110° / 1 — D 1.158 — n_D 1.5150
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[28229-56-3] HMIS: 3-2-1-X 25g ¥25,700



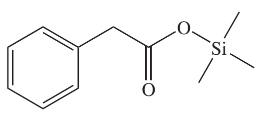
SIP6723.3
3-PHENOXYPROPYLTRICHLOROSILANE
$C_9H_{11}Cl_3OSi$ — Mw 269.63 — bp 40° / 0.02 — D 1.2574 — n_D 1.5190
Flashpoint: >110°C (>230°F)
See also SIM6492.5
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[60333-76-8] HMIS: 3-1-1-X 25g ¥15,400 100g ¥42,200



SIP6723.5
PHENOXYTRIMETHYLSILANE
TRIMETHYLSILYLPHENOXIDE
$C_9H_{14}OSi$ — Mw 166.30 — bp 81° / 23 — mp (-55°) — D 0.920 — n_D 1.4782
Flashpoint: 52°C (126°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1529-17-5] (既) 3-2640 TSCA EC 216-211-8 HMIS: 3-2-1-X 25g ¥12,500

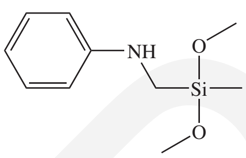


SIP6723.4
11-PHENOXYUNDECYLTRICHLOROSILANE
$C_{17}H_{27}Cl_3OSi$ — Mw 381.85 — bp 166-7° / 0.3 — D 1.089[25]
Forms SAMs that orient pentadecene
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[526204-46-6] HMIS: 3-1-1-X 5g ¥59,100

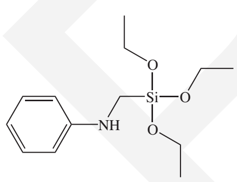


SIP6723.6
PHENYLACETOXYTRIMETHYLSILANE
$C_{11}H_{16}O_2Si$ — Mw 208.33 — bp 96-7° / 0.7 — D 0.982 — n_D 1.4780
Flashpoint: 77°C (171°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2078-18-4] HMIS: 2-2-1-X 25g ¥13,000

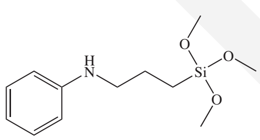
PHENYLALLYLDICHLOROSILANE - see SIA0486.0 ALLYLPHENYLDICHLOROSILANE



SIP6723.67
(PHENYLAMINOMETHYL)METHYLDIMETHOXYSILANE, 95%
$C_{10}H_{17}NO_2Si$ — Mw 211.34 — bp 255° — D 1.04 — n_D 1.5147
Flashpoint: 106°C (223°F)
Polycondensation reaction with silanol functional PDMS oligomers forms low pourpoint fluids.[1]
1. Andranov, K. et al. *Bull. Acad. Sci. USSR* **1962**, *11*, 1492.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17890-10-7] HMIS: 3-2-1-X 25g ¥11,100 100g ¥28,400

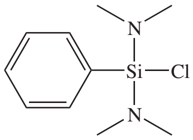


SIP6723.7
N-PHENYLAMINOMETHYLTRIETHOXYSILANE
$C_{13}H_{23}NO_3Si$ — Mw 269.42 — bp 135-7° / 4 — D 1.004[25] — n_D 1.485[25]
Flashpoint: >110°C (>230°F)
Converts isocyanate-terminated polyurethanes to moisture curable resins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3473-76-5] HMIS: 3-2-1-X 25g ¥9,800 100g ¥24,100 2kg ¥146,000
COMMERCIAL

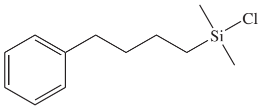


SIP6724.0
N-PHENYLAMINOPROPYLTRIMETHOXYSILANE
$C_{12}H_{21}NO_3Si$ — Mw 255.38 — bp 132-5° / 0.3 — D 1.07 — n_D 1.504
Specific wetting surface: 307 m^2/g
Flashpoint: 165°C (329°F)
Oxidatively stable coupling agent for polyimides, phenolics, epoxies
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3068-76-6] (既) 3-2644 TSCA EC 221-328-2 HMIS: 3-1-1-X 25g ¥4,000 2kg ¥63,000 18kg ¥395,000
COMMERCIAL

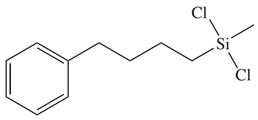
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



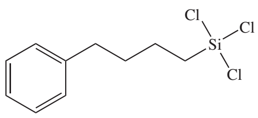
SIP6724.6
PHENYLBIS(DIMETHYLAMINO)CHLOROSILANE, 95%
1-CHLORO-N,N,N',N'-TETRAMETHYL-1-PHENYLSILANEDIAMINE
$C_{10}H_{17}ClN_2Si$ — 228.80 — 127-9° / 23
Hazy liquid — Flashpoint: 73°C (163°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[25374-10-1] TSCA EC 246-907-7 HMIS: 3-2-2-X 25g ¥38,500



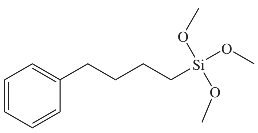
SIP6724.7
4-PHENYLBUTYLDIMETHYLCHLOROSILANE
$C_{12}H_{19}ClSi$ — 226.83 — 85-7° / 0.6 — 0.964^{25} — 1.4979^{25}
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[32328-67-9] TSCA-L HMIS: 3-1-1-X 25g ¥32,600



SIP6724.8
4-PHENYLBUTYLMETHYLDICHLOROSILANE
$C_{11}H_{16}Cl_2Si$ — 247.24 — 105-9° / 1.5 — 1.09^{25}
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17776-69-1] HMIS: 3-1-1-X 25g ¥32,600

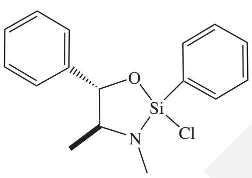


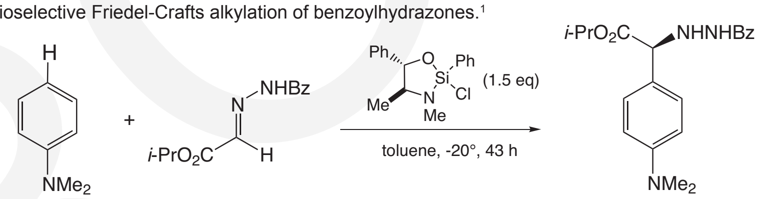
SIP6724.9
4-PHENYLBUTYLTRICHLOROSILANE
$C_{10}H_{13}Cl_3Si$ — 267.66 — 82° / 0.4 — 1.192 — 1.5121
Flashpoint: >110°C (>230°F)
Forms HPLC bonded phases for separation of aromatics.[1]
1. Den, T. et al. in "*Silanes, Surfaces, Interfaces*" D. Leyden ed., 1986, 403.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17886-88-3] TSCA-L HMIS: 3-1-1-X 25g ¥27,800 100g ¥82,700



SIP6724.92
4-PHENYLBUTYLTRIMETHOXYSILANE
$C_{13}H_{22}O_3Si$ — 254.40 — 80° / 0.5 — 1.006 — 1.4742
Flashpoint: >110°C (>230°F)
See also SIP6724.9, SIP6736.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[152958-91-3] HMIS: 3-2-1-X 25g ¥32,600

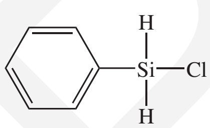
SIP6724.95
(S,S)-2-PHENYL-2-CHLORO-3,4-DIMETHYL-5-PHENYL-[1,3,2]-OXAZASILOLIDINE
1-OXA-3-AZA-2-SILACYCLOPENTANE, 2-CHLORO-3,4-DIMETHYL-5-PHENYL-2,5-DIPHENYL, (4S,5S)
$C_{16}H_{18}ClNOSi$ — 303.86 — 138° / 0.5 — 1.016
Viscous liquid
Catalyzes the enantioselective Friedel-Crafts alkylation of benzoylhydrazones.[1]



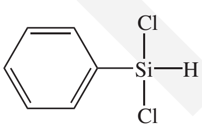


65%; 95% ee

Promotes a tandem asymmetric Aza-Darzens-ring-opening reaction to α-amino-β-chloro esters and α-amino-β-aryl esters.[2]
1. Shirakawa, S. et al. *J. Am. Chem. Soc.* **2005**, *127*, 2858
2. Valdez, S. C.; Leighton, J. L. *J. Am. Chem. Soc.* **2009**, *131*, 14638.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[680592-40-9] HMIS: 2-2-1-X 5g ¥32,600

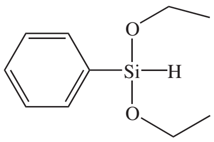


SIP6724.98
PHENYLCHLOROSILANE
C_6H_7ClSi — 142.66 — 41° / 9 — 1.070 — 1.526
Flashpoint: 54°C (129°F)
Intermediate for dendron synthesis.[1]
1. Cuadrado et al. *J. Am. Chem. Soc.* **1997**, *119*, 7613.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4206-75-1] TSCA EC 224-124-1 HMIS: 3-3-1-X 5g ¥26,800



SIP6725.0
PHENYLDICHLOROSILANE
$C_6H_6Cl_2Si$ — 177.10 — 65-6° / 10 — 1.2115 — 1.5257
Flashpoint: 48°C (118°F)
Carries out thionation and selenation of amides and lactams with elemental sulfur or selenium, respectively.[1]
1. Shibahara, F. et al. *Org. Lett.* **2009**, *11*, 3064.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1631-84-1] (既) 3-2634 TSCA EC 216-635-3 HMIS: 3-2-1-X 10g ¥15,600 50g ¥52,200

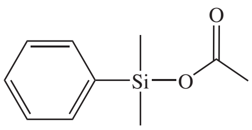
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIP6725.2
PHENYLDIETHOXYSILANE

$C_{10}H_{16}O_2Si$	196.32	80-4° / 10		0.9533^{25}	1.4814

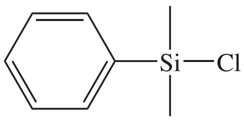
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17872-93-4] HMIS: 2-2-1-X 10g ¥24,100



SIP6726.0
PHENYLDIMETHYLACETOXYSILANE

$C_{10}H_{14}O_2Si$	194.30	127-9° / 44		1.006	1.4907

Flashpoint: 72°C (162°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17887-60-4] TSCA EC 241-836-8 HMIS: 2-2-1-X 25g ¥36,900

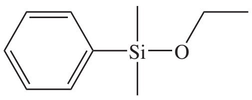


SIP6728.0
PHENYLDIMETHYLCHLOROSILANE

$C_8H_{11}ClSi$	170.71	192-3°		1.032	1.5082

Viscosity: 1.4 cSt
ΔHvap: 47.7 kJ/mole
Flashpoint: 61°C (142°F)
Vapor pressure, 25°: 1 mm
Forms cuprate.[1]
1. Fleming, I.; Terrett, N. K. *Tetrahedron Lett.* **1984,** *25*, 5103.
F&F: Vol. 7, p 133; Vol. 8, p 196; Vol. 11, p 209; Vol. 12, p 210.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[768-33-2] (既) 3-2641 TSCA EC 212-193-0 HMIS: 3-2-1-X 25g ¥9,700 100g ¥25,700 750g ¥116,400

COMMERCIAL



SIP6728.4
PHENYLDIMETHYLETHOXYSILANE

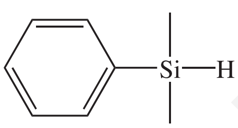
$C_{10}H_{16}OSi$	180.32	93° / 25		0.926	1.4799

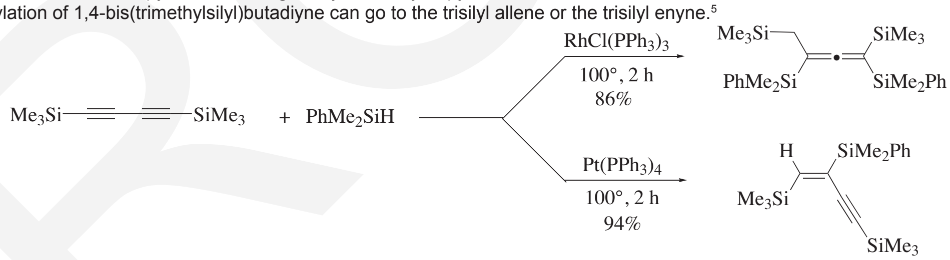
Viscosity: 1.3 cSt
Dipole moment: 1.34 debye
Flashpoint: 61°C (142°F)
TOXICITY: oral rat, LD50: 2,460 mg/kg
Antiepileptic activity in petit mal syndrome
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1825-58-7] (既) 2-2639 TSCA EC 217-366-4 HMIS: 2-2-1-X 10g ¥9,800 50g ¥28,900

SIP6729.0
PHENYLDIMETHYLSILANE
DIMETHYLPHENYLSILANE

$C_8H_{12}Si$	136.27	156-7°	(-124°)	0.889	1.4995

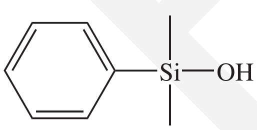
Flashpoint: 38°C (100°F)
Vapor pressure, 25°: 4 mm
Review of synthetic utility.[1]
Used to prepare α-phenyldimethylsilyl esters with high enantioselectivity.[2]
Yields optically active reduction products with chiral Rh or Pd catalysts.[3]
Undergoes 1,4-addition to pyridines forming N-silylated dihydropyridines.[4]
Hydrosilylation of 1,4-bis(trimethylsilyl)butadiyne can go to the trisilyl allene or the trisilyl enyne.[5]





1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 254-255.
2. Zhang, Y.-Z. et al. *Angew. Chem., Int. Ed. Engl.* **2008**, *47*, 8496.
3. F&F: Vol. 12, p 209; Vol. 13, p 123; Vol. 15, p 168.
4. Gutsulyak, D. V. et al. *Angew. Chem., Int. Ed. Engl.* **2011**, *50*, 1384.
5. Kusumoto, T. et al. *Bull. Chem. Soc. Jpn.* **1992**, *65*, 1280.

HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[766-77-8] TSCA EC 212-170-5 HMIS: 2-2-1-X 25g ¥14,600 100g ¥39,500

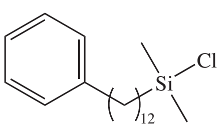


SIP6729.2
PHENYLDIMETHYLSILANOL

$C_8H_{12}OSi$	152.26	60-2°/1		0.997	1.5120

Flashpoint: 91°C (196°F)
Reagent for cross-coupling
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[5272-18-4] EC 217-366-7 HMIS: 2-1-0-X 5g ¥28,900

PHENYLDIMETHYLSILYLMETHYL METHACRYLATE -
see SIM6481.5 (METHACRYLOXYMETHYL)PHENYLDIMETHYLSILANE

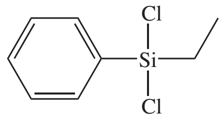


SIP6729.5
12-PHENYLDODECYLDIMETHYLCHLOROSILANE

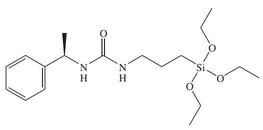
$C_{20}H_{35}ClSi$	339.03	172-4° / 0.25		0.921	1.487

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 5g ¥87,800

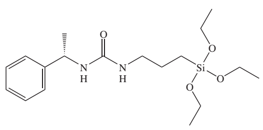
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



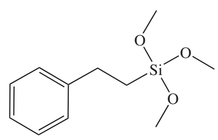
SIP6730.0
PHENYLETHYLDICHLOROSILANE
$C_8H_{10}Cl_2Si$ 205.16 225-6° 1.184 1.5321
Viscosity, 20°: 1.2 cSt
ΔHvap: 49.8 kJ/mole
Flashpoint: 92°C (198°F)
Vapor pressure, 100°: 13 mm
Heat capacity, 27°: 1.420 kJ/kg°C
Monomer for Hyde's first silicone
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1125-27-5] (既) 3-2641 TSCA EC 214-407-8 HMIS: 3-2-1-X 25g ¥42,700



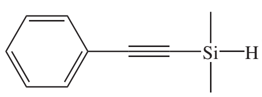
SIP6731.5
(R)-N-1-PHENYLETHYL-N'-TRIETHOXYSILYLPROPYLUREA
$C_{18}H_{32}N_2O_4Si$ 368.55 1.05^{25}
Viscous liquid or solid
Flashpoint: >110°C (>230°F)
Optically active silane; treated surfaces resolve enantiomers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[131206-15-0] HMIS: 2-1-0-X 25g ¥26,800



SIP6731.6
(S)-N-1-PHENYLETHYL-N'-TRIETHOXYSILYLPROPYLUREA
$C_{18}H_{32}N_2O_4Si$ 368.55 1.05^{25}
Viscous liquid or solid
Flashpoint: >110°C (>230°F)
Optically active silane; treated surfaces resolve enantiomers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[67240-22-2] HMIS: 2-1-0-X 25g ¥32,600

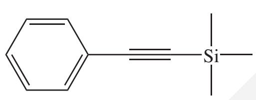


SIP6731.8
2-PHENYLETHYLTRIMETHOXYSILANE
$C_{11}H_{18}O_3Si$ 226.35 121-2° / 6 1.037 1.4753
See also SIP6722.6
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[49539-88-0] EC 256-363-2 HMIS: 3-1-1-X 25g ¥19,400



SIP6732.0
PHENYLETHYNYLDIMETHYLSILANE
$C_{10}H_{12}Si$ 160.29 33-4° / 0.3 0.906 1.5407
Flashpoint: 76°C (169°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[87290-97-9] HMIS: 2-2-1-X 5g ¥25,200

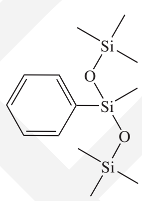
SIP6736.0
PHENYLETHYNYLTRIMETHYLSILANE
$C_{11}H_{14}Si$ 174.32 67° / 5 0.896 1.5284
Flashpoint: 82°C (180°F)



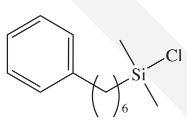
Reacts with tetraphenylcyclopentadienone to form pentaphenylphenyltrimethylsilane.[1]
Cross couples with aryl halides and triflates as well as homocouples to 1,2-diynes.[2]
Undergoes alkynyl cross metathesis reactions.[3]
Provides the ethynyl silver acetylide.[4]
Reacts w/ propargyl chlorides to form 1,2-diene-4-ynes.[5]
Ethynylsilanes react w/ propargyl halides to form 1,4-diynes.[6]

1. Jianhua, C. et al. In *Silicon Chemistry;* Corey, J., et al. Ed.; Wiley: 1988: p. 105.
2. Nashihara, Y. et al. *J. Org. Chem.* **2000,** *65*, 1780.
3. Furstner, A.; Mathes, C. *Org. Lett.* **2001,** *3*, 221.
4. Vitérisi, A. et al. *Tetrahedron Lett.* **2006**, *47*, 2779.
5. Montel, F. et al. *Org. Lett.* **2006**, *8*, 1905.
6. Kuninobu, Y.; Ishii, E.; Takai, K. *Angew. Chem., Int. Ed. Engl.* **2007***, 46*, 3296.

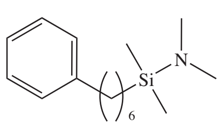
See also SIB1760.0 BIS(PHENYLETHYNYL)DIMETHYLSILANE
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[2170-06-1] HMIS: 2-2-1-X 5g ¥9,800 25g ¥28,900



SIP6736.2
3-PHENYLHEPTAMETHYLTRISILOXANE, 95%
1,1,1,3,5,5,5-HEPTAMETHYL-3-PHENYLTRISILOXANE
$C_{13}H_{26}O_2Si_3$ 298.60 95° / 5 (-56°) 0.909 1.4468
Viscosity, 25°: 2 cSt
Surface tension, 27°: 30.8 mN/m
Flashpoint: 64°C (147°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[546-44-1] HMIS: 2-2-1-X 25g ¥15,600 100g ¥43,200



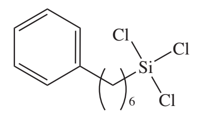
SIP6736.3
6-PHENYLHEXYLDIMETHYLCHLOROSILANE
$C_{14}H_{23}ClSi$ 254.88 132-3° / 1.5 0.942 1.4931
Forms bonded phases for HPLC
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[97451-53-1] HMIS: 3-1-1-X 5g ¥30,000



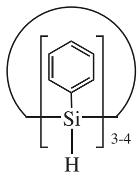
SIP6736.32
6-PHENYLHEXYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_{16}H_{29}NSi$ 263.49 120° / 0.5
Forms bonded phases for HPLC
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1223044-18-5] HMIS: 3-2-1-X 5g ¥41,100

SILICON COMPOUNDS

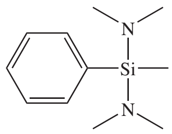
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



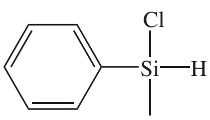
SIP6736.4
6-PHENYLHEXYLTRICHLOROSILANE
$C_{12}H_{17}Cl_3Si$ — 295.71 — 95° / 0.1 — 1.1436 — 1.5065
Flashpoint: >110°C (>230°F)
See also SIP6724.9
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18035-33-1] HMIS: 3-1-1-X 5g ¥28,400



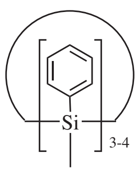
SIP6736.5
PHENYLHYDROCYCLOSILOXANES, tech-95
$((C_6H_5)HSiO)_{3-5}$ — 366.58 - 610.99 — 1.08 — 1.561
Contains linears
Viscosity: 10-15 cSt
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
HMIS: 2-2-1-X 5g ¥19,400 25g ¥67,100



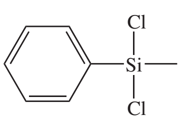
SIP6736.8
PHENYLMETHYLBIS(DIMETHYLAMINO)SILANE
$C_{11}H_{20}N_2Si$ — 208.38 — 108-9° / 11 — 1.4982
Flashpoint: 78°C (172°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[33567-83-8] HMIS: 3-2-1-X 10g ¥16,200



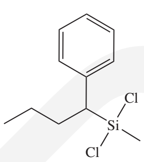
SIP6737.0
PHENYLMETHYLCHLOROSILANE
C_7H_9ClSi — 156.59 — 176-7° — 1.054 — 1.5171
Flashpoint: 40°C (104°F)
Vapor pressure, 113°: 100 mm
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1631-82-9] (既) 3-2641 TSCA EC 216-633-2 HMIS: 3-2-1-X 10g ¥20,400 50g ¥71,300



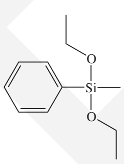
SIP6737.5
PHENYLMETHYLCYCLOSILOXANES, 95%
$C_{21}H_{24}O_3Si_3$ - $C_{28}H_{32}O_4Si_4$ — 408.7 - 544.9 — 130-240° / 1.5 — 1.1 — 1.545
Hazy liquid - may contain solids
Flashpoint: >200°C (>392°F)
Contains tetrasiloxanes and trisiloxanes, cis and trans isomers present
Suppresses male hormonal response
Silicone monomer
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[546-45-2] TSCA EC 208-900-7 HMIS: 3-1-0-X 25g ¥14,600 100g ¥39,500



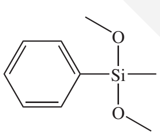
SIP6738.0
PHENYLMETHYLDICHLOROSILANE
$C_7H_8Cl_2Si$ — 191.13 — 205-6° — (-53°) — 1.187 — 1.5180
Viscosity, 20°: 1.2 cSt
ΔHvap: 48.1 kJ/mole
Flashpoint: 82°C (180°F)
TOXICITY: ipr mouse, LD50: 300 mg/kg
Autoignition temperature: >400°C
Vapor pressure, 82.5°: 13 mm
Monomer for high temperature silicones
F&F: Vol. 10, p 91; Vol. 11, p 247; Vol. 12, p 231.
See also SIP6730.0, SIP6740.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[149-74-6] (既) 3-2641 TSCA EC 205-746-2 HMIS: 3-2-1-X 25g ¥7,700 500g ¥23,600



SIP6738.5
1-PHENYL-1-(METHYLDICHLOROSILYL)BUTANE
$C_{11}H_{16}Cl_2Si$ — 247.24 — 87-9° / 1 — 1.1 — 1.512
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X 25g ¥35,300

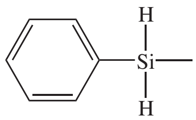


SIP6739.0
PHENYLMETHYLDIETHOXYSILANE
$C_{11}H_{18}O_2Si$ — 210.35 — 117-8° / 31 — 0.963 — 1.4690
Dipole moment: 1.32 debye
Flashpoint: 89°C (192°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[775-56-4] (既) 3-2639 TSCA EC 212-275-6 HMIS: 2-2-1-X 25g ¥10,300 100g ¥25,700



SIP6740.0
PHENYLMETHYLDIMETHOXYSILANE
$C_9H_{14}O_2Si$ — 182.29 — 199-200° — 0.9934 — 1.4694
Viscosity, 20°: 1.65 cSt
Flashpoint: 76°C (169°F)
TOXICITY: oral rat, LD50: 892 mg/kg
Additive to coupling agent systems, increasing interface flexibility, UV stability
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3027-21-2] (既) 3-2639 TSCA EC 221-192-4 HMIS: 3-2-1-X 25g ¥5,300 2kg ¥110,000 18kg ¥524,000
COMMERCIAL

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



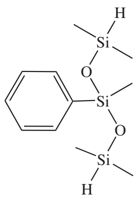
SIP6742.0
PHENYLMETHYLSILANE

$C_7H_{10}Si$	122.24	139-40°		0.8895	1.5058

Flashpoint: 25°C (77°F)

Used in the preparation of vicinal diamines.[1]
1. Rangareddy, K. et al. *J. Org. Chem.* **2004,** *69*, 6843.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[766-08-5] TSCA EC 212-160-0 HMIS: 3-3-1-X 10g ¥15,100 50g ¥50,100

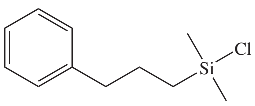
PHENYLMETHYLVINYLCHLOROSILANE - see SIV9094.0 VINYLPHENYLMETHYLCHLOROSILANE



SIP6742.5
3-PHENYL-1,1,3,5,5-PENTAMETHYLTRISILOXANE

$C_{11}H_{22}O_2Si_3$	270.55	88° / 6		1.023^{25}	1.4471^{25}

Chain extender for 2-component RTVs
See also SIH6117.0, SIP6826.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[17962-34-4] EC 241-886-0 HMIS: 2-2-1-X 25g ¥25,700

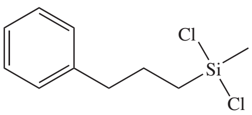


SIP6743.0
(3-PHENYLPROPYL)DIMETHYLCHLOROSILANE

$C_{11}H_{17}ClSi$	212.78	75° / 0.5		0.963	

Flashpoint: 103°C (217°F)

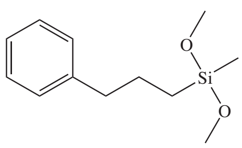
See also SIP6724.7
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17146-09-7] TSCA EC 241-208-3 HMIS: 3-1-1-X 5g ¥8,000 50g ¥35,000



SIP6744.0
(3-PHENYLPROPYL)METHYLDICHLOROSILANE

$C_{10}H_{14}Cl_2Si$	233.21	96-8° / 4		1.086^{25}	1.5090^{25}

HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17776-66-8] TSCA HMIS: 3-2-1-X 25g ¥28,900

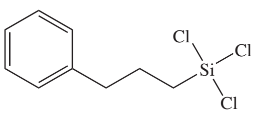


SIP6744.2
3-PHENYLPROPYLMETHYLDIMETHOXYSILANE

$C_{12}H_{20}O_2Si$	224.37	100-2° / 4		0.9623	1.4804

Flashpoint: >110°C (>230°F)

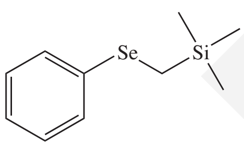
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1233513-31-9] HMIS: 3-2-1-X 25g ¥36,300



SIP6744.6
(3-PHENYLPROPYL)TRICHLOROSILANE

$C_9H_{11}Cl_3Si$	253.63	110° / 10		1.2239	1.514

See also SIP6724.9
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13617-40-8] HMIS: 3-2-1-X 25g ¥34,200

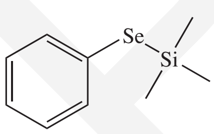


SIP6745.0
(PHENYLSELENOMETHYL)TRIMETHYLSILANE, 95%

$C_{10}H_{16}SeSi$ 毒物	243.29	106° / 6		1.176	1.5520

Flashpoint: 95°C (203°F)

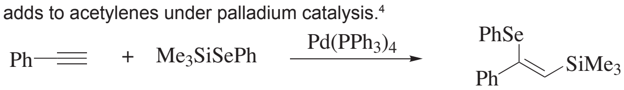
Synthetic equivalent of formyl carbanion.[1]
1. White, J. et al. *Tetrahedron Lett.* **1983,** *24*, 4539.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[56253-60-2] EC 260-077-3 HMIS: 3-2-1-X 5g ¥52,200



SIP6747.0
PHENYLSELENOTRIMETHYLSILANE, 95%
PHENYLTRIMETHYLSILYLSELENIDE

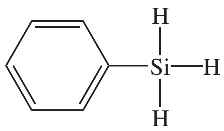
$C_9H_{14}SeSi$ 毒物	229.26	92-3° / 5	(-5°)	1.196	1.5525

Review of synthetic utility.[1]
Catalytic radical initiator for alkylselenation and other radical reactions.[2]
Asymmetrically opens epoxides.[3]
Regio- and stereoselectively adds to acetylenes under palladium catalysis.[4]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 421-422.
2. Pandey, G. et al. *J. Org. Chem.* **2000,** *65*, 4309.
3. Tiecco, M. et al. *Tetrahedron* **2008**, *64*, 3337.
4. Detty, M. R. *J. Org. Chem.* **1979**, *44*, 4528.
F&F: Vol. 9, p 373.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[33861-17-5] HMIS: 3-2-1-X 5g ¥73,500

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

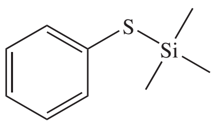


SIP6750.0
PHENYLSILANE
C_6H_8Si — 108.21 — 120° — (-64 to -68°) — 0.8681 — 1.5125
ΔHvap: 34.8 kJ/mole
Flashpoint: 8°C (46°F)
UVmax, nm: 218(vs), 263, 268, 275

Reducing reagent in radical reductions.[1]
Yields $ISiH_3$ on treatments with HI in presence of AlI_3.[2]
Adds to norbornene with high ee.[3]

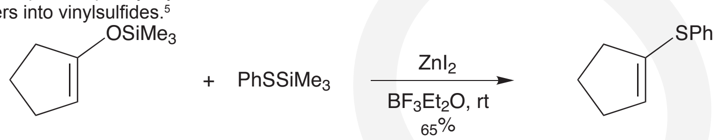
1. Barton, D. et al. *Synlett* 1991, 435.
2. Tamizhmani, G. et al. *Chem. Mater.* **1990,** *2*, 473.
3. Gountchev, T. I.; Tilley, T. D. *Organometallics* **1999,** *18*, 5661.

F&F: Vol. 5, p 523; Vol. 17, p 284; Vol. 21, p 487.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[694-53-1] TSCA EC 211-772-5 HMIS: 2-4-1-X 5g ¥14,600 25g ¥48,000



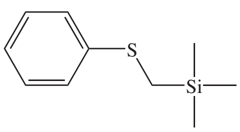
SIP6770.0
PHENYLTHIOTRIMETHYLSILANE
$C_9H_{14}SSi$ — 182.36 — 72° / 8 — 0.963 — 1.5320
Flashpoint: 33°C (91°F)

Review of synthetic utility.[1]
Converts adehydes to phenylsulfides.[2]
Converts aromatic aldehydes to coupled diols with Yb metal.[3]
Reacts w/ aryl fluorides to provide phenylaryl thioethers.[4]
Converts enol silyl ethers into vinylsulfides.[5]

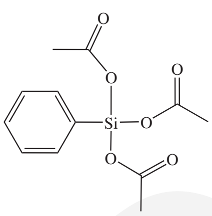


1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 414-418.
2. Glass, R. *Synth. Commun.* **1976,** *6*, 47.
3. Fujiwara, Y. et al. *Tetrahedron Lett.* **1996,** *37*. 3465.
4. Liu, C. et al. *Synlett* **2011**, *22*, 1143.
5. Degl'innocenti, A. et al. *Synlett.***1992**, 499.

F&F: Vol. 10, p 426; Vol. 12, p 535; Vol. 16, p 278.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4551-15-9] TSCA EC 224-916-7 HMIS: 3-3-1-X 25g ¥32,600

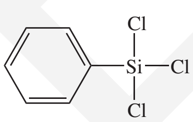


SIP6775.0
(PHENYLTHIOMETHYL)TRIMETHYLSILANE
$C_{10}H_{16}SSi$ — 196.38 — 155-6° / 50 — 0.967
Flashpoint: 39°C (102°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[17873-08-4] HMIS: 2-3-0-X 5g ¥19,400



SIP6790.0
PHENYLTRIACETOXYSILANE, tech-90
$C_{12}H_{14}O_6Si$ — 282.32 — 144-6° / 2 — (36-7°) — 1.1939 — 1.4708
Flashpoint: 102°C (216°F)

Cross-linker for moisture-cure clear glass sealants
Decomposes >250°
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18042-54-1] TSCA EC 241-952-9 HMIS: 3-1-1-X 25g ¥21,500



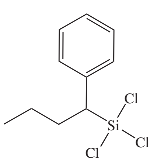
SIP6810.0
PHENYLTRICHLOROSILANE
$C_6H_5Cl_3Si$ — 211.55 — 201° — (-33°) — 1.324 — 1.5247
Viscosity: 1.08 cSt
ΔHvap: 47.7 kJ/mole
Dipole moment: 2.41 debye
Surface tension: 27.9 mN/m
Flashpoint: 91°C (196°F)
TOXICITY: oral rat, LD50: 2,340 mg/kg
Vapor pressure, 75°: 10 mm
Critical temperature: 438˚C
Specific heat: 1.00 J/g/°
Coefficient of thermal expansion: 1.2×10^{-3}

Intermediate for high refractive index resins
Immobilizes pentacene films.[1]

1. Shankar, K. et al. *J. Mater. Res.* **2004,** *19*, 2003.

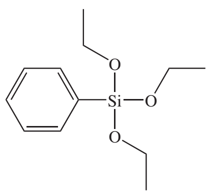
See also SIT8040.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[98-13-5] (既) 3-2634 TSCA EC 202-640-8 HMIS: 3-2-1-X 25g ¥3,400 1kg ¥25,000 18kg ¥214,000

COMMERCIAL



SIP6813.0
1-PHENYL-1-TRICHLOROSILYLBUTANE
$C_{10}H_{13}Cl_3Si$ — 267.65 — 78-80° / 0.8 — 1.201 — 1.518
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X 10g ¥32,600

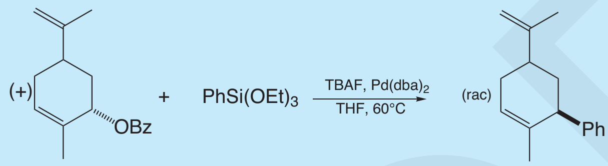
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIP6821.0 PHENYLTRIETHOXYSILANE $C_{12}H_{20}O_3Si$	240.37	112-3° / 10		0.996	1.4718



Viscosity, 25˚: 1.7 cSt
Dipole moment: 1.85 debye
Surface tension: 28 mN/m
Dielectric constant: 4.12

Flashpoint: 96°C (205°F)
TOXICITY: oral rat, LD50: 2,830 mg/kg
Autoignition temperature: 265˚C
Vapor pressure, 75°: 1 mm
Coefficient of thermal expansion: 0.9 x 10^{-3}

Improves photoresist adhesion to silicon nitride
Electron donor component of polyolefin polymerization catalyst complexes
Effective treatment for organic-grafted clays.[1]
Phenylates allyl benzoates.[2]



Extensive review on the use in silicon-based cross-coupling reactions.[3]

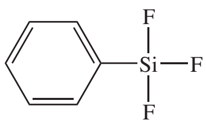
1. Canrado, K. et al. *Chem. Mater.* **2001,** *13*, 3766.
2. Correia, R.; DeShong, P. *J. Org Chem.* **2001,** *66*, 7159.
3. Denmark, S. E. et al. *Organic Reactions,* Vol. 75, Denmark, S. E. ed., John Wiley and Sons, 233, **2011**.

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water

[780-69-8] (既) 3-2635 TSCA EC 212-305-8 HMIS: 2-1-1-X 100g ¥5,000 2kg ¥39,000 17kg ¥195,000

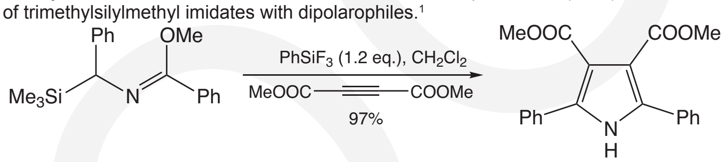
COMMERCIAL

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIP6821.5 PHENYLTRIFLUOROSILANE, 95% $C_6H_5F_3Si$	162.19	101-2°	(-19°)	1.2169	1.4110



Dipole moment: 2.77 debye
Flashpoint: -5°C (23°F)

Catalyzes the reaction of trimethylsilylmethyl imidates with dipolarophiles.[1]



1. Washizuka, K. et al. *Tetrahedron* **1999,** *55*, 12969.

HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents

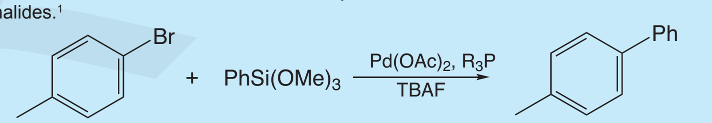
[368-47-8] HMIS: 3-4-1-X 50g ¥39,800

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIP6822.0 PHENYLTRIMETHOXYSILANE $C_9H_{14}O_3Si$	198.29	211°	(-25°)	1.064	1.4734

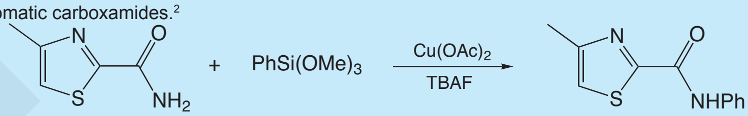
Viscosity, 25˚: 2.1 cSt
Dipole moment: 1.77 debye
Dielectric constant: 4.44

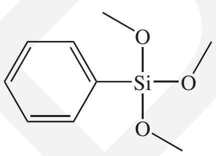
Flashpoint: 86°C (187°F)
TOXICITY: ivn mouse, LD50: 180 mg/kg
Vapor pressure, 108°: 20 mm

Intermediate for high temperature silicone resins
Hydrophobic additive to other silanes with excellent thermal stabilty
Cross couples with aryl halides.[1]



Phenylates heteroaromatic carboxamides.[2]





Directly couples with 1° alkyl bromides and iodides.[3]
Converts carboxylic acids to phenyl esters and vinyl carboxylates.[4]
Converts arylselenyl bromides to arylphenylselenides.[5]
Reacts with anhydrides to transfer both phenyl and methoxy and thus form the mixed diester.[6]
Used in the nickel-catalyzed direct phenylation of C-H bonds in heteroaromatic system such as benzoxazoles.[7]
Immobilization reagent for aligned metallic single wall nanotubes (SWNT).[8,9]
Extensive review on the use in silicon-based cross-coupling reactions.[10]

1. Mowery, M. E.; DeShong, P. *J. Org. Chem.* **1999**, *64*, 1684.
2. Lam, P. Y. S. et al. *Tetrahedron Lett.* **2001.** *42*, 2427.
3. Young, J.-Y.; Fu, G. C. *J. Am. Chem. Soc.* 2003, 125, 5616.
4. Luo, F. et al. *Synthesis* **2010**, 2005.
5. Bhadra, S. et al. *J. Org. Chem.* **2010**, *75*, 4864.
6. Luo, F. et al. *J. Org. Chem.* **2010**, *75*, 5379.
7. Hachilya, H. et al. *Angew. Chem., Int. Ed. Engl.* **2010**, *49*, 2202.
8. LeMieux, M. *Science* **2008**, *321*, 101.
9. Nish, A. et al. *Nature Nanotechnol.* **2007**, *2*, 640.
10. Denmark, S. E. et al. *Organic Reactions,* Vol. 75, Denmark, S. E. ed., John Wiley and Sons, 233, **2011**.

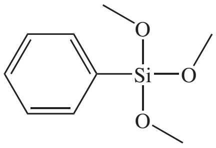
See also SIP6821.0, SIP6722.6

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water

[2996-92-1] (既) 3-2635 TSCA EC 221-066-9 HMIS: 3-2-1-X 100g ¥5,000 2kg ¥35,000 18kg ¥210,000

COMMERCIAL

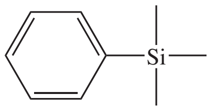
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIP6822.1
PHENYLTRIMETHOXYSILANE, 99+%

$C_9H_{14}O_3Si$	198.29	211°	(-25°)	1.064	1.4734

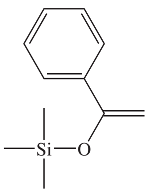
Flashpoint: 86°C (187°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2996-92-1] TSCA EC 221-066-9 HMIS: 3-2-1-X 100g ¥14,600



SIP6823.0
PHENYLTRIMETHYLSILANE

$C_9H_{14}Si$	150.30	169-70°		0.872	1.4908

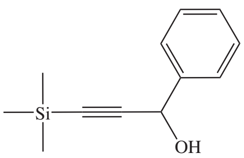
Viscosity: 1.1 cSt
Dipole moment: 0.44 debye
Flashpoint: 40°C (104°F)
Used to silylate and determine acid number of hydroxyl groups in aluminosilicate.[1]
1. Song, W. et al. *J. Am. Chem. Soc.* 2003, 125, 13964.
See also GEP6806, SIT6997.2, SIT8043.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[768-32-1] TSCA EC 212-192-5 HMIS: 2-2-0-X 25g ¥18,800



SIP6824.0
1-PHENYL-1-TRIMETHYLSILOXYETHYLENE

$C_{11}H_{16}OSi$	192.33	53-4° / 1		0.938	1.5020

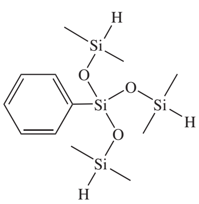
Flashpoint: 78°C (172°F)
Undergoes cross-aldol condensation with ketones.[1]
1. Organic Synthesis; Wiley & Sons: New York; 1993; Collect. Vol. 8, 323.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13735-81-4] HMIS: 2-2-1-X 5g ¥17,200



SIP6824.6
1-PHENYL-3-TRIMETHYLSILYL-2-PROPYN-1-OL

$C_{12}H_{16}OSi$	204.34			0.961	1.5193

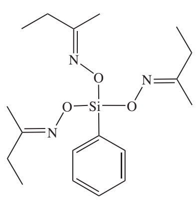
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[89530-43-7] HMIS: 3-1-1-X 10g ¥49,600



SIP6826.0 COMMERCIAL
PHENYLTRIS(DIMETHYLSILOXY)SILANE

$C_{12}H_{26}O_3Si_4$	330.68	91° / 2		0.942	1.4396^{28}

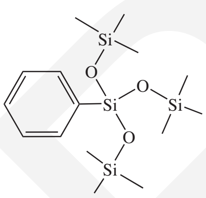
Flashpoint: 87°C (189°F)
Crosslinker for vinylphenylsilicone 2-component elastomers
See also SID4582.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18027-45-7] TSCA EC 241-940-3 HMIS: 2-2-1-X 25g ¥13,000 100g ¥35,000 2kg ¥203,000



SIP6826.5
PHENYLTRIS(METHYLETHYLKETOXIMINO)SILANE, tech-95

$C_{18}H_{29}N_3O_3Si$	363.53	60-5° / 3		0.995	

Flashpoint: >61°C (>142°F)
Neutral cross-linker for condensation cure silicone RTVs
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[34036-80-1] TSCA HMIS: 3-2-1-X 50g ¥8,800 250g ¥25,800

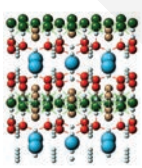


SIP6827.0 COMMERCIAL
PHENYLTRIS(TRIMETHYLSILOXY)SILANE
TRIS(TRIMETHYLSILOXY)PHENYLSILANE, PHENYLTRIMETHICONE

$C_{15}H_{32}O_3Si_4$	372.76	264-6°	(-102°)	0.924	1.4368^{25}

Viscosity, -40˚: 20 cSt
Viscosity, 20˚: 3.8 cSt
Surface tension: 27.2 mN/m
Flashpoint: 127°C (261°F)
TOXICITY: oral rat, LDLo: >34,500 mg/kg
Autoignition temperature: 430˚C
Vapor pressure, 105°: 1 mm
See also SIP6736.2, SIO6715.7
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[2116-84-9] (既) 7-474 TSCA EC 218-320-6 HMIS: 1-1-0-X 100g ¥8,800 1kg ¥38,800 10kg ¥265,000

PHENYLVINYLDICHLOROSILANE - see SIV9092.0 VINYLPHENYLDICHLOROSILANE



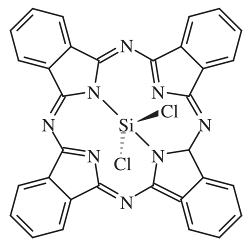
Crystal structure image courtesy of webmineral.com

SIP6827.7
PHLOGOPITE
MAGNESIUM MICA

$KMg_3[AlO(SiO_3)_3](F,OH)$			(>1,500°)	2.8	1.53

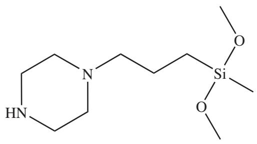
Particle size: <74 µm
Typical bulk density, not compacted: 0.28 g/cm³
Specific heat: 0.88 J/g/˚
Mohs Hardness: 2.0-2.5
Monoclinic prismatic
Transparent amber prismatic coarse platey crystals
Employed in flat films, accoustical deadening, electrical insulation, coatings
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12251-00-2] TSCA-E HMIS: 1-0-0-X 100g ¥8,500 5kg ¥36,800

	Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

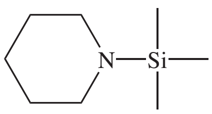


SIP6828.0
PHTHALOCYANATODICHLOROSILANE, tech-90
DICHLORO(29H,31H-PHTHALOCYANATO)SILICON
$C_{32}H_{16}Cl_2N_8Si$ — Mw 611.52 — (430° sub.)
λmax: 702 nm
Forms stacked phthalocyanines.[1]
1. Anderson, A. et al. *J. Am. Chem. Soc.* **1985,** *107*, 192.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[19333-10-9] TSCA EC 242-969-4 HMIS: 2-1-0-X 1.0g ¥20,400 5g ¥71,300

PINANE DERIVATIVES - see SID4074.0 (DIMETHYLCHLOROSILYL)METHYL-7,7-DIMETHYLNORPINANE



SIP6828.4
[3-(1-PIPERAZINYL)PROPYL]METHYLDIMETHOXYSILANE
$C_{10}H_{24}N_2O_2Si$ — Mw 232.40 — bp 95-7° / 2 — D_4^{20} 0.99 — n_D^{20} 1.4628[25]
Flashpoint: 123°C (253°F)
Adhesion promoter for metal substrates
Comonomer for silicones
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[128996-12-3] HMIS: 3-2-1-X 25g ¥16,200



SIP6828.6
(N-PIPERIDINO)TRIMETHYLSILANE
1-TRIMETHYLSILYLPIPERIDINE
$C_8H_{19}NSi$ — Mw 157.33 — bp 160-1° — D_4^{20} 0.832 — n_D^{20} 1.4423
Dipole moment: 0.95 debye
pKa: 18.81
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3768-56-7] TSCA EC 233-198-2 HMIS: 3-3-1-X 10g ¥25,700

$Pt^0 \cdot CO \cdot (CH_2{=}CH(Me)SiO)_4$

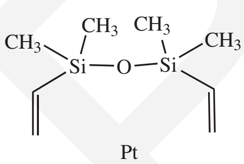
SIP6829.2
PLATINUM CARBONYL CYCLOVINYLMETHYLSILOXANE COMPLEX
OSSKO CATALYST
$C_8H_{18}OPtSi_2 \cdot CO$ — D_4^{20} 1.02
1.85 - 2.1% platinum concentration in vinylmethylcyclic siloxanes
Catalyst for Si-H addition to olefins; silicone vinyl addition cure catalyst
Employed in elevated temperature curing silicones
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[73018-55-0] TSCA HMIS: 2-2-0-X 5g ¥19,400 25g ¥67,100

$Pt^0 \cdot 1.5[(CH_2{=}CH(Me)_2Si]_2O)$

SIP6830.3
PLATINUM-DIVINYLTETRAMETHYLDISILOXANE COMPLEX
KARSTEDT CATALYST
$C_{24}H_{54}O_3Pt_2Si_6$ — Mw 474.68 — D_4^{20} 0.98
3-3.5% platinum concentration in vinyl terminated polydimethylsiloxane, 200 cSt
Complex is $Pt[O(SiMe_2CH{=}CH_2)_2]_{1.5}$
Neutral catalyst for Si-H addition to olefins, silicone vinyl addition cure catalyst
Employed in room temperature curing silicones
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[68478-92-2] TSCA EC 270-844-4 HMIS: 2-2-0-X 5g ¥16,400 25g ¥55,400

$Pt^0 \cdot 1.5[(CH_2{=}CH(Me)_2Si]_2O)$

SIP6831.2
PLATINUM-DIVINYLTETRAMETHYLDISILOXANE COMPLEX in xylene
KARSTEDT CATALYST
$C_{24}H_{54}O_3Pt_2Si_6$ — Mw 474.68 — D_4^{20} 0.8852 — n_D^{20} 1.4954
Flashpoint: 38°C (100°F)
2.1-2.4% platinum concentration
Hot catalyst employed in room temperature curing silicones
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[68478-92-2] TSCA EC 270-844-4 HMIS: 2-3-0-X 5g ¥19,400 25g ¥67,100

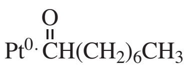


SIP6831.2LC
PLATINUM-DIVINYLTETRAMETHYLDISILOXANE COMPLEX in xylene, LOW COLOR
KARSTEDT CATALYST
$C_{24}H_{54}O_3Pt_2Si_6$ — Mw 474.68 — D_4^{20} 0.89
Flashpoint: 38°C (100°F)
2.0 - 2.2% platinum concentration
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[68478-92-2] TSCA EC 270-844-4 HMIS: 2-3-0-X 10g ¥45,900

$Pt^0 \cdot (CH_2{=}CH(Me)SiO)_4$

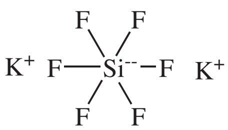
SIP6832.2
PLATINUM-CYCLOVINYLMETHYLSILOXANE COMPLEX
ASHBY-KARSTEDT CATALYST
D_4^{20} 1.02
2.0 - 2.3% platinum concentration in cyclic methylvinylsiloxanes
Neutral catalyst for Si-H additions to olefins
Silicone vinyl addition cure catalyst employed in moderately elevated temperature curing silicones
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[68585-32-0] TSCA EC 271-555-6 HMIS: 2-2-0-X 5g ¥18,000 25g ¥59,100

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



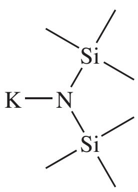
SIP6833.2
PLATINUM-OCTANAL/OCTANOL COMPLEX
LAMOREAUX CATALYST
D: 0.845 n: 1.4344
Flashpoint: 81°C (178°F)

2 - 2.5% platinum concentration in octanol
Catalyst for Si-H additions to olefins
Silicone vinyl addition cure catalyst
Increases flammability resistance of silicones
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[68412-56-6] TSCA EC 270-195-7 HMIS: 2-2-0-X 5g ¥15,100 25g ¥50,100



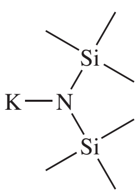
SIP6885.0
POTASSIUM HEXAFLUOROSILICATE
F_6K_2Si 劇物 — Mw 220.29, bp dec., D 2.67, n 1.3991
TOXICITY: oral gpg, LD50: 500 mg/kg

Solubility in water: 17 deg : 1.2 g/l
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[16871-90-2] TSCA EC 240-896-2 HMIS: 2-0-0-X 500g ¥13,000



SIP6890.0
POTASSIUM HEXAMETHYLDISILAZIDE, 11% in toluene, 0.5M
POTASSIUM BIS(TRIMETHYLSILYL)AMIDE
$C_6H_{18}KNSi_2$ — Mw 199.49, mp (194-5°), D 0.877
Flashpoint: 4°C (39°F)

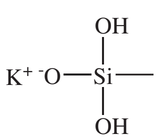
Review of synthetic utility.[1]
Sterically hindered base.[2]
Anionic initiator for preparation of polyalkylene oxides.[3]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 432-453.
2. Es-Sayed, M. et al. *Synlett* **1992,** *12*, 962.
3. Yokoyama, M. *Bioconjugate Chem.* **1992,** *3*, 275.
F&F: Vol. 4, p 407; Vol. 10, p 38, p 326; Vol. 13, p 257; Vol. 16, p 282.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[40949-94-8] HMIS: 3-4-1-X 400g ¥37,200 2kg ¥126,500



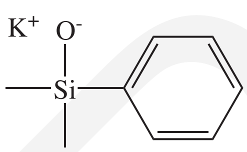
SIP6890.1
POTASSIUM HEXAMETHYLDISILAZIDE, 20% in THF
POTASSIUM BIS(TRIMETHYLSILYL)AMIDE
$C_6H_{18}KNSi_2$ — Mw 199.49, D 0.898
Flashpoint: -14°C (7°F)

Sterically hindered base.[1]
1. Es-Sayed, M. et al. *Synlett* **1992,** *12*, 962.
F&F: Vol. 4, p 407; Vol. 10, p 38, p 326; Vol. 13, p 257; Vol. 16, p 282.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[40949-94-8] HMIS: 3-4-1-X 400g ¥23,400 2kg ¥79,800

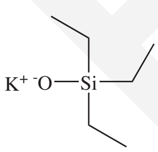
COMMERCIAL



SIP6898.0
POTASSIUM METHYLSILICONATE, 40% in water
CH_5KO_3Si — Mw 132.23, D 1.29
pH: 13
Aqueous water repellent concentrate for impregnation of mineral-based construction materials.[1]
1. Sinica, M. et al. *Materials Science (Medziagotyra)* **2007**, *13*, 229.
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[31795-24-1] TSCA HMIS: 3-0-0-X 500g ¥13,000

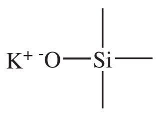


SIP6898.5
POTASSIUM PHENYLDIMETHYLSILANOLATE, 95%
$C_8H_{11}KOSi$ — Mw 190.36
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 10g ¥32,600

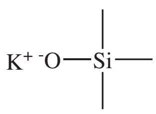


SIP6899.0
POTASSIUM TRIETHYLSILANOLATE, 95%
$C_6H_{15}KOSi$ — Mw 170.37
Soluble: methylene chloride, THF
Reagent for cross-coupling reactions - greater solubility, reactivity than $KOSiMe_3$
Used as a nucleophiles in the enantioselective formation of allyl alcohols from allyl carbonates.[1]
Employed in an inexpensive vinylation of aryl bromides.[2]
Catalyst for the cross-coupling of aryl and vinylsilanes.[3]
1. Lyothier, I. et al. *Angew. Chem., Int. Ed. Engl.* **2006**, *45*, 6204.
2. Denmark, S. E.; Butler, C.R. *J. Am. Chem. Soc.* **2008**, *130*, 3690.
3. Jeffery, T. *Tetrahedron Lett.* **1999**, *40*, 1673.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[25706-33-6] HMIS: 3-2-1-X 10g ¥19,400 50g ¥67,100

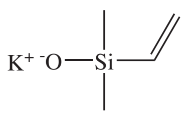
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



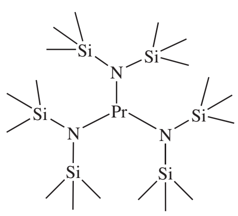
SIP6901.0
POTASSIUM TRIMETHYLSILANOLATE, tech-95
C_3H_9KOSi — Mw 128.29 — (134-8° dec.)
Contains potassium hydroxide, hexamethyldisiloxane
Initiates silicone (cyclic siloxane) polymerizations.
Cleaves esters under non-aqueous conditions.[1]
Catalyzes fluoride-free, silicon-based cross-coupling reactions.[2]
Converts difluorobenzenes to fluorophenols.[3]
Catalyst for the cross-coupling of aryl and vinylsilanes.[4]
1. Laganis, E. et al. *Tetrahedron Lett.* **1984,** *25*, 5831.
2. Denmark, S. E.; Regens, C. S. *Accts. Chem. Res.* **2008**, *41*, 1486.
3. Li, J. et al. *Synlett* **2009**, 633.
4. Jeffery, T. *Tetrahedron Lett.* **1999***, 40*, 1673.
F&F: Vol. 12, p 414.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[10519-96-7] TSCA EC 234-062-7 HMIS: 3-2-1-X 25g ¥14,600 100g ¥39,500



SIP6901.2
POTASSIUM TRIMETHYLSILANOLATE, 2M in tetrahydrofuran
C_3H_9KOSi — Mw 128.29 — D_4^{20} 0.91
26-29 wgt %; contains <5% methanol — Flashpoint: -14°C (7°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[10519-96-7] TSCA EC 234-062-7 HMIS: 3-4-1-X 25g ¥8,800 2kg ¥90,900

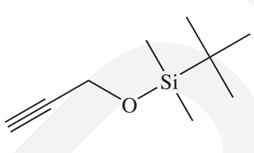


SIP6902.0
POTASSIUM VINYLDIMETHYLSILANOLATE, tech-90
C_4H_9KOSi — Mw 140.30 — (> 130°C dec.)
Flashpoint: >110°C (>230°F)
Initiates silicone (cyclic siloxane) polymerizations
Soluble: THF
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X 10g ¥18,300

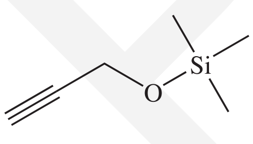


SIP6902.1
PRASEODYMIUM TRIS(HEXAMETHYLDISILAZIDE)
$C_{18}H_{54}N_3PrSi_6$ — Mw 622.07 — bp 88-90° / 10^{-4} — (154-7°)
Color: light green
Precursor for 15-21 k dielectric films.[1]
1. Kukli, K. et al. *Chem Mater.* **2004***, 16*, 5162.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[35789-00-5] HMIS: 3-2-1-X 5g ¥81,400

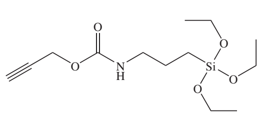
SIP6902.2
PRASEODYMIUM ZIRCONIUM SILICATE
$Pr_{0.25}Zr_{1.75}Si_2O_8$ (approx.) — (>1,250°) — D_4^{20} 4.5
Particle size 15-22 µm; bright yellow color
Spinel structure
Ceramic pigment
Undergoes color change (whitens) when pulsed with Nd:YAG laser (532 nm, 240 mJ).[1]
1. Gugger, H. et al. Eur. Pat. Appl. EP 1987-810049, 1987.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[68187-15-5] TSCA EC 269-075-7 HMIS: 2-0-0-X 25g ¥14,600



SIP6902.4
PROPARGYLOXY-t-BUTYLDIMETHYLSILANE
$C_9H_{18}OSi$ — Mw 170.32 — bp 40° / 8 — D_4^{20} 0.84 — n_D^{20} 1.429
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[76782-82-6] HMIS: 4-3-1-X 5g ¥19,900



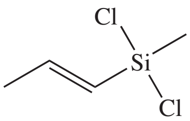
SIP6903.0
PROPARGYLOXYTRIMETHYLSILANE
O-TRIMETHYLSILYLPROPARGYL ALCOHOL
$C_6H_{12}OSi$ — Mw 128.25 — bp 110-1° — D_4^{20} 0.833 — n_D^{20} 1.4090
Flashpoint: 27°C (81°F)
TOXICITY: oral rat, LD50: 650 mg/kg
Reagent for the preparation of 1,4-dienes[1], 4-en-1-ynes.[2]
Sonogashira cross-coupling would yield silyl-protected propargyl alcohol derivatives.[3]
1. Knochel, P. et al. *J. Organomet. Chem.* **1986,** *309*, 1.
2. Mesnard, D. et al. *J. Organomet. Chem.* **1991,** *420*, 163.
3. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5582-62-7] (既) 2-2959 TSCA EC 226-981-7 HMIS: 3-3-1-X 25g ¥25,700



SIP6902.6
O-(PROPARGYL)-N-(TRIETHOXYSILYLPROPYL) CARBAMATE, 90%
$C_{13}H_{25}NO_5Si$ — Mw 303.43 — bp 110-20° / 0.2 — D_4^{20} 0.990 — n_D^{25} 1.4461
Inhibited with MEHQ — Flashpoint: 95°C (203°F)
Surface derivatization reagent enabling "click" chemistry of nanoparticles.[1]
1. Achatz, D. et al. *Sensors and Actuators B* **2010***, 150*, 211.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[870987-68-1] HMIS: 2-2-1-X 25g ¥24,100

SILICON COMPOUNDS

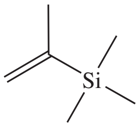
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIP6904.0
1-PROPENYLMETHYLDICHLOROSILANE, 95%

$C_4H_8Cl_2Si$	155.10	124-7° Flashpoint: 28°C (82°F)		1.0593	1.4395

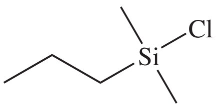
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18142-37-5] HMIS: 3-3-1-X 2.5g ¥45,900



SIP6905.0
2-PROPENYLTRIMETHYLSILANE, 95%
ISOPROPENYLTRIMETHYLSILANE

$C_6H_{14}Si$	114.26	83° Flashpoint: -12°C (10°F)		0.72	1.4061

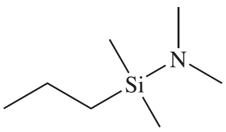
For introduction of the 2-propenyl group via cross-coupling.[1]
1. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[18163-07-0] HMIS: 2-4-0-X 5g ¥46,900



SIP6910.0
n-PROPYLDIMETHYLCHLOROSILANE

$C_5H_{13}ClSi$	136.70	113-4° Flashpoint: 10°C (50°F)		0.8726	1.4138

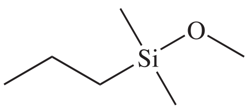
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17477-29-1] (既) 2-2041 TSCA EC 241-492-9 HMIS: 3-4-1-X 25g ¥16,400 100g ¥45,600



SIP6910.3
n-PROPYLDIMETHYL(DIMETHYLAMINO)SILANE

$C_7H_{19}NSi$	145.32	135-8°		0.767	

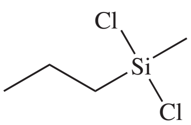
Volatile capping, hydrophobizing agent for nanoparticles
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[77303-23-2] HMIS: 3-3-1-X 25g ¥59,100



SIP6911.0
n-PROPYLDIMETHYLMETHOXYSILANE

$C_6H_{16}OSi$	132.28	94-6°		0.787	1.3927^{25}

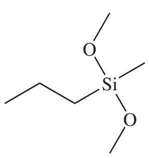
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18182-14-4] HMIS: 3-3-1-X 10g ¥25,200



SIP6912.0
n-PROPYLMETHYLDICHLOROSILANE

$C_4H_{10}Cl_2Si$	157.11	125° Flashpoint: 27°C (81°F)		1.027	1.425

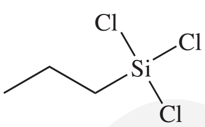
Viscosity, 20°: 0.8 cSt
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4518-94-9] (既) 2-2041 TSCA EC 224-843-0 HMIS: 3-3-1-X 25g ¥14,300 100g ¥39,000



SIP6914.0
n-PROPYLMETHYLDIMETHOXYSILANE

$C_6H_{16}O_2Si$	148.28	126°		0.8689	1.3931

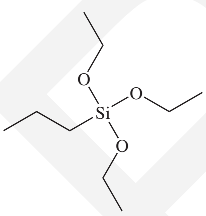
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18173-73-4] HMIS: 3-3-1-X 25g ¥26,300



SIP6915.0 *COMMERCIAL*
n-PROPYLTRICHLOROSILANE

$C_3H_7Cl_3Si$	177.53	123-4° Flashpoint: 35°C (95°F) Vapor pressure, 16°: 10 mm		1.185	1.4290

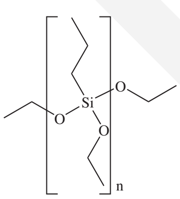
ΔHvap: 36.4 kJ/mole
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[141-57-1] (既) 2-2041 TSCA EC 205-489-6 HMIS: 3-3-1-X 25g ¥3,600 2.5kg ¥66,000



SIP6917.0 *COMMERCIAL*
n-PROPYLTRIETHOXYSILANE

$C_9H_{22}O_3Si$	206.36	179-80° Flashpoint: 57°C (135°F)		0.8916	1.3956

Architectural masonry water repellant
Surface modifier for TiO_2 particles that improves dispersibility but does not reduce photocatalytic activity.[1]
1. Ukaji, E. et al. *Appl. Surf. Sci.* **2007**, *254*, 563.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2550-02-9] (既) 2-2052 TSCA EC 219-842-7 HMIS: 2-2-1-X 25g ¥3,400 2kg ¥46,000 16kg ¥184,000

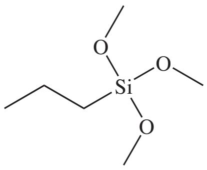


SIP6917.2
PROPYLTRIETHOXYSILANE, oligomeric hydrolysate

				1.03	1.4243

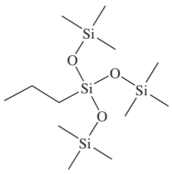
Viscosity: 25-40 cSt
Reactive hydrophobic surface treatment with reduced volatile by-products
See also SIO6715.2
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[314270-00-3] TSCA HMIS: 2-2-1-X 100g ¥6,700

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



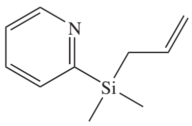
SIP6918.0
n-PROPYLTRIMETHOXYSILANE
$C_6H_{16}O_3Si$ 164.27 142° 0.932[25] 1.3880
γc of treated surface: 28.5 mN/m
Flashpoint: 34°C (93°F)
TOXICITY: oral rat, LD50: 7,420 mg/kg
Donor in Zeigler-Natta polymerization catalyst systems for polyolefins
Hydrophobic surface treatment
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1067-25-0] (既) 2-2052 TSCA EC 213-926-7 HMIS: 3-3-1-X 25g ¥3,400 2kg ¥36,000 16kg ¥165,000

COMMERCIAL

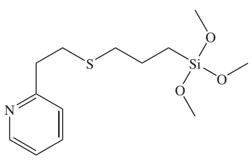


SIP6921.0
PROPYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{12}H_{34}O_3Si_4$ 338.74 234-7°
Viscosity: 2 cSt
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[60111-46-8] HMIS: 1-2-0-X 100g ¥25,700

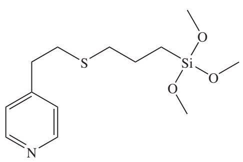
PROPYNYLTRIMETHYLSILANE - see SIT8606.5 1-TRIMETHYLSILYLPROPYNE



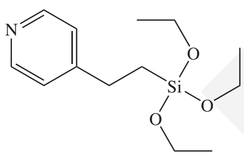
SIP6923.0
(2-PYRIDYL)ALLYLDIMETHYLSILANE, 90%
$C_{10}H_{15}NSi$ 177.32 104-5° / 18 1.5046
Flashpoint: 71°C (160F)
Allylates ketones and aldehydes in the absence of palladium catalysis. Source for other 2- pyridyl allylsilanes.[1]
Extensive review on the use in silicon-based cross-coupling reactions.[2]
1. Kamei, T. et al. *Org. Lett.* **2005**, *7*, 4725.
2. Denmark, S. E. et al. *Organic Reactions,* Vol. 75, Denmark, S. E. ed., John Wiley and Sons, 233, **2011**.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[118722-54-6] HMIS: 3-2-1-X store <5°C 2.5g ¥52,200



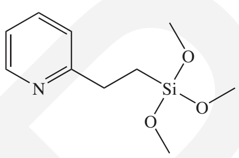
SIP6926.2
3-(2-PYRIDYLETHYL)THIOPROPYLTRIMETHOXYSILANE
$C_{13}H_{23}NO_3SSi$ 301.48 156-7° / 0.25 1.089 1.498
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[29098-72-4] HMIS: 3-2-1-X 10g ¥34,700



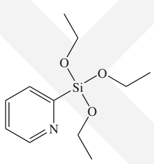
SIP6926.4
3-(4-PYRIDYLETHYL)THIOPROPYLTRIMETHOXYSILANE
$C_{13}H_{23}NO_3SSi$ 301.48 160-2° / 0.2 1.09 1.5037
pKa: 4.8
Immobilizable ligand for immunoglobulin IgG separation using hydrophobic charge induction chromatography (HCIC)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[198567-47-4] HMIS: 3-2-1-X 10g ¥36,300



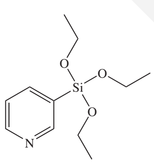
SIP6928.0
2-(4-PYRIDYLETHYL)TRIETHOXYSILANE
$C_{13}H_{23}NO_3Si$ 269.43 105° / 0.9 1.00 1.4624[24]
Amber liquid
Forms self-assembled layers which can be "nano-shaved" by scanning AFM.[1]
1. Rosa, L. et al. *Mater. Lett.* **2009**, *63*, 961.
See also SIP6930.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[98299-74-2] HMIS: 3-2-1-X 10g ¥35,000



SIP6930.0
2-(2-PYRIDYLETHYL)TRIMETHOXYSILANE
2-(TRIMETHOXYSILYLETHYL)PYRIDINE
$C_{10}H_{17}NO_3Si$ 227.33 105° / 0.3 1.06 1.4755
Flashpoint: >110°C (>230°F)
See also SIP6928.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[27326-65-4] HMIS: 3-1-1-X 10g ¥16,400 50g ¥55,400



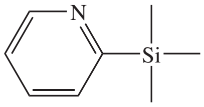
SIP6932.0
2-PYRIDYLTRIETHOXYSILANE
$C_{11}H_{19}NO_3Si$ 241.36
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[213602-91-6] HMIS: 2-2-1-X 5g ¥42,700



SIP6934.0
3-PYRIDYLTRIETHOXYSILANE
$C_{11}H_{19}NO_3Si$ 241.36
Extensive review on the use in silicon-based cross-coupling reactions.[1]
1. Denmark, S. E. et al. *Organic Reactions,* Vol. 75, Denmark, S. E. ed., John Wiley and Sons, 233, **2011**.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[129663-08-7] HMIS: 2-2-1-X 2.5g ¥53,800

SILICON COMPOUNDS

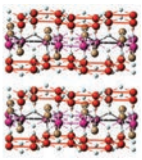
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIP6942.0
2-PYRIDYLTRIMETHYLSILANE

$C_8H_{13}NSi$	151.28	74° / 21		0.911^{25}	1.4885

Undergoes facile cross-coupling reactions
Useful as a hydroxymethyl synthon.[1]
Extensive review on the use in silicon-based cross-coupling reactions.[2]
1. Itami, K. et al. *J. Org. Chem.* **2001**, *66*, 3970.
2. Denmark, S. E. et al. *Organic Reactions,* Vol. 75, Denmark, S. E. ed., John Wiley and Sons, 233, **2011**.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[13737-04-7] HMIS: 3-2-1-X 5g ¥42,200


Crystal structure image courtesy of webmineral.com

SIP6943.0
PYROPHYLLITE

$Al_2(Si_4O_{10})(OH)_2$	360.31			2.84	1.54

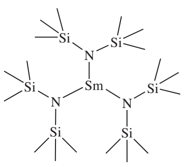
Particle Size: <24 µm — Mohs Hardness: 1.5-2.0
Typical bulk density, not compacted: 0.40 g/cm³ — Triclinic pinacoidal
Brown green, fine grain, foliated platy cleavage, alumina source, high internal surface area
Used in refractories, ceramics, adsorbent, plastics, rubber, cement, anti-caking agent
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12269-78-2] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 6kg ¥43,500

QUARTZ, - see SIS6964.0 SILICON DIOXIDE, crystalline

QUATS - see SID3392.0, SIO6620.0, SIS6994.0, SIT7090.0, SIT8395.0, SIT8405.0, SIT8412.0, SIT8414.0, SIT8415.0

QUININE SILANE - see SIT8192.4 (R)-N-TRIETHOXYSILYLPROPYL-O-QUININEURETHANE

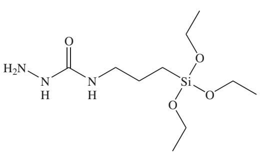
RHENIUM V11 OXIDE TRIMETHYLSILOXIDE - see SIT8598.0 TRIMETHYLSILYLPERRHENATE



SIS6943.4
SAMARIUM TRIS(HEXAMETHYLDISILAZIDE)

$C_{18}H_{54}N_3Si_6Sm$	631.52	83-4° / 1x10⁻⁴ sub.	(93-105°)		

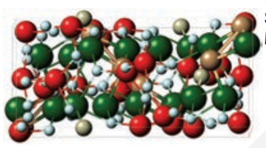
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[35789-01-6] HMIS: 3-2-1-X 1.0g ¥42,700



SIS6944.0
3-(4-SEMICARBAZIDYL)PROPYLTRIETHOXYSILANE, tech-95

$C_{10}H_{25}N_3O_4Si$	279.41			1.08	1.4593

Flashpoint: >110°C (>230°F)
Employed in immobilization of oligonucleotides.[1]
1. Podyminogin, M. et al. *Nucleic Acids Res.* **2001,** *29*, 5090.
See also SIO6708.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[106868-88-6] HMIS: 3-1-1-X 5g ¥52,800

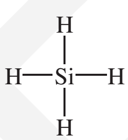

Crystal structure image courtesy of webmineral.com

SIS6948.0
SEPIOLITE

$Mg_4Si_6O_{15}\cdot 6H_2O$	613.82			2.0	1.52

Particle Size: <35 µm — Mohs Hardness: 2.0
Typical bulk density, not compacted: 0.35 g/cm³ — Orthorhombic
Surface Area: 300 m²/g
Unit cell structure 50% larger than Attapulgite, elongate crystal
Exhibits sorptive properties, used as desiccant, pharmaceuticals adjuvant
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[63800-37-3] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 6kg ¥37,600

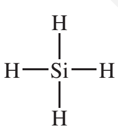
SILACROWN - see SID4220.4 TO SID4221.0



Reference Compound 9
SILANE

H_4Si	32.12	-112°	(-185°)	0.680^{-185}	

Viscosity of gas, 25˚C: 116 micropoise — TOXICITY: ihl rat, LC50: 9,600 ppm/4H
ΔHform: -34 kJ/mole — Vapor pressure, -118°: 530 mm
ΔHvap: 12.39 kJ/mole — Critical temperature: -3.5˚C
Heat capacity, 25˚: 42.86 kJ/mole — Critical pressure: 47.8 atm
Bond dissociation energy: 377 kJ/mole — Flammability limit, lower: 1.37%
Reference compound. Data is provided for investigators. Gelest offers silane as mixtures with argon (SIS6950.1) and nitrogen (SIS6950.4)
HYDROLYTIC SENSITIVITY: 10: reacts extremely rapidly with moisture and oxygen - pyrophoric - sealed system required
[7803-62-5] TSCA EC 232-263-4 HMIS: 3-4-3-X

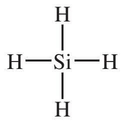


SIS6950.1
SILANE, 7.0 - 7.5% in argon

H_4Si	32.12	-112°	(-185°)	0.680^{-185}	

WARNING: PYROPHORIC - MAY FORM EXPLOSIVE MIXTURES WITH AIR
SURFACE TRANSPORT ONLY - UPS FORBIDDEN. AIR TRANSPORT FORBIDDEN
Employed in epitaxial deposition of silicon
HYDROLYTIC SENSITIVITY: 10: reacts extremely rapidly with moisture and oxygen - pyrophoric - sealed system required
[7803-62-5] TSCA EC 232-263-4 HMIS: 3-4-3-X 100g inquire
** includes gas dispensing cylinder zCYL-HPA-6000*

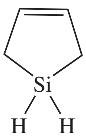
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIS6950.4
SILANE, 7.0 - 7.5% in nitrogen
H_4Si — 32.12 — -112° — (-185°) — 0.680^{-185}

WARNING: PYROPHORIC - MAY FORM EXPLOSIVE MIXTURES WITH AIR
SURFACE TRANSPORT ONLY - UPS FORBIDDEN. AIR TRANSPORT FORBIDDEN

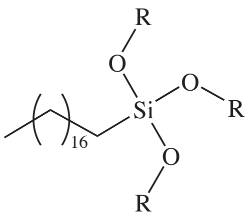
Employed in epitaxial deposition of silicon
HYDROLYTIC SENSITIVITY: 10: reacts extremely rapidly with moisture and oxygen - pyrophoric - sealed system required
[7803-62-5] TSCA EC 232-263-4 HMIS: 3-4-3-X 100g inquire
** includes gas dispensing cylinder zCYL-HPA-6000*



SIS6951.0
1-SILA-3-CYCLOPENTENE, tech-95
3-SILOLENE
C_4H_8Si — 84.19 — 69-70° — 0.848 — 1.4658

HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[7049-25-4] HMIS: 2-4-1-X store <5°C 2.5g ¥52,200

3-SILAPENTANE - see SID3410.0 DIETHYLSILANE



SIS6952.0
SILICLAD®
Octadecyl functional silane, 20% in t-butanol/diacetone alcohol — 0.88

COMMERCIAL

- Amber liquid
- Coefficient of friction of treated glass surface: 0.2 - 0.3
- γc of treated glass surface: 31 mN/m
- Flashpoint: 25°C (77°F)
- Surface resistivity of treated surface: 1.2×10^{13} ohms

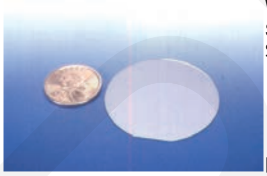
For application information see Gelest Performance Products Brochure
Reduces blood protein adsorption.[1]
Anti-stiction coating for polysilicon.[2]
1. Arkles, B. et al. In *Silanes Surfaces & Interfaces;* Leyden, D., Ed; Gordon & Breach: 1986; p 91.
2. Almanza-Workman, A. et al. *J. Electrochem. Soc.* **2002**, *149*, H6
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[39443-39-5] TSCA HMIS: 2-3-1-X 100g ¥8,800 1.5kg ¥54,000 15kg ¥213,000

Si

SIS6955.0
SILICON, 99% powder
Si — 28.086 — 2,680° — (1,420°) — 2.330

- Particle size: <75 µm (-200 mesh)
- ΔHcomb: 28.5 kJ/g-atom
- ΔHfus: 46.5 kJ/g-atom
- ΔHsub: 377 kJ/g-atom
- ΔHvap: 297 J/mole
- Atomic number: 14
- Dielectric constant: 12
- Electron mobility, 27°: 1,300 cm^2/volt-sec
- Hole mobility, 27°: 500 cm^2/volt-sec
- Hardness: 7.0 moh; 48 shore
- Intrinsic resistivity: 0.23 megaohm
- Critical temperature: 4,920°C
- Critical pressure: 1,450 atm
- Specific heat, 25°: 0.678 J/g/°
- Thermal conductivity: 0.84 J/sec/cm^2/°C/cm
- Electronegativity: 1.8
- Van der Waal's radius: 1.7Å
- Covalent radius: 1.11Å
- Lattice constant:, 25°: 5.429×10^{-8}
- Young's modulus: 10,890 kg/mm^2
- Electrical conductivity: 0.1 $microohms^{-1}$

Relative abundance-^{28}Si: 92.21%; ^{29}Si: 4.70%; ^{30}Si: 3.096%
Silicon composes 27.7% of the earth's crust
The need for silicon in mammalian nutrition has been established
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[7440-21-3] TSCA EC 231-130-8 HMIS: 1-3-0-X 250g ¥15,000



W-SI-76-0.4
SILICON WAFER
Si

- 76 mm (3 inch) x 3 mm (0.125 inch)
- Undoped
- Single side polished
- Orientation: <100>

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[7440-21-3] TSCA EC 231-130-8 HMIS: 0-0-0-X 5 wafers ¥80,400

Si

W-SIN-76-0.4
SILICON WAFER
Si

- 76 mm (3 inch) x 3 mm (0.125 inch)
- N-doped (phosphorus)
- Single side polished
- Resistivity: 0.01 Ω-cm
- Orientation: <100>

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[7440-21-3] TSCA EC 231-130-8 HMIS: 0-0-0-X Each ¥51,200

Si

W-SIP-76-0.4
SILICON WAFER
Si

- 76 mm (3 inch) x 3 mm (0.125 inch)
- P-doped (boron)
- Single side polished
- Resistivity: 0.01 Ω-cm
- Orientation: <100>

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[7440-21-3] TSCA EC 231-130-8 HMIS: 0-0-0-X Each ¥45,900

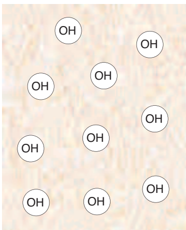
SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

SiC

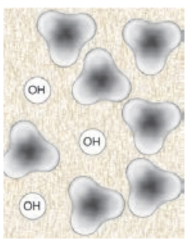
SIS6959.0
SILICON CARBIDE, powder
CSi — 40.10 — (2,700°) — 3.23 — 2.65
35-60µ (~200-450 mesh equivalent) — Hardness, Mohs: 9.5
ΔHform: -109 kJ/mole — Dielectric constant: 9.7-10.2
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[409-21-2] (既) 7-174 TSCA EC 206-991-8 HMIS: 1-0-0-X 250g ¥10,200

W-SIO-76-03
SILICON DIOXIDE WAFER
SiO_2 — 60.09 — (1,610°) — 2.20 — 1.4585
76 mm (3 inch) x 3 mm (0.125 inch) — Resistivity: 1014 Ω-cm
Both sides polished — Hardness, Mohs: 6
Fused quartz
Suitable substrate for coupling agent treatments and immobilization studies
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[7631-86-9] TSCA EC 231-545-4 HMIS: 0-0-0-X Each ¥20,400 5 wafers ¥71,100



SIS6960.0
SILICON DIOXIDE, amorphous
Fumed silica
SiO_2 — 60.09 — (>1,600°) — 2.2 — 1.46
Ultimate particle size: 12 - 20 nm — TOXICITY: oral rat, LD50: 8,160 mg/kg
Surface area: 200 m²/g — γc: 44 mN/m
Isoelectric point: 2.2 — Bulk density: ~50 g/l
pH, (4% aqueous slurry): 3.5-4.5
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[112945-52-5] TSCA HMIS: 2-0-0-X 500g ¥9,600 2kg ¥29,000
COMMERCIAL

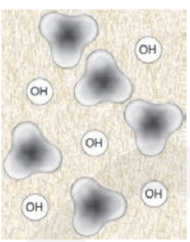
SIS6961.0
SILICON DIOXIDE, amorphous, OCTAMETHYLCYCLOTETRASILOXANE TREATED
Fumed silica, D4 treated
SiO_2 — 60.09 — (>1,600°) — 2.2 — 1.46
Ultimate particle size: 20 nm — Bulk density: ~50 g/l
Surface area: 300 m²/g
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[68583-49-3]/[7631-86-9] TSCA EC 271-514-2 HMIS: 2-0-0-X 500g ¥14,900 2kg ¥42,100
COMMERCIAL



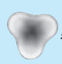
SIS6962.0
SILICON DIOXIDE, amorphous, HEXAMETHYLDISILAZANE TREATED
Fumed silica, HMDZ treated
SiO_2 — 60.09 — (>1,600°) — 2.2 — 1.45
Ultimate particle size: 20 nm — Carbon content: 3%
Surface area: 150-200 m²/g — Calculated ratio: $(CH_3)_3$Si/HO-Si: 2/1

 *= $(CH_3)_3Si$- = trimethylsilyl group*

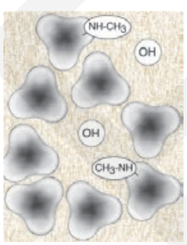
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[68909-20-6]/[7631-86-9] TSCA EC 272-697-1 HMIS: 2-0-0-X 500g ¥17,300 2kg ¥50,000
COMMERCIAL



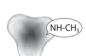
SIS6962.1M30
SILICON DIOXIDE, amorphous, HEXAMETHYLDISILAZANE TREATED
Fumed silica, HMDZ treated
SiO_2 — 60.09 — (>1,600°) — 2.2 — 1.45
Ultimate particle size: 20 nm — Carbon content: 2-3%
Surface area: 150-200 m²/g — Calculated ratio: $(CH_3)_3$Si/HO-Si: 1/1

 *= $(CH_3)_3Si$- = trimethylsilyl group*

HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[68909-20-6]/[7631-86-9] TSCA EC 272-697-1 HMIS: 2-0-0-X 500g ¥15,200 2kg ¥42,600
COMMERCIAL



SIS6962.1N30
SILICON DIOXIDE, amorphous, CYCLIC AZASILANE/HEXAMETHYLDISILAZANE TREATED
SiO_2 — 60.09 — (>1,600°) — 2.2 — 1.45
Ultimate particle size: 20 nm — Carbon content: 4-7%
Surface area: 150-200 m²/g — Calculated ratio: $CH_3NHCH_2CH_2CH_2Si/(CH_3)_3Si/HO-Si$: 1/2/1



= $CH_3NHCH_2CH_2CH_2Si(CH_3)_2$

HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
TSCA HMIS: 2-0-0-X 500g ¥33,700

SiO_2

SIS6963.0
SILICON DIOXIDE, amorphous GEL, 30% in isopropanol
COLLOIDAL SILICA in isopropanol
SiO_2 — 60.09 — 0.97^{25}
Particle size: 10 nm — Flashpoint: 12°C (54°F)
Viscosity: 3-20 cSt.
HYDROLYTIC SENSITIVITY: 6: forms irreversible hydrate
[112926-00-8] TSCA HMIS: 2-3-0-X 500g ¥25,200 2.5kg ¥92,800

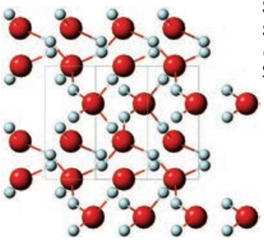
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

SiO_2

SIS6963.2
SILICON DIOXIDE, amorphous GEL, 15% in water
COLLOIDAL SILICA
SiO_2 — Mw 60.09 — D_4^{20} 1.29
Particle size, average: 4-5 nm — pH: 9.1
Surface area: 600-650 m^2/g
Ammonium stabilizing counterion
For preparation of silica catalytic supports
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[7631-86-9] (既) 1-548 TSCA EC 231-545-4 HMIS: 3-0-0-X 1kg ¥14,400 4kg ¥46,000

SiO_2

SIS6963.4
SILICON DIOXIDE, amorphous GEL, 40% in water
COLLOIDAL SILICA
SiO_2 — Mw 60.09 — D_4^{20} 1.29
Particle size, average: 20-22 nm — pH: 9.1
Surface area: 135-150 m^2/g
Ammonium stabilizing counterion
For preparation of silica catalytic supports
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[7631-86-9] (既) 1-548 TSCA EC 231-545-4 HMIS: 3-0-0-X 1kg ¥11,200 4kg ¥35,700



Crystal structure image courtesy of webmineral.com

SIS6964.0
SILICON DIOXIDE, crystalline
QUARTZ POWDER
SiO_2 — Mw 60.09 — bp 2,230° — mp (1,610°) — D_4^{20} 2.65 — n_D^{20} 1.540
Particle Size: <10 µm — TOXICITY: oral rat, LD50: 3,160 mg/kg
Typical bulk density, not compacted: 0.24 g/cm^3 — Mohs Hardness: 7.0
ΔHform: -858 kJ/mole — Trigonal trapezohedral
Isoelectric point: 2.2
Dielectric constant: 3.8-5.4
Clear, transparent cryptocrystalline
Employed in abrasives, filtration, refractories, ceramics
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[7631-86-9] (既) 1-548 TSCA EC 231-545-4 HMIS: 1-0-0-X 500g ¥7,200 10kg ¥47,000

SiO_2

SIS6964.4
SILICON DIOXIDE, fused
SYNTHETIC
SiO_2 — Mw 60.09 — mp (1,585°) — D_4^{20} 2.203 — n_D^{20} 1.45
Particle Size: <55 µm; amorphous glass — Mohs Hardness: 5.5-6.5
Coefficient of Thermal Expansion, 5˚C - 35˚C: 0.52 ppm/K
Clear, transparent, exceptional transmittance
Used in high energy laser optics, optical fibers, photolithography, filler for electronic composites
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[60676-86-0] (既) 1-548 TSCA-E HMIS: 1-0-0-X 500g ¥12,000

SiO_2

SIS6966.0
SILICON DIOXIDE, precipitated
SiO_2 — Mw 60.09
200-400 mesh (35-70 µm) — Pore size: 150 Å
pH, (5% aqueous slurry): 6.7-7.3 — Surface area: 300 m^2/g
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[7631-86-9] TSCA EC 231-545-4 HMIS: 1-0-0-X 500g ¥30,000

SiS_2

SIS6967.0
SILICON DISULFIDE, 95%
S_2Si — Mw 92.21 — bp 1,090° sub. — D_4^{20} 2.02
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13759-10-9] TSCA EC 237-344-8 HMIS: 3-3-1-X 10g ¥55,400

SILICONE OIL - See CONVENTIONAL SILICONE FLUIDS in Polymer Section

SiB_6

SIS6968.0
SILICON HEXABORIDE
B_6Si — Mw 92.95 — mp (1,950°) — D_4^{20} 2.430
Thermal conductivity: 9 W/m˚C
Electrical conductivity: 6.5 ohm-cm
High temperature ceramic
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[12008-29-6] TSCA EC 234-535-8 HMIS: 2-1-0-X 25g ¥35,300

SiO

SIS6970.0
SILICON MONOXIDE
OSi — Mw 44.08 — mp (1,880°) — D_4^{20} 2.13 — n_D^{20} 1.98
2-6 µm powder — Coefficient of thermal expansion: 4.6 $x10^{-6}$
ΔHform: -5.9 kJ/mole
ΔHvap: 320.6 kJ/mole
Evaporation at 1,000 - 1,400˚ at 2 X 10^{-6} mm gives near IR anti-reflective coatings
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[10097-28-6] (既) 1-814 TSCA EC 233-232-8 HMIS: 1-0-0-X 25g ¥15,600

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

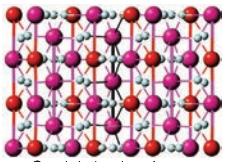
Si_3N_4

SIS6972.0
SILICON NITRIDE, powder
N_4Si_3 — 140.28 — (1,900°) — 3.44
0.5-1.0 µm powder
Dielectric constant: 6.1
Primarily α-phase
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12033-89-5] (既) 1-493 TSCA EC 234-796-8 HMIS: 1-0-0-X 25g ¥13,000

SILICON TETRAACETATE - see SIT6998.0 TETRAACETOXYSILANE

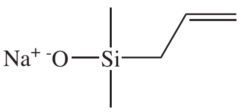
SILICON TETRABROMIDE - see SIT7050.0 TETRABROMOSILANE

SILICON TETRACHLORIDE - see SIT7085.0 TETRACHLOROSILANE

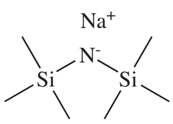

Crystal structure image courtesy of webmineral.com

SIS6975.0
SILLIMANITE
Al_2SiO_5 — 162.05 — 3.24 — 1.65
Particle Size: <44 µm
Mohs Hardness: 7.0
Orthorhombic dipyramidal
Brownish green, acicular crystals
Alumina & silica source, used in refractories, advanced ceramics, metallurgy, abrasives
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1332-58-7] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 10kg ¥44,000

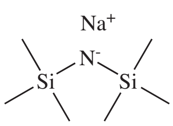
SILOXENE - see SIC2054.0 CALCIUM SILICIDE



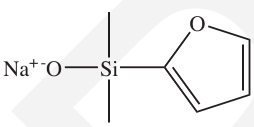
SIS6977.0
SODIUM ALLYLDIMETHYLSILANOLATE, 2M in tetrahydrofuran
$C_5H_{11}NaOSi$ — 138.22
Flashpoint: -14°C (7°F)
Extensive review on the use in silicon-based cross-coupling reactions.[1]
1. Denmark, S. E. et al. *Organic Reactions,* Vol. 75, Denmark, S. E. ed., John Wiley and Sons, 233, **2011**.
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
HMIS: 2-4-1-X 10g ¥51,200



SIS6980.0
SODIUM BIS(TRIMETHYLSILYL)AMIDE, 95%
N-SODIOHEXAMETHYLDISILAZANE
$C_6H_{18}NNaSi_2$ — 183.37 — 202° / 1-2 — (165-7°)
Soluble: hexane, toluene, ether, THF
Review of synthetic utility.[1]
Reacts with allyl chloride in toluene to form cyclopropene.[2]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 468-478.
2. Binger, P. et al. *Org. Synth.* **1999,** *77*, 254.
F&F: Vol. 1, p 1046; Vol. 3, p 261; Vol. 6, p 442; Vol. 7, p 329; Vol. 12, p 441, p 446; Vol. 16, p 307; Vol. 21, p 401.
See also SIS6980.2
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1070-89-9] TSCA EC 213-983-8 HMIS: 3-3-1-X 50g ¥35,300

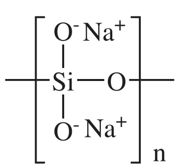


SIS6980.2
SODIUM BIS(TRIMETHYLSILYL)AMIDE, 2M in tetrahydrofuran
$C_6H_{18}NNaSi_2$ — 183.37 — 0.90
Flashpoint: -14°C (7°F)
Review of synthetic utility.[1]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 468-478.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1070-89-9] TSCA EC 213-983-8 HMIS: 3-4-1-X 100g ¥13,000 2kg ¥136,000 16kg ¥484,000
COMMERCIAL



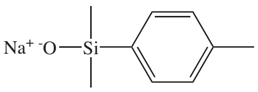
SIS6980.6
SODIUM (2-FURYL)DIMETHYLSILANOLATE
$C_6H_9NaO_2Si$ — 164.24 — (65-80°)
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[879904-88-8] HMIS: 3-3-1-X 10g ¥49,900

SIS6981.0
SODIUM HEXAFLUOROSILICATE
F_6Na_2Si 劇物 — 188.06 — 2.679 — 1.3120
TOXICITY: oral rat, LD50: 125 mg/kg
Component in aluminum etching solutions
Solubility in water: 6.5 g/l
See also SIP6885.0
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[16893-85-9] TSCA EC 240-934-8 HMIS: 3-0-0-X 25g ¥7,400 500g ¥12,500

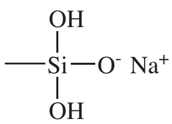


SIS6982.0
SODIUM METASILICATE
DISODIUM TRIOXOSILICATE
$(Na_2O_3Si)_n$ — 122.06 — (1,088°) — 2.4
TOXICITY: oral rat, LD50: 1,280 mg/kg
Solubility in water, 30°: 270 g/l
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[6834-92-0] (既) 1-508 TSCA EC 229-912-9 HMIS: 1-0-0-X 500g ¥8,800 3kg ¥28,400

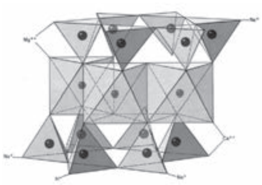
Name | Mw | bp °C/mm | (mp °C) | D_4^{20} | n_D^{20}



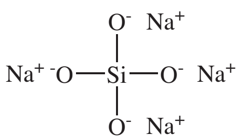
SIS6983.0
SODIUM (4-METHYLPHENYL)DIMETHYLSILANOLATE, 2M in tetrahydrofuran
$C_9H_{13}NaOSi$ 188.27
Flashpoint: -14°C (7°F)
Cross-coupling reagent
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
HMIS: 2-4-1-X 10g ¥35,300



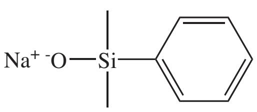
SIS6984.0
SODIUM METHYLSILICONATE, 30% in water
CH_5NaO_3Si 116.12 1.24
Viscosity: 10 cSt.
pH: 13.0
Forms economical water-repellent coatings
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[16589-43-8] TSCA EC 240-648-3 HMIS: 3-0-0-X 100g ¥6,600 2.5kg ¥26,000 20kg ¥164,000
COMMERCIAL



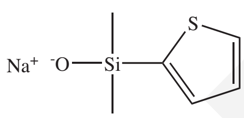
SIS6985.0
SODIUM MONTMORILLONITE CLAY
BENTONITE
$(Na,_{0.5}Ca)_{0.7}(AL,Mg,Fe)_4(Si,Al)_8O_{20}(OH)_4{\cdot}XH_2O$ 2.3 1.48
Particle size <24 µm
Typical bulk density, not compacted: 0.48 g/cm³
Mohs hardness: 1.5-2.0
Surface area: >750 m²/g
Pillared, interlayered clay - may be exfoliated for composite and catalyst applications.[1]
1. Gil, A. et al. *Catal. Rev.* **2000,** *42*, 145.
See also SIH5840.2, SIM6470.7
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1318-93-0] TSCA-E EC 215-288-5 HMIS: 1-0-0-X 100g ¥6,600 2kg ¥25,600 10kg ¥101,000



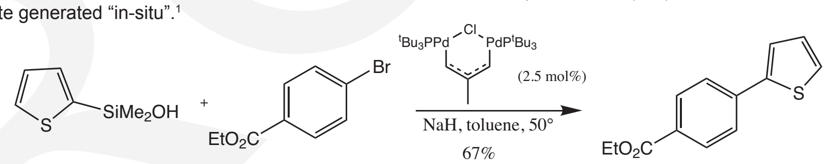
SIS6986.0
SODIUM ORTHOSILICATE, tech-90
Na_4O_4Si 184.04 (1,018°)
Disproportionates to metasilicate and sodium hydroxide
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[13472-30-5] TSCA EC 236-741-3 HMIS: 3-0-0-X store <5°C 500g ¥23,600



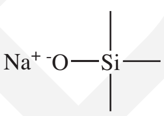
SIS6986.1
SODIUM PHENYLDIMETHYLSILANOLATE, 2M in tetrahydrofuran
$C_8H_{11}NaOSi$ 174.25 (87-94°)neat
Flashpoint: -14°C (7°F)
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[7646-75-5] HMIS: 2-4-1-X 10g ¥27,300



SIS6987.0
SODIUM (2-THIENYL)DIMETHYLSILANOLATE, 2M in tetrahydrofuran
$C_6H_9NaOSSi$ 180.31
Flashpoint: -14°C (7°F)
Sodium silanolate generated "in-situ".[1]



1. Denmark, S. E.; Baird, J. D. *Org. Lett.* **2006***, 8*, 793.
HYDROLYTIC SENSITIVITY: 5: forms reversible hydrate
[879904-87-7] HMIS: 2-4-1-X 10g ¥49,900

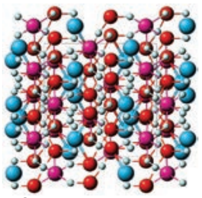


SIS6988.0
SODIUM TRIMETHYLSILANOLATE, 96%
C_3H_9NaOSi 112.18 (147-150° dec.)
Used as a weak base for alkylation of phenols.[1]
Directly generates amines from carboxylic acids in a modified Curtius reaction.[2]
Important promoter for silicon-based cross-coupling reactions.[3]
1. Houpis, N. et al. *Org. Lett.* **2005**, *7*, 1947.
2. Ma, B.; Lee, C-W. *Tetrahedron Lett.* **2010**, *51*, 385.
3. Denmark, S. E. et al. *Organic Reactions,* Vol. 75, Denmark, S. E. ed., John Wiley and Sons, 233, **2011**.
See also SIP6901.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18027-10-6] TSCA EC 241-939-8 HMIS: 3-1-0-X 25g ¥19,900 100g ¥57,000

SILICON COMPOUNDS

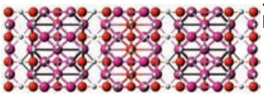
Gelest

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



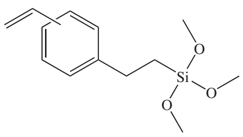
Crystal structure image courtesy of webmineral.com

SIS6988.5
SPODUMENE
LITHIUM ALUMINUM SILICATE
$AlLiO_7Si_2$ — Mw 202.09 — D_4^{20} 2.650
Particle Size: <74 µm — Mohs Hardness: 6.5-7.0
Typical bulk density, not compacted: 1.20 g/cm³
Monoclinic prismatic
White, prismatic crystals
Upon heating converts to eucryptite w/ negative thermal expansion coefficient: -8.5 x10⁻⁶
Lowers melt temperature of glasses and glazes
See also SIL6465.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12068-40-5] TSCA EC 235-098-6 HMIS: 1-0-0-X 250g ¥11,600

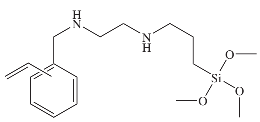


Crystal structure image courtesy of webmineral.com

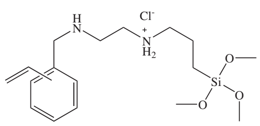
SIS6988.6
STAUROLITE
$Fe_{1.4}Li_{0.1}Mg_{0.1}Al_{8.6}Si_{3.9}Al_{0.1}O_{21.7}(OH)_{2.4}$ — Mw 811.89 — D_4^{20} 3.7 — n_D^{20} 1.74
Particle Size: <74 µm — Mohs Hardness: 7.0-7.5
Monoclinic prismatic
Dark brown, short prismatic crystals, rough surfaces
Applications include: airblast abrasive, coatings, primers
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12182-56-8] TSCA-E HMIS: 1-0-0-X 500g ¥9,600 10kg ¥49,200



SIS6990.0
STYRYLETHYLTRIMETHOXYSILANE, tech-90
$C_{13}H_{20}O_3Si$ — Mw 252.38 — bp 98° / 0.1 — D_4^{20} 1.02 — n_D^{20} 1.505
Inhibited with t-butyl catechol — Flashpoint: 97°C (207°F)
Copolymerization parameter, e,Q: -0.880, 1.500
Mixed m-, p-isomers and α-, β-isomers
Contains ethylphenethyltrimethoxysilane
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[119181-19-0]/[52783-38-7] TSCA-E HMIS: 2-1-1-X store <5°C 10g ¥21,500 50g ¥75,600

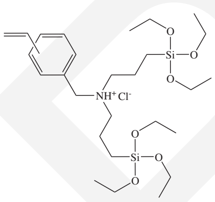


SIS6993.0
3-(N-STYRYLMETHYL-2-AMINOETHYLAMINO)PROPYLTRIMETHOXYSILANE, 40% in methanol
$C_{17}H_{30}N_2O_3Si$ — Mw 338.52 — D_4^{20} 0.871 — n_D^{20} 1.3900
Inhibited with BHT — Flashpoint: 11°C (52°F)
Coupling agent for unsaturated polyesters
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[34937-00-3] TSCA EC 252-297-3 HMIS: 3-4-1-X store <5°C 25g ¥9,300 100g ¥22,500 2kg ¥97,800



SIS6994.0 サイラエース **S350**
3-(N-STYRYLMETHYL-2-AMINOETHYLAMINO)PROPYLTRIMETHOXYSILANE HYDROCHLORIDE, 40% in methanol
$C_{17}H_{31}ClN_2O_3Si$ — Mw 374.98 — D_4^{20} 0.91 — n_D^{20} 1.395
Inhibited with BHT — Flashpoint: 11°C (52°F)
Viscosity: 2.3 cSt
Specific wetting surface area: 208 m²/g
Coupling agent for phenolic and epoxy fiberglass laminates (printed circuit boards)
See also SIS6989.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
サイラエース S350 100ml ¥4,900 1L ¥9,300
[34937-00-3] (既) 3-3387 TSCA EC 252-297-3 HMIS: 3-4-1-X store <5°C 25g inquire 2kg inquire 15kg inquire

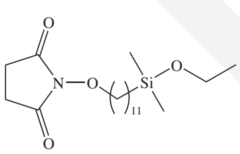
COMMERCIAL



SIS6989.0
(STYRYLMETHYL)BIS(TRIETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 40% in ethanol
$C_{27}H_{52}ClNO_6Si_2$ — Mw 578.34 — D_4^{20} 0.909
Inhibited with BHT, mixed m-, p-isomers — Flashpoint: 15°C (59°F)
Dipodal quaternary coupling agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-4-1-X store <5°C 25g ¥11,900 100g ¥31,000

(STYRYLMETHYLENEOXY)TRIMETHYLSILANE - see SIV9061.0 (m,p-VINYLBENZYLOXY)TRIMETHYLSILANE

STYRYLOXY(t-BUTYLDIMETHYL)SILANE - see SIB1941.0 p-(t-BUTYLDIMETHYLSILOXY)STYRENE



SIS6995.0
11-(SUCCINIMIDYLOXY)UNDECYLDIMETHYLETHOXYSILANE, 95%
$C_{19}H_{37}NO_4Si$ — Mw 371.59 — bp 195-200° / 0.6 — (mp 28°)
Reagent for immobilization of proteins via primary amines
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 1.0g ¥59,100

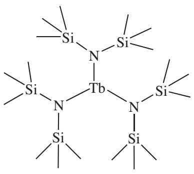
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT6996.0 TANTALUM SILICIDE, 99.9+% Si_2Ta	237.12		(2,200°)	9.14	
SIT6997.0 TERBIUM TRIS(HEXAMETHYLDISILAZIDE) $C_{18}H_{54}N_3Si_6Tb$	640.09		(162-5°)		
SIT6997.2 m-TERPHENYL-5'-YLTRIMETHYLSILANE $C_{21}H_{22}Si$	302.48		(79-80°)		
SIT6998.0 TETRAACETOXYSILANE, 95% *SILICON TETRAACETATE* $C_8H_{12}O_8Si$	264.26	148° / 6	(111-5°)		
SIT7010.0 TETRAALLYLOXYSILANE $C_{12}H_{20}O_4Si$	256.37	114-6° / 12		0.982	1.4336
SIT7020.0 TETRAALLYLSILANE $C_{12}H_{20}Si$	192.37	91° / 10		0.8345	1.4864
SIT7050.0 TETRABROMOSILANE *SILICON TETRABROMIDE* Br_4Si	347.70	154°	(5°)	2.772^{25}	1.5627
SIT7062.0 TETRA-n-BUTOXYSILANE *TETRABUTYLORTHOSILICATE* $C_{16}H_{36}O_4Si$	320.54	115° / 3	(<-80°)	0.899	1.4128

TaSi$_2$

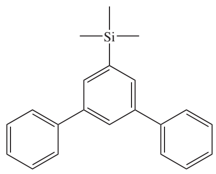
SIT6996.0
TANTALUM SILICIDE, 99.9+%
Si_2Ta 237.12 (2,200°) 9.14
Powder, average particle size: 10 µm
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12039-79-1] TSCA EC 234-902-2 HMIS: 2-1-0-X 10g ¥16,200

TAS-FLUORIDE - see SIT8715.0 TRIS(DIMETHYLAMINO)SULFUR(TRIMETHYLSILYL)DIFLUORIDE, 95%

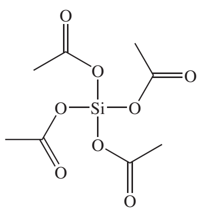
TEOS - see SIT7110.0 TETRAETHOXYSILANE



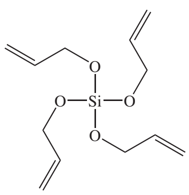
SIT6997.0
TERBIUM TRIS(HEXAMETHYLDISILAZIDE)
$C_{18}H_{54}N_3Si_6Tb$ 640.09 (162-5°)
See also SIT6943.4
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[109433-86-5] HMIS: 3-2-1-X 1.0g ¥48,000



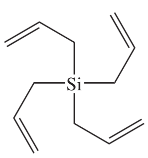
SIT6997.2
m-TERPHENYL-5'-YLTRIMETHYLSILANE
$C_{21}H_{22}Si$ 302.48 (79-80°)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[128388-53-4] HMIS: 1-1-0-X 1.0g ¥38,500



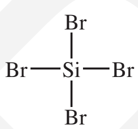
SIT6998.0
TETRAACETOXYSILANE, 95%
SILICON TETRAACETATE
$C_8H_{12}O_8Si$ 264.26 148° / 6 (111-5°)
Flashpoint: >110°C (>230°F)
Decomposes rapidly above 175° to SiO_2 and Ac_2O
See also SID2790.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[562-90-3] (既) 2-293 TSCA EC 209-239-7 HMIS: 2-1-1-X 25g ¥13,500 100g ¥36,300



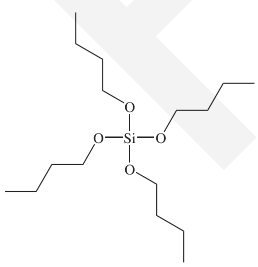
SIT7010.0
TETRAALLYLOXYSILANE
$C_{12}H_{20}O_4Si$ 256.37 114-6° / 12 0.982 1.4336
Flashpoint: 82°C (180°F)
Forms linear and branched carbosiloxane dendrimers by hydrosilylation/alcoholysis cycles.[1]
1. Bruning, K. et al. *Synthesis* **1999,** 1931.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1067-43-2] TSCA EC 213-930-9 HMIS: 3-2-1-X 10g ¥17,800 50g ¥60,700



SIT7020.0
TETRAALLYLSILANE
$C_{12}H_{20}Si$ 192.37 91° / 10 0.8345 1.4864
Flashpoint: 77°C (171°F)
Starting point for dendrimer synthesis.[1,2]
1. Van der Made, A. et al. *Adv. Mater.* **1993,** *5*, 466.
2. Alonso, B. et al. *J. Chem. Soc., Chem. Commun.* **1994,** 2575.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[1112-66-9] HMIS: 2-2-0-X 5g ¥21,700 25g ¥76,600



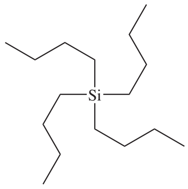
SIT7050.0
TETRABROMOSILANE
SILICON TETRABROMIDE
Br_4Si 347.70 154° (5°) 2.772^{25} 1.5627
ΔHform: -297 kJ/mole
ΔHvap: 37.9 kJ/mole
Surface tension: 16.9 mN/m
Vapor pressure, 0°: 1.8 mm
Critical temperature: 383°C
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7789-66-4] TSCA EC 232-182-4 HMIS: 3-1-2-X 10g ¥17,200



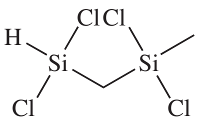
SIT7062.0
TETRA-n-BUTOXYSILANE
TETRABUTYLORTHOSILICATE
$C_{16}H_{36}O_4Si$ 320.54 115° / 3 (<-80°) 0.899 1.4128
Viscosity: 2.33 cSt
ΔHvap: 61.9 kJ/mole
Dipole moment: 1.61 debye
Surface tension: 22.8 mN/m
Flashpoint: 78°C (172°F)
Specific heat: 1.55 J/g/°
Dielectric constant, 100 Hz: 2.92
Used in preparation of mesoporous silica spheres by surfactant templated synthesis.[1]
1. Huo, Q. et al. *Chem. Mater.* **1997,** *9*, 14.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4766-57-8] (既) 2-2048 TSCA EC 225-305-8 HMIS: 2-2-0-X 100g ¥14,100 500g ¥47,000

SILICON COMPOUNDS

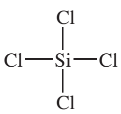
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT7082.0
TETRA-n-BUTYLSILANE
$C_{16}H_{36}Si$ 256.55 230-3° (-56°) 0.799 1.4465
Viscosity: 10 cSt — Flashpoint: 75°C (167°F)
Vapor pressure, 120°: 2 mm
See also SIM6559.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[994-79-6] TSCA EC 213-621-9 HMIS: 2-2-0-X 25g ¥24,700 100g ¥72,400



SIT7084.0
1,1,3,3-TETRACHLORO-1,3-DISILABUTANE, tech-90
$C_2H_6Cl_4Si_2$ 228.05 166-7° 1.32
Contains pentachloro-1,3-disilabutane — Flashpoint: 42°C (108°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[148859-49-8] HMIS: 3-3-1-X 10g ¥23,600

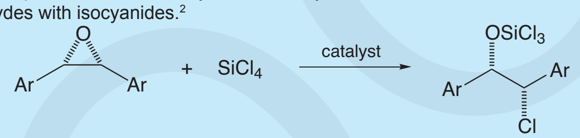


SIT7085.0
TETRACHLOROSILANE, 98%
SILICON TETRACHLORIDE
Cl_4Si 169.90 57.6° (-70°) 1.481 1.4153

Viscosity: 0.35 cSt
ΔHform: -640 kJ/mole
ΔHvap: 31.8 kJ/mole
Surface tension: 19.7 mN/m
Dielectric constant: 2.40

TOXICITY: ihl rat, LD50: 8,000 ppm/4H
Vapor pressure, 20°: 194 mm
Critical temperature: 234°C
Critical pressure: 37.0 atm
ΔHfus: 45.2 J/g
Coefficient of thermal expansion: 1.1×10^{-3}
Specific heat: 0.84 J/g/°

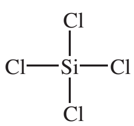
Reaction with living alkali metal terminated polymers results in star polymers
Primary industrial use - combustion with hydrogen and air to give fumed silica
Enantioselectively opens stilbine epoxides to trichlorosilylated chlorohydrins.[1]
Promotes the reaction of aldehydes with isocyanides.[2]



1. Tao, B. et al. *J. Am. Chem. Soc.* **2001,** *123*, 353.
2. Denmark, S. E.; Fan, Y. *J. Am. Chem. Soc.* **2003**, *125*, 7825.

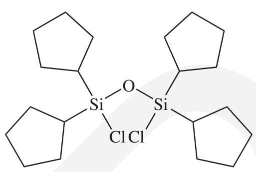
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[10026-04-7] (既) 1-258 TSCA EC 233-054-0 HMIS: 3-0-2-X 25g ¥3,400* 2.5kg ¥36,500* 25kg ¥197,000**
** includes solid fluoropolymer cap*
*** requires zCYL-S-99 cylinder or zDR-S-09 stainless steel pail*

COMMERCIAL

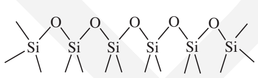


SIT7085.1
TETRACHLOROSILANE, 99.99%
Cl_4Si 169.90 57.6° (-70°) 1.481 1.4153
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[10026-04-7] TSCA EC 233-054-0 HMIS: 3-0-2-X 50g ¥97,000* 5kg ¥438,000**
** includes zCYL-HPS-0050*
*** includes stainless steel liquid dispensing cylinder zCYL-S-004*

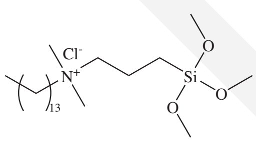
COMMERCIAL



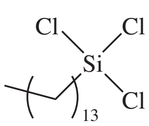
SIT7087.0
1,1,3,3-TETRACYCLOPENTYLDICHLORODISILOXANE
$C_{20}H_{36}Cl_2OSi_2$ 419.58 220° / 1 1.087 1.5098
reagent for protection of 3',5' nucleosides
See also SIT7273.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[865811-56-9] HMIS: 3-1-1-X 5g ¥20,700 25g ¥72,400



SIT7089.0
TETRADECAMETHYLHEXASILOXANE
MD4M
$C_{14}H_{42}O_5Si_6$ 459.02 245-6° (-59°) 0.8910 1.3948
Viscosity: 2.63 cSt — Flashpoint: 75°C (167°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[107-52-8] TSCA EC 203-499-5 HMIS: 1-2-0-X 10g ¥23,600

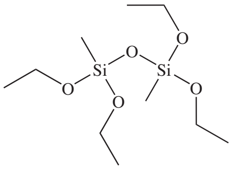


SIT7090.0
TETRADECYLDIMETHYL(3-TRIMETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 50% in methanol
$C_{22}H_{50}ClNO_3Si$ 440.18 0.878 1.3971
Contains 3-5% $Cl(CH_2)_3Si(OMe)_3$ — Flashpoint: 11°C (52°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[41591-87-1] TSCA EC 255-451-8 HMIS: 3-4-0-X 25g ¥17,800

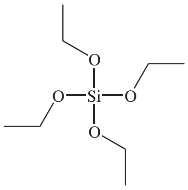


SIT7093.0
TETRADECYLTRICHLOROSILANE
$C_{14}H_{29}Cl_3Si$ 331.83 155-6° / 3 1.00 1.4575
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18402-22-7] (既) 2-2041 TSCA HMIS: 3-1-1-X 25g ¥28,900

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT7095.0
1,1,3,3-TETRAETHOXY-1,3-DIMETHYLDISILOXANE, 95%
$C_{10}H_{26}O_5Si_2$ — Mw 282.48 — bp 205° — D_4^{20} 0.953 — n_D^{20} 1.3912
Flashpoint: 58°C (136°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18001-60-0] EC 241-915-7 HMIS: 3-2-1-X — 25g ¥22,500



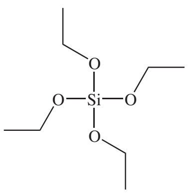
TEOS forms low density insulating aerogels

SIT7110.0
TETRAETHOXYSILANE, 98%
TETRAETHYLORTHOSILICATE; TEOS
$C_8H_{20}O_4Si$ — Mw 208.33 — bp 169° — mp (-77°) — D_4^{20} 0.9335 — n_D^{20} 1.3818

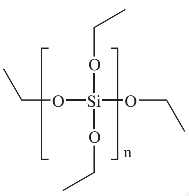
28-9% SiO_2 equivalent
Viscosity: 0.8 cSt
ΔHvap: 46.0 kJ/mole
Dipole moment: 1.63 debye
Vapor viscosity, 60˚: 60 micropoise
Dielectric constant: 4.1
Solubility parameter: 7.87
Specific heat: 2.30 J/g/˚
Flashpoint: 46°C (115°F)
TOXICITY: oral rat, LD50: 6,270 mg/kg
Autoignition temperature: 260°C
Vapor pressure, 20°: 11.8 mm
Vapor pressure, 60°: 12 mm
Vapor pressure, 108°: 200 mm
Critical temperature: 616°C
Coefficient of thermal expansion: 1.1×10^{-3}
Coefficient of thermal conductivity: 4.0

TEOS forms low density insulating aerogels
Source by hydrolysis of SiO_2 and sol-gel derived glasses.[1]
Intermediate for silica spheres with controlled dimensions.[2]
1. Brinker, C. et al. *Sol-Gel Science;* Academic Press: 1990.
2. Stöber, W. et al. *J. Coll. Interface Sci.* **1968,** *26*, 62.
See also polydiethoxysiloxane - PSI-021, GET7100
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[78-10-4] (既) 2-2048 TSCA EC 201-083-8 HMIS: 2-2-1-X — 100g ¥3,400 — 3kg ¥17,000 — 17kg ¥120,000

COMMERCIAL

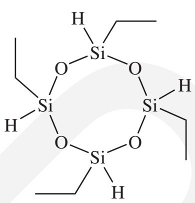


SIT7110.2
TETRAETHOXYSILANE, 99.9+%
$C_8H_{20}O_4Si$ — Mw 208.33 — bp 169° — D_4^{20} 0.9335 — n_D^{20} 1.3818
Low metal impurities grade
Flashpoint: 46°C (115°F)
Intermediate for high purity SiO_2 by oxygen plasma CVD and sol-gel
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[78-10-4] (既) 2-2048 TSCA EC 201-083-8 HMIS: 2-2-1-X — 500g ¥11,600 — 3kg ¥54,000

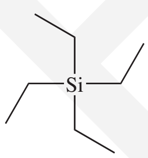


SIT7110.3
TETRAETHOXYSILANE, oligomeric hydrolysate
ETHYLSILICATE 40, POLY(DIETHOXYSILANE)
$[(C_2H_5O)_2SiO]$ — Mw 650 - 800 — D_4^{20} 1.05-1.07 — n_D^{20} 1.398
Metal content: 20.5-21.5% Si (40-42% SiO_2 equivalent)
Viscosity: 3-5 cSt
Base for zinc-rich paints
Crosslinker for two-component condensation cure (silanol) RTVs
See also SIT7510.3
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[68412-37-3] TSCA HMIS: 2-2-1-X — 100g ¥4,800 — 2kg ¥19,000 — 18kg ¥143,000

COMMERCIAL

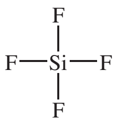


SIT7112.0
1,3,5,7-TETRAETHYLCYCLOTETRASILOXANE, 95%
$C_8H_{24}O_4Si_4$ — Mw 296.61 — bp 105° / 20 — D_4^{20} 0.981 — n_D^{20} 1.4141
Contains other cyclics
ΔHcomb: 8,028 kJ/mole
ΔHform: 2,043 kJ/mole
Cyclic monomer - undergoes hydrosilylation reactions
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[16066-10-7] HMIS: 2-2-1-X — 25g ¥38,500

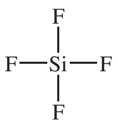


SIT7115.0
TETRAETHYLSILANE
$C_8H_{20}Si$ — Mw 144.33 — bp 153-5° — mp (-82°) — D_4^{20} 0.762 — n_D^{20} 1.4246
Viscosity: 0.9 cSt
ΔHcomb: -6,685 kJ/mole
ΔHform: -172 kJ/mole
ΔHvap: 41.4 kJ/mole
Flashpoint: 32°C (90°F)
Autoignition temperature: 235˚C
Silicon dopant for n-type GaN thin films.[1]
1. Obuci, Y. et al. *J. Cryst. Growth* **1997,** *170*, 325.
See also SIE4901.5
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[631-36-7] TSCA EC 211-155-0 HMIS: 2-3-0-X — 10g ¥17,200 — 50g ¥58,600

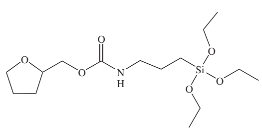
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



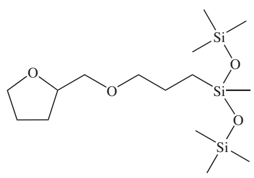
SIT7120.0
TETRAFLUOROSILANE
SILICON TETRAFLUORIDE
F_4Si | 104.08 | -95.7° | (-90°) | 1.66^{-95}
AIR TRANSPORT FORBIDDEN
ΔHform: -1,616 kJ/mole
ΔHvap: 22.2 kJ/mole
TOXICITY: ihl rat, LC50: 2,272 ppm/4hours/3days
Vapor pressure, -100°: 515 mm
Vapor density, 1 atm, 0°C: 4.67 g/l
Critical temperature: -14.15˚C
Critical pressure: 37.3 atm
F&F: Vol. 12, p 466.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7783-61-1] (既) 1-343 TSCA EC 232-015-5 HMIS: 4-0-2-X 50g inquire
** includes gas dispensing cylinder zCYL-G-2400*



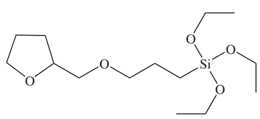
SIT7120.1
TETRAFLUOROSILANE, 99.99+%
F_4Si | 104.08 | -95.7° | (-90°) | 1.66^{-95}
AIR TRANSPORT FORBIDDEN
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7783-61-1] (既) 1-343 TSCA HMIS: 4-0-2-X 25g inquire
** includes gas dispensing cylinder zCYL-HPS-0420*



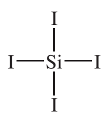
SIT7122.3
3-(O-TETRAHYDROFURFURYL)CARBAMOYLPROPYLTRIETHOXYSILANE
$C_{15}H_{31}NO_6Si$ | 349.50 | 1.053^{25} | 1.4495^{25}
Reagent for "PEG-free" hydrophilic surface modification
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-1-1-X 25g ¥21,500

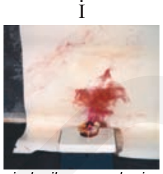


SIT7122.4
3-(TETRAHYDROFURFURYLOXYPROPYL)HEPTAMETHYLTRISILOXANE
$C_{15}H_{36}O_4Si_3$ | 364.70 | 132-6° / 2 | 0.9250^{25} | 1.426^{25}
Viscosity: 5 cSt
Flashpoint: >110°C (>230°F)
Surface tension: 23.8 mN/m
Surface tension, 0.1% aqueous solution: 42 mN/m
Silicone surfactant
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[1361237-41-3] HMIS: 1-2-0-X 100g ¥19,900



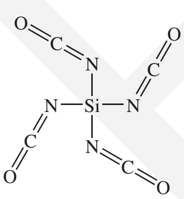
SIT7122.6
TETRAHYDROFURFURYLOXYPROPYLTRIETHOXYSILANE
$C_{14}H_{30}O_5Si$ | 306.47 | 130° / 0.3 | 0.990
Reagent for "PEG-free" hydrophilic surface modification
See also SIT7122.3
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 1-2-1-X 10g ¥28,900



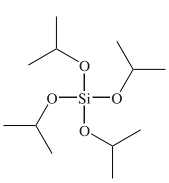


Tetraiodosilane can be ignited in air forming SiO_2 and purple iodine vapors

SIT7123.0
TETRAIODOSILANE
I_4Si | 535.70 | 287-8° | (120-1°) | 4.198
ΔHform: -189.5 kJ/mole
ΔHfus: -29 kJ/mole
UV absorption max: 284 nm
May be reduced to silicon metal.[1]
Reacts with NH_3 <500° to form SiN.[2]
1. Szekely,G. *J. Electrochem. Soc.* **1957,** *104*, 663.
2. Kaloyeros, A. et al. *Chemical Aspects of Electronic Ceramic Processing MRS Proc* **1998,** 495.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13465-84-4] (既) 1-746 TSCA EC 236-706-2 HMIS: 3-2-2-X 10g ¥30,500 50g ¥111,700

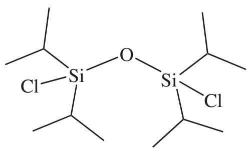


SIT7125.0
TETRAISOCYANATOSILANE
$C_4N_4O_4Si$ | 196.16 | 186° | (25-6°) | 1.442 | 1.4610
ΔHvap: 54.0 kJ/mole
Flashpoint: 50°C (122°F)
Forms hydrogen free films by CVD with trialkylamines.[1]
1. Uchida, Y. et al. *Mater. Res. Soc. Symp. Proc. (Amorphous Thin Films)* **2001,** 446.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[3410-77-3] (既) 1-1157 EC 222-297-8 HMIS: 3-2-1-X 10g ¥40,600



SIT7271.0
TETRAISOPROPOXYSILANE
$C_{12}H_{28}O_4Si$ | 264.44 | 185-6° | 0.8772 | 1.3895
ΔHvap: 48,974 kJ/mole
Flashpoint: 58°C (136°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1992-48-9] (既) 2-2048 TSCA EC 217-875-1 HMIS: 2-2-1-X 25g ¥38,500

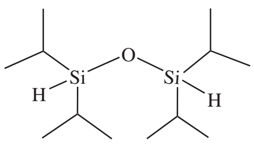
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



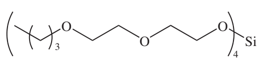
SIT7273.0
1,1,3,3-TETRAISOPROPYL-1,3-DICHLORODISILOXANE
$C_{12}H_{28}Cl_2OSi_2$ | 315.43 | 120° / 1.5 | | 0.986 | 1.4543
Flashpoint: 76°C (169°F)

Review of synthetic utility.[1]
Reagent for protection of 3',5' hydroxy nucleosides.[2,3]
Key review in natural products synthesis.[4]
Protects the four equatorial hydroxyls of inositol in a single step.[5]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 230-233.
2. Kanaya, E. N. et al. *Biochemistry* **1987,** *26*, 7159.
3. Markiewicz, W. *J. Chem. Res.* **1979,** 24.
4. Ziegler, T. et al. *Trends Org. Chem.* **1997,** *6*, 91.
5. Martin-Lomas, M. et al. *Eur. J. Org. Chem.* **2000**, 1539.
F&F: Vol. 16, p 125.
See also SIT7087.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[69304-37-6] (既) 2-3942 HMIS: 3-2-1-X 5g ¥9,400 25g ¥45,600 750g ¥307,000

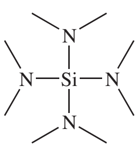
COMMERCIAL



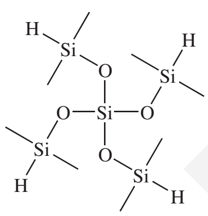
SIT7274.0
1,1,3,3-TETRAISOPROPYLDISILOXANE
$C_{12}H_{30}OSi_2$ | 246.54 | 122-4° / 45 | | 0.831 | 1.4327
Flashpoint: 68°C (154°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18043-71-5] HMIS: 2-2-1-X 5g ¥14,600 25g ¥46,900



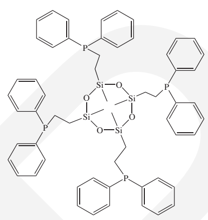
SIT7275.0
TETRAKIS(BUTOXYETHOXYETHOXY)SILANE, tech-95
$C_{32}H_{68}O_{12}Si$ | 672.97 | 257° / 0.1 | | 1.018 |
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[254455-63-5] HMIS: 2-1-0-X 25g ¥21,700



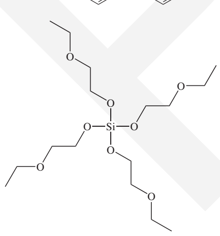
SIT7276.0
TETRAKIS(DIMETHYLAMINO)SILANE
$C_8H_{24}N_4Si$ | 204.39 | 74-5° / 19 | (16°) | 0.8851 | 1.4436
Flashpoint: 34°C (93°F)
Undergoes transamination reactions
Reacts with chromophores to form NLO active hybrid organic-inorganics.[1]
1. Kakkar, A. et al. *J. Am. Chem. Soc.* **1999,** *121*, 3657.
See also SIT8714.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1624-01-7] TSCA EC 216-611-2 HMIS: 4-3-1-X 25g ¥52,200



SIT7278.0
TETRAKIS(DIMETHYLSILOXY)SILANE
3,3-BIS(DIMETHYLSILOXY)-1,1,5,5-TETRAMETHYLTRISILOXANE
$C_8H_{28}O_4Si_5$ | 328.73 | 188-90° | | 0.886 | 1.3841
Viscosity: 1.1 cSt | Flashpoint: 67°C (153°F)
Crosslinker for vinyl functional silicones.[1]
1. Ando. T. et al. *Polymer Gels and Networks* **1993,** *1*, 45.
See also SID4582.0, SIP6826.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[17082-47-2] TSCA HMIS: 2-2-1-X 25g ¥14,100 100g ¥37,900



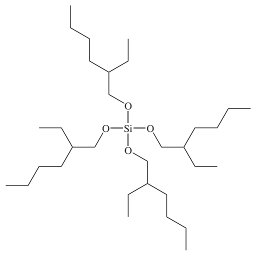
SIT7281.0
1,3,5,7-TETRAKIS(2-DIPHENYLPHOSPHINOETHYL)TETRAMETHYLCYCLOTETRASILOXANE, 95%
$C_{60}H_{68}O_4P_4Si_4$ | 1089.46
See also SIB1091.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[124998-64-7] HMIS: 2-1-0-X 1.0g ¥59,100



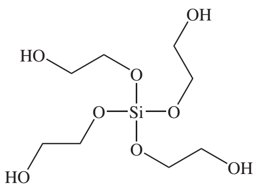
SIT7282.0
TETRAKIS(ETHOXYETHOXY)SILANE, tech-95
$C_{16}H_{36}O_8Si$ | 384.54 | 200° / 0.1 | | 1.02 | 1.422
Contains tris(ethoxyethoxy)ethoxysilane | Flashpoint: 131°C (268°F)
Viscosity: 5 cSt
Soluble in water-alcohol combinations, slowly hydrolyzing to SiO_2
See also SIT7286.0, SIT7288.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18407-94-8] (既) 2-2049 TSCA EC 242-287-7 HMIS: 2-1-0-X 50g ¥8,500 250g ¥24,700

SILICON COMPOUNDS

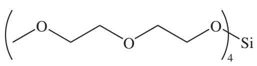
Name | Mw | bp °C/mm | (mp °C) | D_4^{20} | n_D^{20}



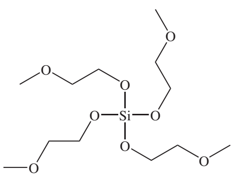
SIT7283.0
TETRAKIS(2-ETHYLHEXOXY)SILANE
$C_{32}H_{68}O_4Si$ 544.97 194° / 1 (<-73°) 0.880 1.4388
Viscosity, -40˚: 310 cSt
Viscosity, 25˚: 10.3 cSt
Viscosity, 38˚: 6.89 cSt
ΔHvap: 70.7 kJ/mole
Dielectric constant: 2.46
Surface tension: 26.7 mN/m
Flashpoint: 188°C (370°F)
TOXICITY: oral rat, LD50: >22,000 mg/kg
Autoignition temperature: 304°C
Vapor pressure, 245°: 10 mm
Specific heat: 2.01 J/g/°
Coefficient of thermal expansion: 0.8 x 10^{-3}
Suitable for extreme low temperature hydraulic fluid in sealed systems
See also SIT7291.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[115-82-2] (既) 2-2048 TSCA EC 204-109-6 HMIS: 1-1-0-X 100g ¥11,900 500g ¥38,500



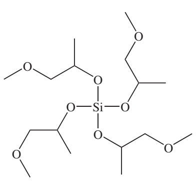
SIT7283.5
TETRAKIS(2-HYDROXYETHOXY)SILANE, tech 90
THES
$C_8H_{20}O_8Si$ 272.33 1.23 1.454
Viscosity: 800-1,200 cSt
Flashpoint: >110°C (>230°F)
Name is for nominal structure - contains cyclic and bridged species, ~ 5% ethoxy esters
Forms hierarchically organized hybrid silica monoliths.[1]
1. Hüsing, N. *13th Sol-Gel Workshop Proc.* **2005,** 18.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17622-94-5] TSCA EC 241-598-5 HMIS: 3-1-1-X 25g ¥11,100 100g ¥28,400



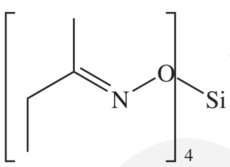
SIT7285.0
TETRAKIS(METHOXYETHOXYETHOXY)SILANE, tech-95
$C_{20}H_{44}O_{12}Si$ 504.65 245° / 1 1.090 1.4395
Flashpoint: 238°C (460°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[24685-89-0] TSCA EC 246-406-3 HMIS: 2-1-0-X 100g ¥19,400



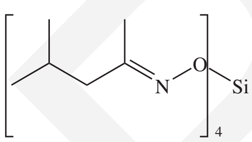
SIT7286.0
TETRAKIS(METHOXYETHOXY)SILANE, tech-95
$C_{12}H_{28}O_8Si$ 328.43 179-82° / 10 1.079 1.4219
Contains tris(methoxyethoxy)ethoxysilane
Viscosity: 4.9 cSt
Flashpoint: 118°C (244°F)
Crosslinker for condensation cure silicone RTVs
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2157-45-1] (既) 2-2049 TSCA EC 218-470-2 HMIS: 3-1-0-X 100g ¥10,900 2.5kg ¥69,700 18kg ¥242,000
COMMERCIAL



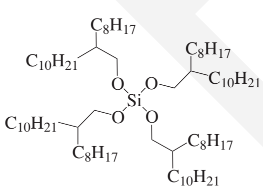
SIT7288.0
TETRAKIS(1-METHOXY-2-PROPOXY)SILANE, tech-95
$C_{16}H_{36}O_8Si$ 384.54 158° / 1 1.01
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18407-95-9] TSCA HMIS: 1-2-0-X 50g ¥15,600



SIT7289.0
TETRAKIS(METHYLETHYLKETOXIMINO)SILANE (50% in toluene)
$C_{16}H_{32}N_4O_4Si$ 372.55 0.938
Flashpoint: 4°C (39°F)
Crosslinker/adhesion promoter for moisture-cure silicones RTVs
See also SIT7290.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[34206-40-1] TSCA EC 251-882-0 HMIS: 3-4-1-X 100g ¥16,200

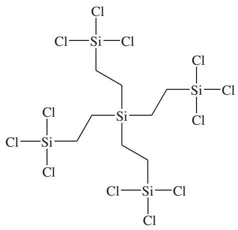


SIT7290.0
TETRAKIS(METHYLISOBUTYLKETOXIMINO)SILANE, tech-90
$C_{24}H_{48}N_4O_4Si$ 484.76 (16-22°) 0.950 1.4568
Flashpoint: >65°C (>150°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Autoignition temperature: 304˚C
Crosslinker for moisture-cure silicone RTVs
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[156145-62-9] TSCA HMIS: 2-2-1-X 25g ¥14,600



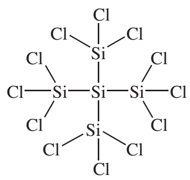
SIT7291.0
TETRAKIS(2-OCTYLDODECYLOXY)SILANE, tech-95
ISOEICOSYLSILICATE
$C_{80}H_{164}O_4Si$ 1218.23 >150° / 1 0.863 1.457
Viscosity: 100-110 cSt
Flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[161395-68-5] HMIS: 1-1-1-X 25g ¥16,400

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



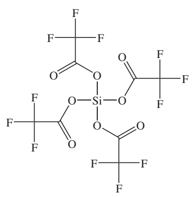
SIT7292.0
TETRAKIS(2-TRICHLOROSILYLETHYL)SILANE, 95%
$C_8H_{16}Cl_{12}Si_5$ — 678.08 — 165-95° / 0.2 — (49-51°)

12 point terminator for living polymers, yielding star polymers
Nucleus for star gels.[1]
1. Sharp, K. *Adv. Mater.* **1998**, *10*, 1243
See also SIT8716.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[67776-46-9] HMIS: 3-1-1-X 5g ¥46,900



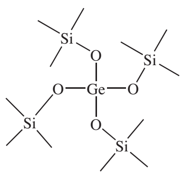
SIT7294.0
TETRAKIS(TRICHLOROSILYL)SILANE
DODECACHLORONEOPENTASILANE
$Cl_{12}Si_5$ — 565.86 — 190° / 15 sub. — (>300° dec.)

HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[50350-62-4] TSCA-L HMIS: 3-2-1-X 5g ¥51,200



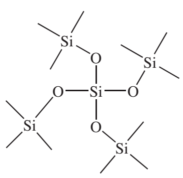
SIT7295.0
TETRAKIS(TRIFLUOROACETOXY)SILANE, tech-95
$C_8F_{12}O_8Si$ — 480.15

H-free SiO_2 precursor
See also SIT7125.0 TETRAISOCYANATOSILANE
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2377-86-8] HMIS: 3-1-1-X 25g ¥38,500



GET7296
TETRAKIS(TRIMETHYLSILOXY)GERMANE
$C_{12}H_{36}GeO_4Si_4$ — 429.35 — 75-80° / 4 — (-62 to -59°) — 0.967 — 1.4015

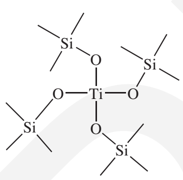
Catalyst for polyester
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18766-53-5] HMIS: 1-2-0-X 2.5g ¥44,500



SIT7298.0
TETRAKIS(TRIMETHYLSILOXY)SILANE
M4Q
$C_{12}H_{36}O_4Si_5$ — 384.84 — 222° — (-60°) — 0.868 — 1.3895

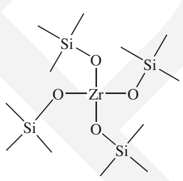
Viscosity: 2.9 cSt
Dipole moment: 1.10 debye
Flashpoint: 80°C (176°F)
Vapor pressure, 100°: 2 mm
Vapor pressure, 125°: 40 mm

Inert, volatile vehicle
See also SIM6592.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[3555-47-3] TSCA EC 222-613-4 HMIS: 1-2-0-X 25g ¥16,200 100g ¥44,800



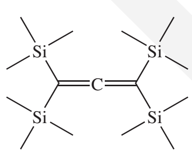
SIT7305.0
TETRAKIS(TRIMETHYLSILOXY)TITANIUM
TITANIUM TRIMETHYLSILOXIDE
$C_{12}H_{36}O_4Si_4Ti$ — 404.66 — 110° / 10 — 0.900 — 1.4278
Flashpoint: 51°C (124°F)

Partial hydrolysis gives soluble polymer.[1]
Catalyst for condensation cure silicones.[2]
1. Bradley, D. et al. *Can. J. Chem.* **1963,** *41*, 629.
2. Buehler, F. A. U.S. Patent 3,235,495, 1966.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[15990-66-6] HMIS: 2-2-1-X 25g ¥14,600 100g ¥39,500



SIT7306.0
TETRAKIS(TRIMETHYLSILOXY)ZIRCONIUM
TETRAKIS(TRIMETHYLSILOXY)ZIRCONIUM
$C_{12}H_{36}O_4Si_4Zr$ — 447.98 — 135° / 0.1 — (150-2°)

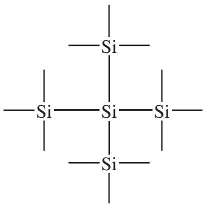
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-1-1-X 10g ¥39,500



SIT7307.0
TETRAKIS(TRIMETHYLSILYL)ALLENE, 95%
1,1,3,3-TETRAKIS(TRIMETHYLSILYL)-1,2-PROPADIENE
$C_{15}H_{36}Si_4$ — 328.80 — 80° / 0.5 — 1.477

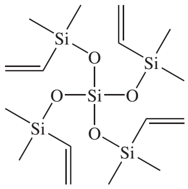
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[3721-17-3] HMIS: 3-2-0-X store <5°C 2.5g ¥52,800

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



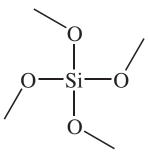
SIT7308.0
TETRAKIS(TRIMETHYLSILYL)SILANE
$C_{12}H_{36}Si_5$ 320.85 (267° sub.)

m.p. (sealed tube): 319-21°C
NMR standard
Mediates photochemical alkylation of heteroaromatic bases with alkyl halides.[1]
Precursor for CVD of amorphous hydrogenated silicon - carbon films.[2]
1. Togo, H. et al. *Chem. Lett.* **1991,** *11*, 2063.
2. Wrobel, A. et al. *Chem. Mater.* **1995,** *7*, 1403.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[4098-98-0] HMIS: 2-2-0-X 5g ¥25,200 25g ¥90,200



SIT7312.0
TETRAKIS(VINYLDIMETHYLSILOXY)SILANE, 95%
$C_{16}H_{36}O_4Si_5$ 432.88 130-5° / 2
Flashpoint: >100°C (>212°F)

Modifies modulus of vinyl-addition (Pt cure) silicone elastomers
See also SIT8725.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[60111-54-8] EC 262-061-1 HMIS: 1-1-0-X 25g ¥33,700



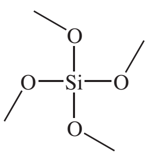
SIT7510.0
TETRAMETHOXYSILANE, 98%
TETRAMETHYLORTHOSILICATE; TMOS
$C_4H_{12}O_4Si$ 毒物 152.22 121-2° (4-5°) 1.032 1.3688
CAUTION: VAPORS CAN CAUSE BLINDNESS- GOGGLES MUST BE WORN
SURFACE TRANSPORT ONLY - UPS FORBIDDEN. AIR TRANSPORT FORBIDDEN

Viscosity: 0.5 cSt
ΔHcomb: 2,905 kJ/mole
ΔHform: 1,256 kJ/mole
ΔHvap: 47.09 kJ/mole
Dipole moment: 1.75 debye

Flashpoint: 20°C (68°F)
TOXICITY: oral rat, LD50: 700 mg/kg
TOXICITY: ihl rat, LCLo:1,000 mg/m³/10M
Autoignition temperature: 245˚C
Vapor pressure, 25°: 12 mm
Specific heat: 1.6 J/g/˚

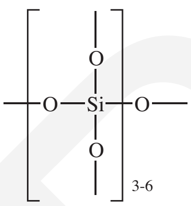
See PSI-026 Poly(dimethoxysiloxane) for safer version; see SIT7510.2 for high purity grade
Deposition frosting of glass
Cocatalyst with CsF for Michael additions
Converts aryl fluorides to anisole derivatives.[1]
1. Buckley, H. L. et al. *Organometallics* **2009**, *28*, 2356.
See also SIT7510.3, GET7500
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[681-84-5] (既) 2-2048 TSCA EC 211-656-4 HMIS: 4-4-1-X 25g inquire 2kg inquire 18kg inquire

COMMERCIAL



SIT7510.2
TETRAMETHOXYSILANE, 99+%
$C_4H_{12}O_4Si$ 毒物 152.22 121-2° (4-5°) 1.032 1.3688
CAUTION: VAPORS CAN CAUSE BLINDNESS- GOGGLES MUST BE WORN
SURFACE TRANSPORT ONLY - UPS FORBIDDEN. AIR TRANSPORT FORBIDDEN
Flashpoint: 20°C (68°F)

Low metal impurity grade; for sol-gel derived optics
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[681-84-5] (既) 2-2048 TSCA EC 211-656-4 HMIS: 4-4-1-X 25g inquire 3kg inquire

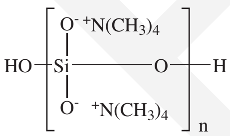


SIT7510.3
TETRAMETHOXYSILANE, oligomeric hydrolysate
METHYLSILICATE, CONDENSED
$CH_3O[(CH_3O)_2SiO]_{3-6}CH_3$ 380 - 500 1.17 1.389

26.0-27.0% silicon - typically 3-5 silicon atoms (50-52% SiO_2 equivalent)
Viscosity: 6-9 cSt.

Lower toxicity replacement for tetramethoxysilane
Highest SiO_2 content precursor for sol-gel; intermediate for synthetic quartz
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[25498-02-6] TSCA HMIS: 3-2-1-X 100g ¥13,000 2.5kg ¥104,000 20kg ¥365,000

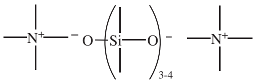
COMMERCIAL



SIT7516.0
TETRAMETHYLAMMONIUM SILICATE, 16-20% in water
$C_8H_{26}N_2O_4Si$ 242.39 1.072

Intermediate for T_8-cube silsesquioxanes
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[53116-81-7] HMIS: 3-0-0-X 1kg ¥29,000 18kg ¥281,000

COMMERCIAL

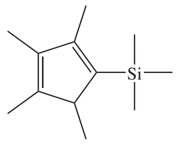


nominal structure

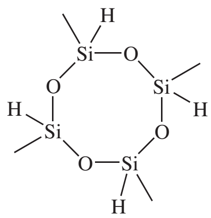
SIT7520.0
TETRAMETHYLAMMONIUM SILOXANOLATE
0.98 1.438

Viscous liquid which may solidify w/ time
1.5-2.0% nitrogen as endcapped polydimethylsiloxane
Siloxane equilibrium catalyst, decomposes >130°
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[68440-88-0] TSCA HMIS: 3-2-1-X 25g ¥12,500 100g ¥32,600

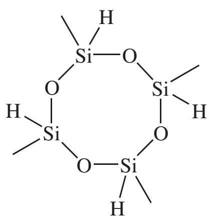
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT7525.0
2,3,4,5-TETRAMETHYLCYCLOPENTADIENYLTRIMETHYLSILANE
$C_{12}H_{22}Si$ — 194.39 — 45° / 0.03 — 0.852 — 1.4860
Flashpoint: 73°C (163°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[134695-74-2] HMIS: 2-2-0-X 5g ¥37,400

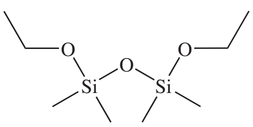


SIT7530.0 COMMERCIAL
1,3,5,7-TETRAMETHYLCYCLOTETRASILOXANE
D'4; TMCTS
$C_4H_{16}O_4Si_4$ — 240.51 — 134-5° — (-69°) — 0.9912 — 1.3870
ΔHcomb: 5,308 kJ/mole — Flashpoint: 31°C (88°F)
ΔHvap: 177.9 kJ/mole — Autoignition temperature: 270°C
Vapor pressure, 20°: 7.0 mm
Critical temperature: 278°C
In presence of oxygen plasma generates SiO_2 films for microelectronics
Cyclic monomer- undergoes hydrosilylation reactions.[1]
Forms hybrid inorganic-organic polymers with dienes suitable for circuit board resins.[2]
Forms gate dielectrics by CVD.[3]
1. Michalczyk, M. et al. *Chem. Mater.* **1993,** *5*, 1687.
2. Leibfried, R. U.S. Patent 4,900,799, 1990.
3. Wang, A. et al. *Res. Soc. Symp. Proc.* **1997,** *424*, 281.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[2370-88-9] (既) 7-477 TSCA EC 219-137-4 HMIS: 2-3-1-X 25g ¥13,100 100g ¥34,600 3kg ¥219,000

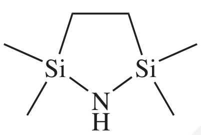


SIT7530.1
1,3,5,7-TETRAMETHYLCYCLOTETRASILOXANE, 99+%
D'4; TMCTS
$C_4H_{16}O_4Si_4$ — 240.51 — 134-5° — (-69°) — 0.9912 — 1.3870
Low metals — Flashpoint: 31°C (88°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[2370-88-9] (既) 7-477 TSCA EC 219-137-4 HMIS: 2-3-1-X 25g ¥164,000* 2.5kg ¥539,000**
** includes zCYL-HPS-0050*
*** includes stainless steel liquid dispensing cylinder zCYL-S-004*

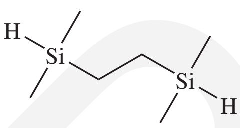
1,1,4,4-TETRAMETHYL-1,4-DICHLOROSILYLETHANE - see SIB1042.0 1,2-BIS(CHLORODIMETHYLSILYL)ETHANE



SIT7534.0
1,1,3,3-TETRAMETHYL-1,3-DIETHOXYDISILOXANE
$C_8H_{22}O_3Si_2$ — 222.43 — 161° — (-134°) — 0.8788 — 1.3880
Viscosity: 1.0 cSt — Flashpoint: 43°C (109°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18420-09-2] (既) 7-492 TSCA EC 242-298-7 HMIS: 2-2-0-X 25g ¥11,400 100g ¥29,400

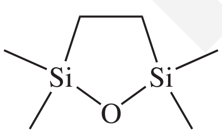


SIT7536.0
2,2,5,5-TETRAMETHYL-2,5-DISILA-1-AZACYCLOPENTANE, 95%
$C_6H_{17}NSi_2$ — 159.38 — 92° / 185 — 0.842 — 1.434
Flashpoint: 25°C (77°F)
See also SIB1073.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7418-19-1] TSCA EC 231-036-7 HMIS: 2-3-1-X 5g ¥13,500 25g ¥43,800



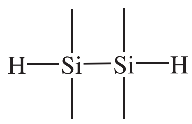
SIT7537.0
1,1,4,4-TETRAMETHYL-1,4-DISILABUTANE
1,2-BIS(DIMETHYLSILYL)ETHANE
$C_6H_{18}Si_2$ — 146.38 — 125-8° — 0.743^{25} — 1.4215
Flashpoint: 20°C (68°F)
Precursor for "star" gel hybrid inorganic-organic polymers.[1]
Forms α-SiC:H by remote plasma CVD.[2]
1. Michalczyk, M. et al. *PCT Int'l Appl.* 9406807, 1994.
2. Wrobel, A. M. et al. *Thin Solid Films* **2012**, *520*, 7100.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[20152-11-8] HMIS: 2-4-1-X 5g ¥15,100

SIT7538.0
1,1,3,3-TETRAMETHYL-1,3-DISILACYCLOBUTANE
$C_6H_{16}Si_2$ — 144.36 — 120-1° — 0.785 — 1.4380
Flashpoint: 1°C (34°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[1627-98-1] HMIS: 3-4-1-X 5g ¥34,700



SIT7540.0
2,2,5,5-TETRAMETHYL-2,5-DISILA-1-OXACYCLOPENTANE
TETRAMETHYLDISILAFURAN
$C_6H_{16}OSi_2$ — 160.36 — 124° — 0.855 — 1.4142
Flashpoint: 15°C (59°F)
Undergoes ring-opening polymerization with tetramethylammonium siloxanoate.[1]
1. Suryananarayanam, B. et al. *J. Polym. Sci.* **1974,** *12*, 1089.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[7418-20-4] TSCA EC 231-037-2 HMIS: 2-4-0-X 10g ¥16,700 50g ¥56,500

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

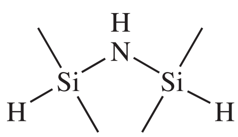


SIT7541.0
1,1,2,2-TETRAMETHYLDISILANE
4M2S

$C_4H_{14}Si_2$	118.32	86-7°	(-93°)	0.7202	1.429

Flashpoint: -26°C (-15°F)

Forms low k carbon doped silicon dioxide films
Forms SiC nanowires by APCVD.[1]
1. Rho, D. *Mater. Res. Soc. Symp. Proc.* **2005**, *832*, 317.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[814-98-2] TSCA HMIS: 2-4-1-X 1.0g ¥32,600

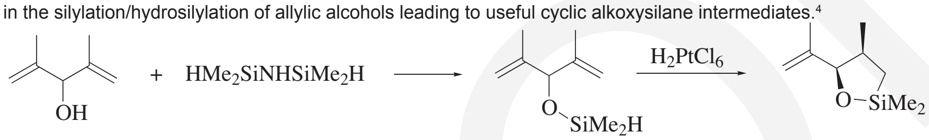


SIT7542.0
1,1,3,3-TETRAMETHYLDISILAZANE

$C_4H_{15}NSi_2$	133.34	99-100°		0.766	1.4044

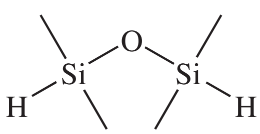
Flashpoint: 11°C (52°F)
Autoignition temperature: 208°C

Forms dimethylsilyl ethers with greater volatility than trimethylsilyl ethers
Review of synthetic utility.[1]
Converts unsaturated alcohols to diols.[2]
Converts homopropargylic alcohols to β-hydroxy ketones in a three-step process.[3]
Employed in the silylation/hydrosilylation of allylic alcohols leading to useful cyclic alkoxysilane intermediates.[4]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 488-490.
2. Tamao, K. et al. *J. Am. Chem. Soc.* **1988,** *110*, 3712.
3. Marshall, J. A.; Yanik, M.W. *Org. Lett.* **2000,** *2*, 2173.
4. Tamao, K. et al. *J. Am. Chem. Soc.* **1986**, *108*, 6090.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[15933-59-2] TSCA EC 240-072-2 HMIS: 3-4-1-X 25g ¥11,900 100g ¥31,000

1,1,4,4-TETRAMETHYLDISILETHYLENE - see SIT7537.0 1,1,4,4-TETRAMETHYL-1,4-DISILABUTANE



SIT7546.0
1,1,3,3-TETRAMETHYLDISILOXANE, 98%

$C_4H_{14}OSi_2$	134.33	70-1°		0.757	1.3669

Viscosity, 20°: 0.56 cSt.
ΔHcomb: 4,383 kJ/mole
ΔHvap: 30.3 kJ/mole

Flashpoint: 12°C (54°F)
TOXICITY: oral mouse, LD50: 3,000 mg/kg
Autoignition temperature: 208°C
Vapor pressure, 27°: 194.8 mm

Endcapper for polymerization of hydride terminated silicones
Employed in reductive halogenation of aldehydes and epoxides.[1]
Used to link ferrocenylsilane, polyolefin block copolymers into stable cylindrical forms.[2]
Employed in the high-yield reduction of amides to amines in the presence of other reducible groups.[3]
Reduces anisoles to arenes.[4]
Hydrosilylates terminal alkynes to form alkenylsilanes capable of cross-coupling w/ aryl and vinyl halides.[5]
1. Azipura et al. *Tetrahedron Lett.* **1984,** *25*, 3123.
2. Wang, X.-S. et al. *J. Am. Chem. Soc.* **2003**, *125*, 12686.
3. Hanada, S. et al. *J. Am. Chem. Soc.* **2009**, *131*, 15032.
4. Alvarez-Bercedo, P.; Martin, R. *J. Am. Chem. Soc.* **2010**, *132*, 17352.
5. Denmark, S. E.; Wang, Z. *Org. Lett.* **2001**, *3*, 1073.
See also SIH6117.0, SIB1838.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[3277-26-7] (既) 7-477 TSCA EC 221-906-4 HMIS: 2-4-1-X 25g ¥4,300 250g ¥21,500 1.5kg ¥81,300

COMMERCIAL

TETRAMETHYLORTHOSILICATE - see SIT7510.0 TETRAMETHOXYSILANE

SIT7555.0
TETRAMETHYLSILANE, 99+%
TMS

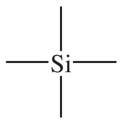
$C_4H_{12}Si$	88.22	26.6-26.7°	(-99°)	0.641	1.3588

NMR grade
Viscosity: 0.4 cSt
ΔHcomb: 3,851 kJ/mole
ΔHform: -232 kJ/mole
ΔHfus: 6.7 kJ/mole
ΔHvap: 26.8 kJ/mole
Photoionization threshold: 8.1 eV
Ce: 1.838×10^{-3}

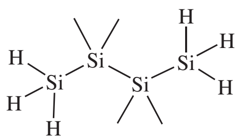
Flashpoint: -27°C (-17°F)
TOXICITY: ihl rat, LC50: >5,000 ppm/4H
Autoignition temperature: 450°C
Vapor pressure, 20°: 589 mm
Critical temperature: 185°C
Critical pressure: 33 atm
Heat capacity: 195.2 joules/mole-K
Dielectric constant: 1.92

Intermediate for α-SiC:H thin films by PECVD.[1]
1. Kim, D. et al. *Thin Solid Films* **1996,** *283*, 109.
See also GET7550
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[75-76-3] (既) 2-660 TSCA EC 200-899-1 HMIS: 1-4-0-X 25g ¥8,500 100g ¥19,900

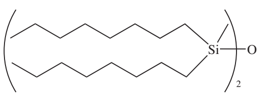
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT7555.1
TETRAMETHYLSILANE, 99.9+%
TMS
$C_4H_{12}Si$ — Mw 88.22 — bp 26.6-26.7° — mp (-99°) — D 0.641 — n 1.3588
Flashpoint: -27°C (-17°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[75-76-3] TSCA EC 200-899-1 HMIS: 1-4-0-X 25g ¥157,300* 2kg ¥463,000**
** includes zCYL-HPS-0050*
*** includes stainless steel liquid dispensing cylinder zCYL-S-004*

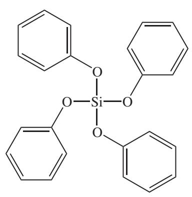


SIT7580.0
2,2,3,3-TETRAMETHYLTETRASILANE, 95%
$C_4H_{18}Si_4$ — Mw 178.53 — bp 125-135°
Candidate material for nanowires.[1]
1. Arkles, B. et al. U.S. Patent Appl. 20120076840, 2012.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1364487-19-3] HMIS: 2-4-1-X 5g ¥112,200



SIT7590.0
1,1,3,3-TETRA-n-OCTYLDIMETHYLDISILOXANE
$C_{34}H_{74}OSi_2$ — Mw 555.11 — D 0.833^{21} — n 1.4496^{25}
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
HMIS: 1-1-0-X 10g ¥28,900

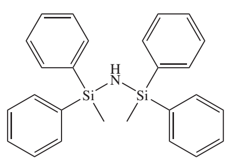
TETRAMETHYLTETRAVINYLCYCLOTETRASILOXANE -
see SIT7900.0 1,3,5,7-TETRAVINYLTETRAMETHYLCYCLOTETRASILOXANE



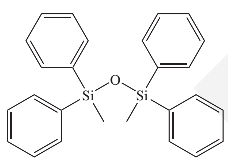
SIT7600.0
TETRAPHENOXYSILANE, tech-95
TETRAPHENYLORTHOSILICATE
$C_{24}H_{20}O_4Si$ — Mw 400.50 — bp 236-7° / 1 — mp (47-50°) — D 1.1412^{60} — n 1.5539^{60}
Viscosity, 55°: 6.6 cSt.
Flashpoint: 160°C (320°F)
ΔHvap: 70.1 kJ/mole
Dipole moment: 1.59 debye
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1174-72-7] TSCA EC 214-638-4 HMIS: 4-2-1-X 10g ¥27,300

TETRAPHENYLDICHLORODISILOXANE - see SID3374.0 1,3-DICHLOROTETRAPHENYLDISILOXANE

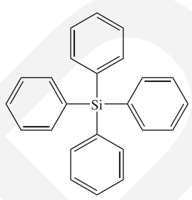
TETRAPHENYLDIMETHYLDISILANE - see SID4238.0 1,2-DIMETHYL-1,1,2,2-TETRAPHENYLDISILANE



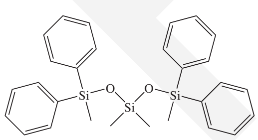
SIT7753.0
1,1,3,3-TETRAPHENYL-1,3-DIMETHYLDISILAZANE
$C_{26}H_{27}NSi_2$ — Mw 409.68 — bp 218-220° / 1.5 — mp (91°)
Flashpoint: >110°C (>230°F)
Deactivates glass capillary columns by persilylation.[1]
1. Grob, K. et al. *High Resol. Chrom. & Col Chrom.* **1980,** *3*, 197.
See also SID4552.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[7453-26-1] TSCA EC 231-227-5 HMIS: 2-1-0-X 5g ¥13,000 25g ¥41,600



SIT7754.0
1,1,3,3-TETRAPHENYLDIMETHYLDISILOXANE
$C_{26}H_{26}OSi_2$ — Mw 410.66 — bp 215° / 0.5 — mp (48-50°) — D 1.076^{25} — n 1.5866^{25}
Specific heat: 1.21 J/g/°
Flashpoint: 193°C (379°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[807-28-3] TSCA EC 212-361-3 HMIS: 2-1-0-X 25g ¥13,500

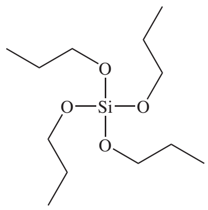


SIT7755.0
TETRAPHENYLSILANE
$C_{24}H_{20}Si$ — Mw 336.51 — bp 228° / 3 — mp (236-7°) — D 1.078
ΔHcomb: -13,459 kJ/mole
Specific heat: 1.2 J/g/°
ΔHform: 246 kJ/mole
Highly efficient UV-violet light emitting polymers formed by Pd-catalyzed copolymerization with fluorene compounds.[1]
1. Zhou, X. et al. *Macromol.* **2007**, *40*, 3015.
See also SIT7888.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1048-08-4] TSCA EC 213-881-3 HMIS: 1-1-0-X 10g ¥18,000



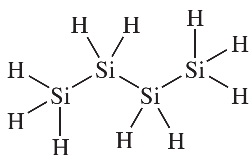
SIT7757.0
1,1,5,5-TETRAPHENYL-1,3,3,5-TETRAMETHYLTRISILOXANE
$C_{28}H_{32}O_2Si_3$ — Mw 484.82 — bp 233° / 0.5 — D 1.07 — n 1.551^{25}
Viscosity: 38 cSt
Flashpoint: 221°C (430°F)
Surface tension, 25°: 35.5 mN/m
See also SIP6719.5, SIT8662.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[3982-82-9] (既) 7-474 TSCA EC 223-620-5 HMIS: 1-1-0-X 25g ¥10,900 100g ¥27,600

Name | **Mw** | **bp °C/mm** | **(mp °C)** | **D_4^{20}** | **n_D^{20}**

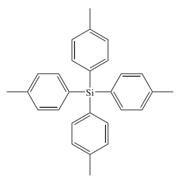


SIT7777.0
TETRA-n-PROPOXYSILANE
SILICON TETRA-n-PROPOXIDE
$C_{12}H_{28}O_4Si$ 264.44 224-5° (<-80°) 0.9158 1.4012
Viscosity: 1.66 cSt — Flashpoint: 95°C (203°F)
Dipole moment: 1.48 debye — Specific heat: 1.7 J/g/°
Dielectric constant: 2.92 — Coefficient of thermal expansion: 9.12 x 10^{-4}/°C
Surface tension: 23.6 mN/m
Crosslinker for tin catalyzed condensation cure silicones
In combination with CTAB intermediate for mesoporous silica fibers.[1]
1. Kleits, F. et al. *Chrom. Mater.* **2001,** *13*, 3587.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[682-01-9] (既) 2-2048 TSCA EC 211-659-0 HMIS: 2-2-1-X 100g ¥7,200 2kg ¥41,000 16kg ¥234,000

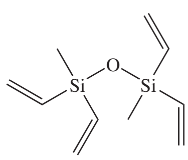
COMMERCIAL



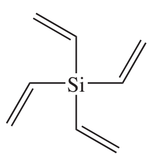
SIT7880.0
n-TETRASILANE
DECAHYDRIDOTETRASILANE
$H_{10}Si_4$ 122.42 107° (-85 to -95°) 0.825
PYROPHORIC
AIR TRANSPORT FORBIDDEN
Contains 10-20% isotetrasilane — Vapor pressure, 20°: ~25 mm
Employed in low temperature CVD of amorphous silicon.[1]
1. Kanoh, H. et al. *Jpn. J. Appl. Phys.* **1993**, *32*, 2613.
See also SII6463.4, SIT8709.6
HYDROLYTIC SENSITIVITY: 10: reacts extremely rapidly with moisture and oxygen - pyrophoric - sealed system required
[7783-29-1] HMIS: 3-4-3-X 10g inquire
** includes cylinder zCYL-HPS-0050*



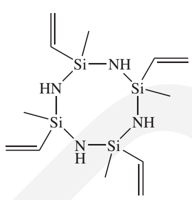
SIT7888.0
TETRA-p-TOLYLSILANE
$C_{28}H_{28}Si$ 392.62 (225-6°) 1.0793
Tetrabromomethyl derivative formed on treatment with N-bromosuccinimide
See also SIT7755.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[10256-83-4] HMIS: 2-1-0-X 10g ¥40,600



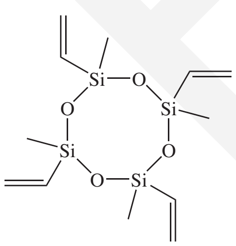
SIT7896.0
1,1,3,3-TETRAVINYLDIMETHYLDISILOXANE, 95%
$C_{10}H_{18}OSi_2$ 210.42 65-8° / 15 0.852 1.4415
Flashpoint: 42°C (108°F)
End-capper for silicones
See also SIT7312.0, SIT7900.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[16045-78-6] EC 240-187-8 HMIS: 2-2-0-X 25g ¥54,900



SIT7897.0
TETRAVINYLSILANE
$C_8H_{12}Si$ 136.27 130-1° 0.815^{25} 1.4610^{25}
Viscosity: 0.6 cSt — Flashpoint: 18°C (64°F)
ΔHcomb: 5,412 kJ/mole
ΔHform: 22 kJ/mole
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[1112-55-6] TSCA EC 214-192-0 HMIS: 2-4-0-X 10g ¥21,000 50g ¥73,500



SIT7899.0
1,3,5,7-TETRAVINYL-1,3,5,7-TETRAMETHYLCYCLOTETRASILAZANE, 95%
$C_{12}H_{28}N_4Si_4$ 340.72 104-7° / 4 0.992^{24} 1.4947
Contains isomers and cyclic trisilazane analogs
See also SIT8736.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5162-63-0] EC 225-940-0 HMIS: 2-1-1-X 25g ¥14,100 100g ¥37,900



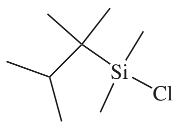
SIT7900.0
1,3,5,7-TETRAVINYL-1,3,5,7-TETRAMETHYLCYCLOTETRASILOXANE
$C_{12}H_{24}O_4Si_4$ 344.66 110° / 10 (-43°) 0.998 1.4342
Viscosity: 3.9 cSt — Flashpoint: 112°C (234°F)
Undergoes ring-opening polymerization
Review of synthetic utility.[1]
Modifier for Pt-catalyst in 2-component RTVs.[2]
Core molecule for dendrimers.[3]
Excellent and inexpensive reagent for vinylations in cross-coupling reactions for the formation of styrenes and dienes.[4,5,6]
Extensive review on the use in silicon-based cross-coupling reactions.[7]

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 484-487.
2. Kim, C. et al. *Bull. Kor. Chem. Soc.* **1997,** *18*, 164.
3. Broadbridge, R. et al. *J. Chem. Soc., Chem. Commun.* **1998,** 1449.
4. Denmark, S. E.; Butler, C. R. *Org. Lett.* **2006**, *8*, 63.
5. Denmark, S. E.; Wang, Z. *J. Organomet. Chem.* **2001**, *624*, 372.
6. Denmark, S. E.; Wehrli, D. *Org. Lett.* **2000**, *2*, 565.
7. Denmark, S. E. et al. *Organic Reactions,* Vol. 75, Denmark, S. E. ed., John Wiley and Sons, 233, **2011**.

See also SIT8737.0, SIO6706.0, SIP6719.7
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2554-06-5] (既) 7-483 TSCA EC 219-863-1 HMIS: 2-1-0-X 25g ¥7,600 100g ¥18,800 2kg ¥112,100

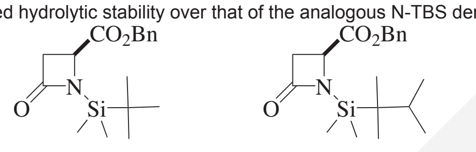
COMMERCIAL

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT7906.0
THEXYLDIMETHYLCHLOROSILANE
t-HEXYLDIMETHYLCHLOROSILANE
$C_8H_{19}ClSi$ — 178.78 — 55-6° / 10 — (14-15°) — 0.911 — 1.4490
Flashpoint: 51°C (124°F)

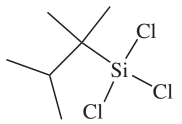
Review of synthetic utility.[1]
The N-silylated β-lactam shows increased hydrolytic stability over that of the analogous N-TBS derivative.[2]



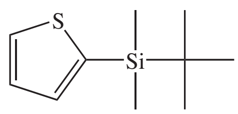
$t_{1/2}$ = 40 min $t_{1/2}$ = 90 min

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 263-265.
2. Wetter, H.; Oertle, K. *Tetrahedron Lett.* **1985**, *26*, 5515.

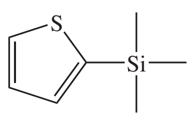
F&F: Vol. 13, p 74.
See also SID3226.0, SID4065.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[67373-56-2] HMIS: 3-2-1-X 25g ¥17,200 100g ¥48,300



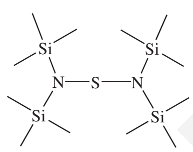
SIT7906.6
THEXYLTRICHLOROSILANE
$C_6H_{13}Cl_3Si$ — 219.61 — 70-2° / 15
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18151-53-6] HMIS: 3-3-1-X 10g ¥40,600



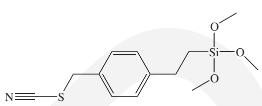
SIT7906.9
2-THIENYL-t-BUTYLDIMETHYLSILANE
$C_{10}H_{18}SSi$ — 198.40 — 40-5° / 0.2 — 0.929
Flashpoint: 77°C (170°F)
Intermediate for polythiophenes
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[163079-25-2] HMIS: 2-2-0-X 2.5g ¥35,300



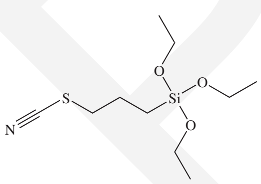
SIT7907.0
2-THIENYLTRIMETHYLSILANE
2-(TRIMETHYLSILYL)THIOPHENE
$C_7H_{12}SSi$ — 156.32 — 165-6° — 0.945 — 1.4980
Flashpoint: 47°C (117°F)
Lithiates w/n-BuLi at 5-position
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18245-28-8] HMIS: 2-2-1-X 10g ¥27,300



SIT7907.5
THIOBIS(HEXAMETHYLDISILAZANE)
$C_{12}H_{36}N_2SSi_4$ — 352.84 — 142-3° / 15 — (65-7°)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18243-89-5] HMIS: 2-2-1-X 5g ¥42,700



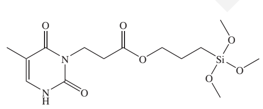
SIT7907.7
(THIOCYANATOMETHYL)PHENETHYLTRIMETHOXYSILANE, tech-95
$C_{13}H_{19}NO_3SSi$ — 297.44 — 100-5° / 0.5
Contains isomers
Flashpoint: >110°C (>230°F)
On exposure to UV light of 254 nm undergoes conversion to isothiocyanate which reacts w/ amines, etc.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 10g ¥48,000



SIT7908.0
3-THIOCYANATOPROPYLTRIETHOXYSILANE, 96%
$C_{10}H_{21}NO_3SSi$ — 263.43 — 95° / 0.1 — 1.03 — 1.4460
Flashpoint: 112°C (234°F)
TOXICITY: oral rat, LD50: 1,423 mg/kg
Complexing agent for Ag, Au, Pd, Pt.[1]
Potential adhesion promoter for gold.[2]

1. Schilling, T. et al. *Mikrochemica Acta* **1996,** *124*, 235.
2. Ciszek, J. W. et al. *J. Am. Chem. Soc.* **2004,** *126*, 13172.

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[34708-08-2] TSCA EC 252-161-3 HMIS: 3-1-1-X 50g ¥10,300 250g ¥32,100

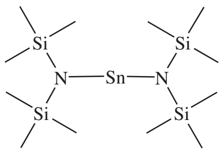


SIT7909.7
(3-(3-THYMINYL)PROPIONOXY)PROPYLTRIMETHOXYSILANE
$C_{14}H_{24}N_2O_7Si$ — 360.44
Derivatized surfaces bind adenine modified polymers.[1]

1. Viswanathan, K. et al. *Polymer Preprints* **2005**, *4602*, 1133.

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[879197-67-8] HMIS: 2-2-1-X 1.0g ¥67,600

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SNB1025
TIN(II) BIS(HEXAMETHYLDISILAZIDE)
$C_{12}H_{36}N_2Si_4Sn$ — Mw 439.47 — bp 112° / 0.05 — (37-8°) — D 1.136 — n 1.5140
Flashpoint: 56°C (133°F)
Intermediate for SnS quantum dots
Promotes conversion of aldehydes and ketones to N,N-dialkyleneamines.[1,2]
1. Burnell-Curty, C. et al. *J. Org. Chem.* **1992**, *57*, 5063.
2. Burnell-Curty, C. et al. *Synlett* **1993**, 131.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[59863-13-7] HMIS: 3-2-1-X 5g ¥12,500 25g ¥36,500

$TiSi_2$

SIT8005.0
TITANIUM SILICIDE, 95%, powder
Si_2Ti — Mw 112.03 — (1,540°) — D 4.39
Particle size, average: 4-8 µm; contains 3-5% iron
ΔHform: -335 kJ/mole
Resistivity: 123 µΩ•cm
Low and high resistivity phases present.[1]
1. Clevenger, L. A. et al. *J. Appl. Phys.* **1992**, *72*, 4978.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12039-83-7] TSCA EC 234-904-3 HMIS: 2-1-0-X 25g ¥8,500 100g ¥19,900

TITANIUM TRIMETHYLSILOXIDE - see SIT7305.0 TETRAKIS(TRIMETHYLSILOXY)TITANIUM

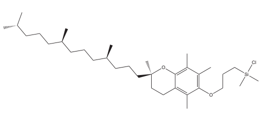
TMCS - see SIT8510.0 TRIMETHYLCHLOROSILANE

TMCTS - see SIT7530.0 1,3,5,7-TETRAMETHYLCYCLOTETRASILOXANE

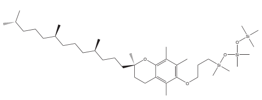
TMOS - see SIT7510.0 TETRAMETHOXYSILANE

TMS - see SIT7555.0 TETRAMETHYLSILANE, 99.9%

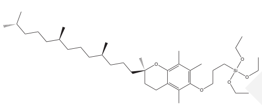
TMSDEA - see SID3398.0 DIETHYLAMINOTRIMETHYLSILANE



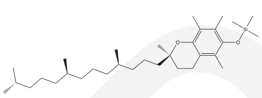
SIT8010.0
O-DL-a-TOCOPHEROLYLPROPYLDIMETHYLCHLOROSILANE, tech-90
$C_{34}H_{61}ClO_2Si$ — Mw 565.39
Forms bonded phases
See also SIT8012.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X 10g ¥42,700



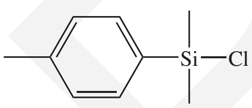
SIT8011.0
O-DL-a-TOCOPHEROLYLPROPYLHEPTAMETHYLTRISILOXANE, tech-90
$C_{39}H_{76}O_4Si_3$ — Mw 693.27 — bp 220-50° / 0.1 — D 0.92 — n 1.472
Amber liquid
Viscosity: 650-750 cSt
Cosmetic vehicle
See also SIH6168.7
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[920741-92-0] HMIS: 1-1-0-X 25g ¥51,200



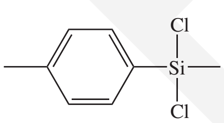
SIT8012.0
O-DL-a-TOCOPHEROLYLPROPYLTRIETHOXYSILANE, tech-90
$C_{38}H_{70}O_5Si$ — Mw 635.04 — D 0.956 — n 1.485
See also SIT8010.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-2-1-X 10g ¥35,300



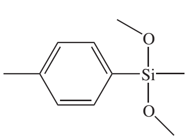
SIT8015.0
O-DL-a-TOCOPHEROLYLTRIMETHYLSILANE, tech-90
$C_{32}H_{58}O_2Si$ — Mw 502.89 — D 0.945 — n 1.495
Viscosity: 800-900 cSt
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2733-26-8] HMIS: 0-1-1-X 10g ¥25,200



SIT8030.0
p-TOLYLDIMETHYLCHLOROSILANE
$C_9H_{13}ClSi$ — Mw 184.74 — bp 215-7° — D 1.007^{25} — n 1.5055
Flashpoint: 67°C (153°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[35239-30-6] TSCA EC 252-456-7 HMIS: 3-2-1-X 5g ¥14,100

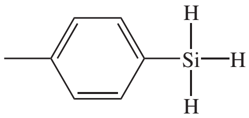


SIT8035.0
p-TOLYLMETHYLDICHLOROSILANE
$C_8H_{10}Cl_2Si$ — Mw 205.16 — bp 161-5° / 7 — D 1.1609 — n 1.5330
Flashpoint: 80°C (176°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[25898-37-7] TSCA HMIS: 3-2-1-X 25g ¥42,700

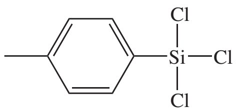


SIT8035.6
p-TOLYLMETHYLDIMETHOXYSILANE
$C_{10}H_{16}O_2Si$ — Mw 196.32 — bp 114-6° / 22 — D 0.998 — n 1.4820
Flashpoint: 78°C (172°F)
Monomer for radical crosslinked silicone elastomers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17873-30-2] HMIS: 3-2-1-X 10g ¥37,900

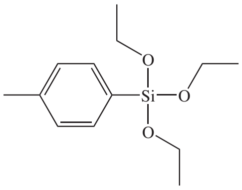
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



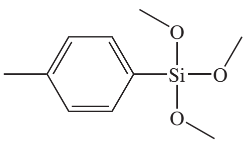
SIT8038.0
p-TOLYLSILANE
$C_7H_{10}Si$ — 122.24 — 147-8° — (-6°) — 0.8775 — 1.5112
Intermediate for Bromosilane, Iodosilane
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[931-70-4] HMIS: 2-4-1-X 10g ¥20,400



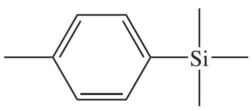
SIT8040.0
p-TOLYLTRICHLOROSILANE
$C_7H_7Cl_3Si$ — 225.58 — 218-20° — 1.28 — 1.5224^{25}
γc of treated surface: 34 mN/m — Flashpoint: 92°C (198°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[701-35-9] TSCA EC 211-854-0 HMIS: 3-2-1-X 25g ¥13,800 100g ¥36,900



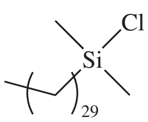
SIT8041.0
p-TOLYLTRIETHOXYSILANE
$C_{13}H_{22}O_3Si$ — 254.40 — 115-7° / 8 — 0.9832 — 1.4664
Flashpoint: >110°C (>230°F)
Reagent for cross-coupling reactions
See also SIM6492.53, SIT8042.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18412-57-2] HMIS: 2-1-1-X 5g ¥21,500



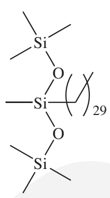
SIT8042.0
p-TOLYLTRIMETHOXYSILANE
$C_{10}H_{16}O_3Si$ — 212.32 — 75-8° / 8 — 1.033 — 1.4726^{25}
γc of treated surface: 34 mN/m — Flashpoint: 94°C (201°F)
Charge control surface treatment for electrostatic copier particles.[1]
Converts arylselenyl bromides to aryl-4-tolylselenides.[2]
1. Yamazaki, H. Jpn. Kokai JP 06027719 A2, 1994.
2. Bhadra, S. et al. *J. Org. Chem.* **2010**, *75*, 4864.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17873-01-7] HMIS: 3-1-1-X 10g ¥13,500 50g ¥43,800



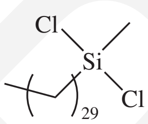
SIT8043.0
p-TOLYLTRIMETHYLSILANE
$C_{10}H_{16}Si$ — 164.33 — 190-3° — 0.8651 — 1.4908
Flashpoint: 46°C (115°F)
Vapor pressure, 73°: 10 mm
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[3728-43-6] HMIS: 2-2-0-X 5g ¥22,500



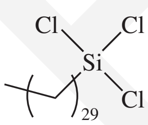
SIT8045.0
TRIACONTYLDIMETHYLCHLOROSILANE, blend
$C_{32}H_{67}ClSi$ — 515.42 — (60-82°)
80% C_{30} and higher, 20% C_{22}-C_{28}
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[70851-52-4] TSCA EC 274-938-6 HMIS: 3-1-0-X 25g ¥18,300 100g ¥51,700



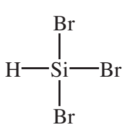
SIT8045.4
3-TRIACONTYLHEPTAMETHYLTRISILOXANE, tech-85
$C_{37}H_{82}O_2Si_3$ — 643.30 — (70-75°) — 0.85
Contains triacontene — TOXICITY: oral rat, LD50: >2,000 mg/kg
Cosmetic wax
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[401514-97-4] HMIS: 1-0-0-X 100g ¥20,400



SIT8046.0
TRIACONTYLMETHYLDICHLOROSILANE, blend
$C_{31}H_{64}Cl_2Si$ — 535.84
80% C_{30} and higher, 20% C_{22}-C_{28}
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-1-1-X 25g ¥33,200



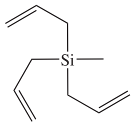
SIT8048.0
TRIACONTYLTRICHLOROSILANE, blend
$C_{30}H_{61}Cl_3Si$ — 556.26 — (60-82°)
80% C_{30} and higher, 20% C_{22}-C_{28}
Employed in bonded phases for HPLC of carotenes
See also SIH5917.0 HEXACOSYLTRICHLOROSILANE; SIT8162.0 13-(TRICHLOROSILYLMETHYL)HEPTACOSANE
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[70851-48-8] TSCA EC 274-933-9 HMIS: 3-1-1-X 25g ¥17,200 100g ¥48,300



Reference Compound 10
TRIBROMOSILANE
HBr_3Si — 268.80 — 111-2° — (-73°)
PYROPHORIC
Reference compound. Data is provided for investigators. Not offered for sale by Gelest.

SILICON COMPOUNDS

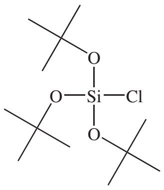
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT8060.0
TRIALLYLMETHYLSILANE

$C_{10}H_{18}Si$	166.34	180-1°		0.8055	1.4662

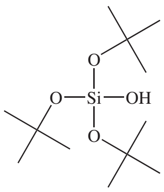
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1112-91-0] HMIS: 2-3-0-X 5g ¥26,800



SIT8085.0
TRI-t-BUTOXYCHLOROSILANE, 95%

$C_{12}H_{27}ClO_3Si$	282.88	97° / 12			

Esters with amino acids are versatile building blocks for peptide synthesis.[1,2]
1. Sharma, R. et al. *Pept.: Biol Chem. Proc. Chin. Pept. Symp.*, 3rd Ed, 1995; p31; *Chem. Abstr.* 126:31636m.
2. Broadbridge, R. et al. *J. Chem. Soc., Chem. Commun.* **1998,** 1449.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18105-64-1] HMIS: 3-2-1-X 10g ¥19,400

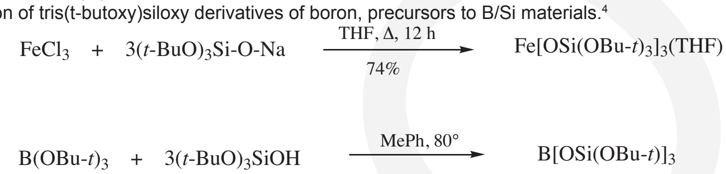


SIT8088.0
TRI-t-BUTOXYSILANOL

$C_{12}H_{28}O_4Si$	264.44	205-9°	(65-6°)		

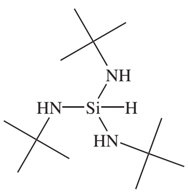
Vapor pressure, 95°: 20 mm

Starting point for a wide range of $MO_2.SiO_2$ materials by sol-gel.[1,2]
Used to prepare single-site iron(III) centers on SBA-15 silica.[3]
Used in the preparation of tris(t-butoxy)siloxy derivatives of boron, precursors to B/Si materials.[4]



1. Terry, K.; Tilley, T. D. *Chem. Mater.* **1991,** *3*, 1001.
2. Terry, K. et al. *Chem. Mater.* **1992,** *4*, 1290.
3. Nozaki, C. et al. *J. Am. Chem. Soc.* **2002,** *124*, 13194.
4. Fujdala, K. L. et al. *Inorg. Chem.* **2003,** *42*, 1140.

See also SIT8627.0 TRI-t-PENTOXYSILANOL
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18166-43-3] HMIS: 2-1-1-X store <5°C 10g ¥22,500 50g ¥79,800

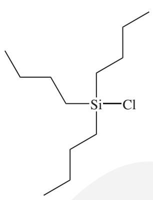


SIT8090.0
TRI-(t-BUTYLAMINO)SILANE, 95%

$C_{12}H_{31}N_3Si$	245.49	76-9° / 0.3		0.827	1.4289

Flashpoint: 54°C (129°F)

CVD precursor for SiN films
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[205503-61-3] HMIS: 3-2-1-X 10g ¥29,400

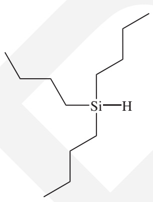


SIT8091.0
TRI-n-BUTYLCHLOROSILANE

$C_{12}H_{27}ClSi$	234.88	93-4° / 4		0.879	1.4472

Flashpoint: 80°C (176°F)

See also SIT8384.0, SIT8378.6
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[995-45-9] (既) 2-2041 TSCA EC 213-627-1 HMIS: 3-2-1-X 5g ¥16,400

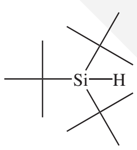


SIT8091.6
TRI-n-BUTYLSILANE

$C_{12}H_{28}Si$	200.44	225-6°		0.7994	1.4380

Flashpoint: 83°C (181°F)
Vapor pressure, 90°: 5 mm

See also SIT8376.0, SIT8378.7
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[998-41-4] HMIS: 2-2-1-X 25g ¥30,500

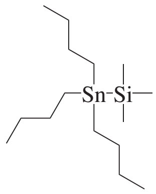


SIT8092.0
TRI-t-BUTYLSILANE, 95%

$C_{12}H_{28}Si$	200.44	142-6° / 100	(33-44°)		

Forms radical cation on radiolysis.[1]
Supersilyl starting material; forms a variety of sterically overloaded compounds.[2]
1. Rhodes, C. *J. Organomet. Chem.* **1993,** *443*, 19.
2. Wiberg, N. in *Frontiers of Organosilicon Chem.;* Bassindale, A., Ed.; Royal Society Chemistry: 1991; p. 263.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18159-55-2] HMIS: 2-2-1-X 1.0g ¥38,500

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SNT8585 TRI-n-BUTYLSTANNYLTRIMETHYLSILANE *TRIMETHYLSILYLTRI-n-BUTYLTIN* $C_{15}H_{36}SiSn$	363.22	102-3° / 0.5		1.040	1.4880

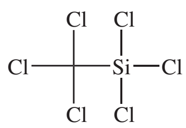


Review of synthetic utility.[1]
Undergoes cis addition to terminal acetylenes with Bu_3Sn internal.[2]
Intermediate for 3-substituted cyclobutenone.[3]
Sn-Si bond shown to react with COD $Pt(cod)_2$ and phosphines to form bis((phosphino)silyl)tinplatinum(II) complexes, which insert into acetylenes.[4]
Used in the synthesis of α-amidotributylstannanes.[5]

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 719-723.
2. Chenard, B. et al. *J. Org. Chem.* **1986**, *51*, 3561.
3. Liebeskind, L. S. et al. *J. Org. Chem.* **1994**, *59*, 7917.
4. Sagawa, T. et al. *Organometallics* **2003**, *22*, 4433.
5. Mita, T.; et al. *Synthesis* **2012**, 194.

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[17955-46-3] HMIS: 2-1-1-X 2.5g ¥13,500 10g ¥33,800

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8153.0 TRICHLOROMETHYLTRICHLOROSILANE, 50% in toluene CCl_6Si	252.81	155-6°	(115° neat)		



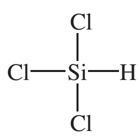
Dark liquid — Flashpoint: 4°C (39°F)
Source for dichlorocarbene.[1]

1. Cunico, R. et al. *J. Organomet. Chem.* **1978**, *154*, C45.

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[17760-13-3] (既) 2-2046 TSCA EC 241-747-4 HMIS: 3-4-1-X 25g ¥34,200

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8155.0 TRICHLOROSILANE, 99% HCl_3Si 劇物	135.45	31.9°	(-128°)	1.3417	1.4020

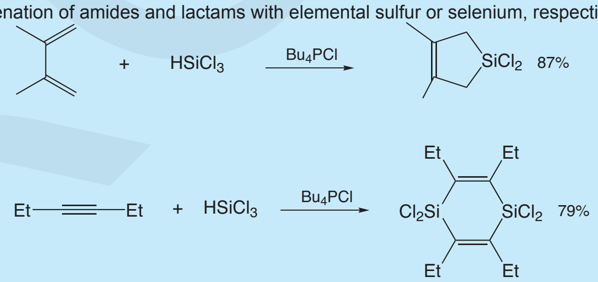
SURFACE TRANSPORT ONLY, UPS FORBIDDEN. AIR TRANSPORT FORBIDDEN



Viscosity, 25˚: 0.23 cSt
ΔHform: -482 kJ/mole
ΔHvap: 28.0 kJ/mole
Dipole moment: 0.97 debye
Specific wetting surface: 240 m^2/g
Surface tension: 14.3 mN/m
Specific heat: 1.05 J/g/°
Coefficient of thermal expansion: 1.9 x 10^{-3}

Flashpoint: -13°C (8°F)
TOXICITY: oral rat, LD50: 1,030 mg/kg
TOXICITY: ihl mouse, LC50: 1,500 mg/m^3/2H
Autoignition temperature: 215˚C
Vapor pressure, -70°: 2.5 mm
Vapor pressure, 14.5°: 400 mm
Critical temperature: 234˚C
Critical pressure: 37 atm
Flammability limit: 6.9-70.0%

Reducing agent
Undergoes hydrosilylation reactions
Employed in production of high purity silicon metal
Generates chlorosilylene chemistry.[1]
Carries out thionation and selenation of amides and lactams with elemental sulfur or selenium, respectively.[2]

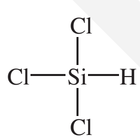


1. Jung, I. N. et al. *Organometallics* **2003,** *22*, 2551.
2. Shibahara, F. et al. *Org. Lett.* **2009**, *11*, 3064.

F&F: Vol. 3, p 298; Vol. 4, p 525; Vol. 5, p 688; Vol. 7, p 606; Vol. 11, p 553; Vol. 13, p 322; Vol. 14, p 82; Vol. 18, p 373.
See also SIT8155.1, GET8150
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[10025-78-2] (既) 1-224 TSCA EC 233-042-5 HMIS: 3-4-2-X 25g inquire 2kg inquire 20kg inquire
** includes liquid dispensing cylinder zCYL-L-2400*
*** requires zDR-S-019 or zCYL-S-019*

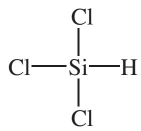
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8155.1 TRICHLOROSILANE, 99.9+% HCl_3Si 劇物	135.45	31.9°	(-128°)	1.3417	1.4020

SURFACE TRANSPORT ONLY, UPS FORBIDDEN. AIR TRANSPORT FORBIDDEN



Flashpoint: -13°C (8°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[10025-78-2] (既) 1-224 TSCA EC 233-042-5 HMIS: 3-4-2-X 250g inquire 20kg inquire
** includes stainless steel cylinder zCYL-HPS-0420-33*
*** includes stainless steel cylinder zCYL-S-019*

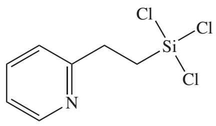
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



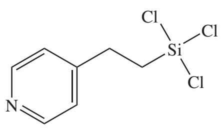
SIT8155.3
TRICHLOROSILANE, 2M (28-29%) in xylene
HCl_3Si 劇物 — Mw 135.45 — D_4^{20} 0.949
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[10025-78-2] (既) 1-224 TSCA EC 233-042-5 HMIS: 3-4-2-X 400g ¥22,300

1-TRICHLOROSILYL-2-(CHLOROMETHYLPHENYL)ETHANE - see SIC2295.3 ((CHLOROMETHYL)PHENYLETHYL)TRICHLOROSILANE

TRICHLOROSILYLETHYLCYCLOHEXENE - see SIC2459.0 [2-(3-CYCLOHEXENYL)ETHYL]TRICHLOROSILANE

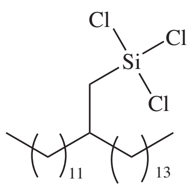


SIT8157.0
2-[2-(TRICHLOROSILYL)ETHYL]PYRIDINE
$C_7H_8Cl_3NSi$ — Mw 240.59 — bp 280° dec. — (mp 207°)
Fuming solid, moisture sensitive
See also SIP6930.0, 2-(4-PYRIDYLETHYL)TRIETHOXYSILANE
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17082-69-8] TSCA EC 241-137-8 HMIS: 3-2-1-X 25g ¥19,900

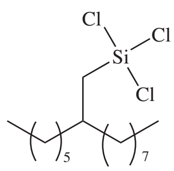


SIT8158.0
4-[2-(TRICHLOROSILYL)ETHYL]PYRIDINE, 15-20% in toluene
$C_7H_8Cl_3NSi$ — Mw 240.59 — D_4^{20} 0.93
Hazy liquid; extremely moisture sensitive — Flashpoint: 4°C (39°F)
Employed in polypyridine self-assembled monolayers.[1]
1. Paulson, S. et al. *J. Chem. Soc., Chem. Commun.* **1992,** *21*, 1615.
See also SIP6930.0, 2-(4-PYRIDYLETHYL)TRIETHOXYSILANE
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17082-70-1] TSCA EC 241-138-3 HMIS: 3-4-1-X 25g ¥13,000 100g ¥34,500

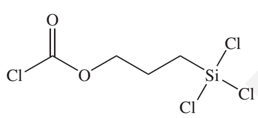
2-(TRICHLOROSILYLMETHYL)ALLYL CHLORIDE - see SIC2281.0 2-(CHLOROMETHYL)ALLYLTRICHLOROSILANE



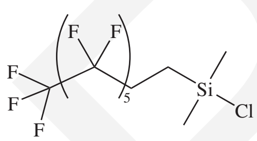
SIT8162.0
13-(TRICHLOROSILYLMETHYL)HEPTACOSANE, 95%
2-DODECYLHEXADECYLTRICHLOROSILANE
$C_{28}H_{57}Cl_3Si$ — Mw 528.21 — bp 215° / 0.01 — (mp 20-35°) — D_4^{20} 0.946
Contains isomers
Forms bonded phases for HPLC applications
See also SIC2266.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[194242-99-4] TSCA-L HMIS: 3-1-1-X 10g ¥38,500



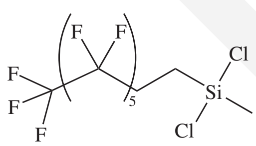
SIT8162.4
7-(TRICHLOROSILYLMETHYL)PENTADECANE, tech-95
2-HEXYLDECYLTRICHLOROSILANE
$C_{16}H_{33}Cl_3Si$ — Mw 359.88 — bp 146-152° / 0.2 — D_4^{20} 0.985
Contains isomers
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X 10g ¥49,600



SIT8163.0
3-(TRICHLOROSILYL)PROPYLCHLOROFORMATE
$C_4H_6Cl_4O_2Si$ — Mw 255.99 — bp 48-50° / 0.35 — D_4^{20} 1.4135 — n_D^{20} 1.4635
Derivatization leads to "removable spacer" for molecular imprinting
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18098-86-7] HMIS: 3-3-1-X 10g ¥40,000

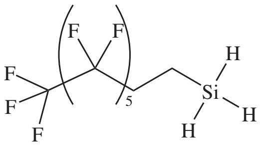


SIT8170.0
(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)DIMETHYLCHLOROSILANE
PERFLUOROOCTYL-1H,1H,2H,2H-DIMETHYLCHLOROSILANE
$C_{10}H_{10}ClF_{13}Si$ — Mw 440.70 — bp 189-91° — D_4^{20} 1.473 — n_D^{20} 1.3453
Packaged over copper powder — Flashpoint: 52°C (126°F)
For branched fluorinated alkylsilane see SIB1706.0
Employed in column chromatography where low protein retentivity is required.[1]
Employed in solid phase extraction of fluorous phases.[2]
Modification of layered silicates yields film-forming compositions.[3]
1. Xindu, G. et al. *J. Chromatogr.* **1983,** *269*, 96.
2. Curran, D. *J. Org. Chem.* **1997,** *62*, 6714.
3. Ogawa, M. et al. *Chem. Mater.* **1998,** *10*, 3787.
See also SIN6597.3, SIT8719.5
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[102488-47-1] HMIS: 3-2-1-X 10g ¥12,700 50g ¥40,600

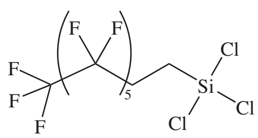


SIT8172.0
(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)METHYLDICHLOROSILANE
$C_9H_7Cl_2F_{13}Si$ — Mw 461.12 — bp 189-90° — D^{25} 1.55 — n_D^{20} 1.3500
Packaged over copper powder — Flashpoint: 51°C (124°F)
Vapor pressure, 76°: 12 mm
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[73609-36-6] (既) 2-2047 EC 277-551-0 HMIS: 3-2-1-X 10g ¥15,400 50g ¥51,200

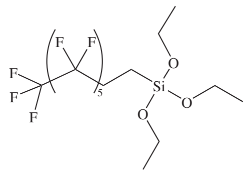
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT8173.0
(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)SILANE
$C_8H_7F_{13}Si$ 378.21 75° / 25 1.446 1.3184
Provides vapor-phase hydrophobic surfaces on titanium, gold, silicon
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[469904-32-3] HMIS: 3-3-1-X 10g ¥53,800



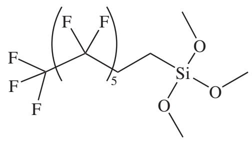
SIT8174.0
(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)TRICHLOROSILANE
$C_8H_4Cl_3F_{13}Si$ 481.55 84-5° / 17 1.639 1.3521
Packaged over copper powder Flashpoint: 54°C (129°F)
Lowers the coefficient of friction of silicon substrates.[1]
1. DePalma, V. et al. *Langmuir* **1989,** *5*, 868.
See also SIH5841.0, SIT8716.3
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[78560-45-9] (既) 2-2046 EC 278-947-6 HMIS: 3-2-1-X 10g ¥11,900 50g ¥37,400



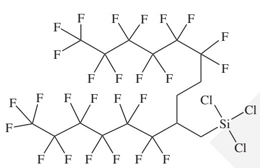
SIT8175.0
(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)TRIETHOXYSILANE
$C_{14}H_{19}F_{13}O_3Si$ 510.36 86° / 1.5 (<-38°) 1.351 1.3436
Viscosity: 3.5 cSt. Flashpoint: 84°C (183°F)
ΔHvap: 66.1 kJ/mole
γc of treated surface: 14 mN/m
Treated surface contact angle, water: 110°
Automotive side windows are treated with fluoroalkylsilanes to provide self-cleaning properties
See also SIN6597.65
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[51851-37-7] TSCA EC 257-473-3 HMIS: 2-2-1-X 10g ¥11,700 50g ¥36,400 3kg ¥641,000

COMMERCIAL

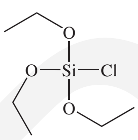
Automotive side windows are treated with fluoroalkylsilanes to provide self-cleaning properties



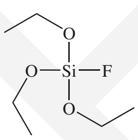
SIT8176.0
(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)TRIMETHOXYSILANE
$C_{11}H_{13}F_{13}O_3Si$ 468.29 60-2° / 0.5 1.44 1.3322
See also SIH5842.2, SIN6597.7
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[85857-16-5] TSCA-L EC 288-657-1 HMIS: 3-1-1-X 10g ¥15,200 50g ¥42,700



SIT8176.3
5,5,6,6,7,7,8,8,9,9,10,10,10-TRIDECAFLUORO-2-(TRIDECAFLUOROHEXYL)DECYLTRICHLOROSILANE, 95%
$C_{16}H_7Cl_3F_{26}Si$ 827.63 110-4° / 0.8 1.709 1.338
Contains ~ 5% isomers
Branched structure forms low surface tension SAMs
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-1-1-X 1.0g ¥31,000



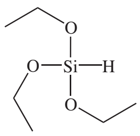
SIT8178.0
TRIETHOXYCHLOROSILANE, tech-95
SILICON CHLORIDE TRIETHOXIDE
$C_6H_{15}ClO_3Si$ 198.72 156-7° 1.012[25] 1.388
Contains tetraethoxysilane Flashpoint: 47°C (117°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4667-99-6] (既) 2-2043 TSCA EC 225-112-9 HMIS: 3-2-1-X 25g ¥22,500 100g ¥65,500



SIT8180.0
TRIETHOXYFLUOROSILANE, 95%
$C_6H_{15}FO_3Si$ 182.27 133-134° 0.94
Vapor pressure, 25°: 3.3 mm
Employed in CVD of silicon dioxide films with low dielectric constants.[1,2,3]
1. Homma, T. et al. *J. Electrochem. Soc.* **1993,** *140*, 687.
2. Hayashi, T. et al. *J. Ceram. Soc. Japan* **1997,** *105*, 428.
3. Gorman, B. P. et al. *Appl. Phys. Lett.* **2001,** *79*, 4010.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[358-60-1] TSCA HMIS: 3-3-1-X 10g ¥13,800 50g ¥44,800

SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8185.0 TRIETHOXYSILANE $C_6H_{16}O_3Si$	164.28	131-2°	(-170°)	0.8753	1.3767

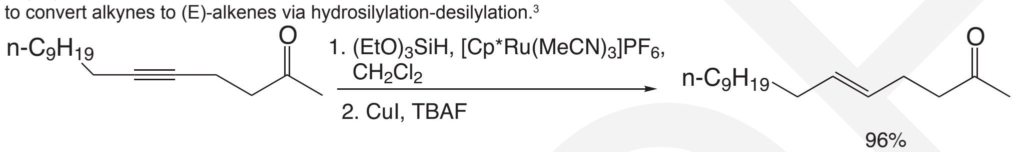


CAUTION: VAPORS CAUSE BLINDNESS - GOGGLES MUST BE WORN
DISPROPORTIONATES IN PRESENCE OF BASE TO PYROPHORIC PRODUCTS

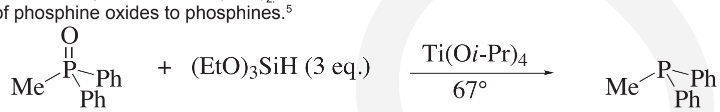
Contains trace Si-Cl for stability
Viscosity: 0.6 cSt
ΔHcomb: -4,604 kJ/mole
ΔHform: 925 kJ/mole
ΔHvap: 175.4 kJ/mole
Surface tension: 22.3 mN/m

Flashpoint: 26°C (79°F)
TOXICITY: ivn mouse, LD50: 180 mg/kg
Vapor pressure, 20°: 20.2 mm
Critical temperature: 244˚C
Dipole moment: 1.78 debye

Hydrosilylates olefins in presence of Pt
Review of synthetic utility.[1]
Reducing agent.[2]
Used to convert alkynes to (E)-alkenes via hydrosilylation-desilylation.[3]



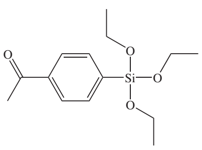
Reduces amides to amines in the presence of $Zn(OAc)_2$.[4]
Used in the reduction of phosphine oxides to phosphines.[5]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 501-505.
2. Boyer, J. et al. *Synthesis* **1981,** 558.
3. Trost, B. M. et al. *J. Am. Chem. Soc.* **2002,** *124*, 7922.
4. Dos, S. et al. *J. Am. Chem. Soc.* **2010**, *132*, 1770.
5. Coumbe, T. et al. *Tetrahedron Lett.* **1994**, *35*, 625.

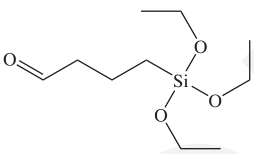
F&F: Vol. 11, p 564.
See also SIM6506.0, SIT8379.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[998-30-1] (既) 2-2048 TSCA EC 213-650-7 HMIS: 4-3-1-X 25g ¥11,900 100g ¥31,000

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8177.0 p-(TRIETHOXYSILYL)ACETOPHENONE, 95% $C_{14}H_{22}O_4Si$	282.41	120° / 0.3	(<-76°)	1.028^{25}	1.4727^{25}



HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[438569-05-2] HMIS: 2-2-1-X 2.5g ¥65,000

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8185.3 TRIETHOXSILYLBUTYRALDEHYDE, tech-90 $C_{10}H_{22}O_4Si$	234.37	85-7° / 1		0.96	1.414

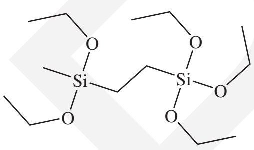


Contains 3-TRIETHOXYSILYL-2-METHYLPROPANAL isomer and cyclic siloxy acetal, 2,2,6-TRIETHOXY-1-OXA-2-SILACYCLOHEXANE
Coupling agent for chitosan to titanium.[1]

1. Martin, H. et al. *Appl. Surf. Sci. 2008,* **254**, 4599.

See also SIT8194.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[917773-12-7]/[88276-92-0] TSCA-L HMIS: 3-3-1-X 10g ¥40,600

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8185.8 1-(TRIETHOXYSILYL)-2-(DIETHOXYMETHYLSILYL)ETHANE $C_{13}H_{32}O_5Si$	324.56	100° / 0.5		0.946	1.4112

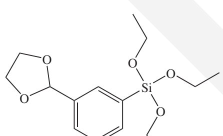


Flashpoint: 102°C (216°F)
TOXICITY: oral rat, LD50: >500 mg/kg

Dipodal silane
Improves hydrolytic stability of silane adhesion promotion systems
Lower toxicity, easier to handle than bis(triethoxysilyl)ethane
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18418-54-7] TSCA HMIS: 2-1-1-X 25g ¥11,100 100g ¥28,400 2kg ¥205,000

COMMERCIAL

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8185.9 2-(3-TRIETHOXYSILYLPHENYL)-1,3-DIOXOLANE $C_{15}H_{24}O_5Si$	312.44				



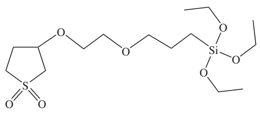
Extensive review on the use in silicon-based cross-coupling reactions.[1]

1. Denmark, S. E. et al. *Organic Reactions,* Vol. 75, Denmark, S. E. ed., John Wiley and Sons, 233, **2011**.

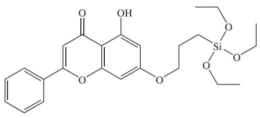
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1227828-43-4] HMIS: 2-2-1-X 5g ¥61,800

TRIETHOXYSILYLPROPENE - see SIA0525.0 ALLYLTRIETHOXYSILANE

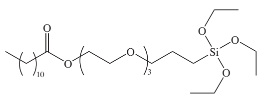
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT8186.0
3-[2-(3-TRIETHOXYSILYLPROPOXY)ETHOXY]SULFOLANE, 95%
$C_{15}H_{32}O_7SSi$ 384.56 190-4° / 0.4 1.122
Forms hydrophilic surfaces
See also SIT7122.6
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[502925-40-8] HMIS: 2-2-1-X 10g ¥20,400

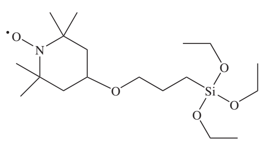


SIT8186.2
7-TRIETHOXYSILYLPROPOXY-5-HYDROXYFLAVONE, 50% in xylene
$C_{24}H_{30}O_7Si$ 458.58
Contains non-reactive dyestuffs Flashpoint: 30°C (86°F)
UV max: 350 nm
See also SID4352.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[945761-08-0] HMIS: 2-3-1-X 1.0g ¥16,200 5g ¥54,400

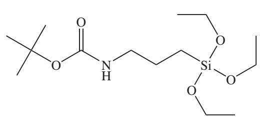


SIT8186.3
TRIETHOXYSILYLPROPOXY(POLYETHYLENEOXY)DODECANOATE, tech-95
$C_{27}H_{56}O_8Si$ 536.82 0.977 1.4479[25]
2-4 EO Units
Contact angle (treated surface), water: 61-2°
Contact angle (treated surface), 2-ethylhexyl palmitate: <15°
Provides embedded hydrophilicity with oleophilic compatibility
Surface treatments stabilize particle dispersions.[1]
1. Arkles, B. et al. in *Silanes and Other Coupling Agents;* Mittal, K., Ed.; VSP (Brill), 2009, Vol. 5, p. 51.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1041420-54-5] TSCA-L HMIS: 2-1-1-X 25g ¥16,200 100g ¥44,800

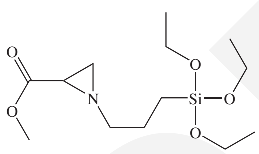
Embedded polarity silanes are utilized to reduce particle-particle interaction as demonstrated for yellow iron oxide pigment in 2-ethylhexylpalmitate left: untreated, right: SIT8186.3 treated



SIT8186.45
4-(TRIETHOXYSILYLPROPOXY)-2,2,6,6-TETRAMETHYLPIPERIDINE N-OXIDE, tech-85
TEMPO-SILANE
$C_{18}H_{38}NO_5Si$ 376.58
Employed in nitroxyl mediated grafting of vinylsilanes to polyolefins.[1]
1. Weaver, J. et al. *J. Polym. Sci., Part A: Polym. Chem.* **2008**, *46*, 4542.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[913375-27-6] HMIS: 2-2-1-X 10g ¥52,200

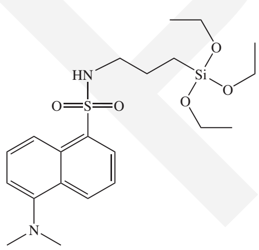


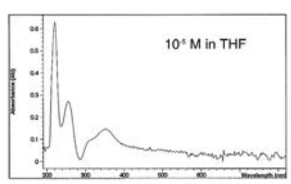
SIT8186.5
N-(3-TRIETHOXYSILYLPROPYL)-O-t-BUTYLCARBAMATE
$C_{14}H_{31}NO_5Si$ 321.49 110-5° / 0.2 0.990 1.4334
Flashpoint: >65°C (>150°F)
Masked isocyanate
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[137376-38-6] HMIS: 2-1-1-X 25g ¥14,600 100g ¥39,500



SIT8186.7
N-[3-(TRIETHOXYSILYL)PROPYL]-2-CARBOMETHOXYAZIRIDINE, 95%
$C_{13}H_{27}NO_5Si$ 305.44 1.052[25] 1.4197[25]
Reacts with fullerenes by 1,3-dipolar addition of azomethine ylide to yield pyrollidine adduct.[1]
1. Bianco, A. et al. *J. Am. Chem. Soc.* **1997,** *119*, 7550.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[193417-26-4] HMIS: 3-2-1-X 2.5g ¥59,100

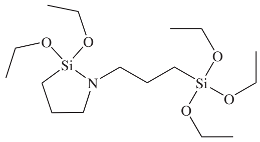
SIT8187.0
N-(TRIETHOXYSILYLPROPYL)DANSYLAMIDE
5-DIMETHYLAMINO-N-(3-TRIETHOXYSILYLPROPYL)NAPTHALENE-1-SULFONAMIDE
$C_{21}H_{34}N_2O_5SSi$ 454.66 115-9° / 0.1 1.12 1.5421
Viscous liquid
UV max: 222(s), 256, 354
Fluorescent - employed as a tracer in UV cure composites
Soluble in toluene, tetrahydrofuran
Fluorescence probe for crosslinking in silicones.[1]
Employed in a chemically modified logic gate.[2]



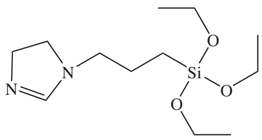


1. Leezenberg, P. et al. *Chem. Mater.* **1995**, *7*, 1784.
2. Mu, L. et al. *Angew. Chem., Int. Ed. Engl.* **2009**, *48*, 3469.
See also SIT8192.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[70880-05-6] TSCA EC 274-980-5 HMIS: 2-1-1-X 1.0g ¥43,800

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

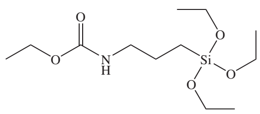


SIT8187.2
(1-(3-TRIETHOXYSILYL)PROPYL)-2,2-DIETHOXY-1-AZA-2-SILACYCLOPENTANE, tech-90
$C_{16}H_{37}NO_5Si_2$ — 379.64 — 136-8° / 1 — 0.974 — 1.4322^{25}
Contains bis(triethoxysilylpropyl)amine
Cyclic azasilane that acts as coupling agent for metal-oxide films
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1184179-50-7] HMIS: 3-2-1-X 25g ¥28,400

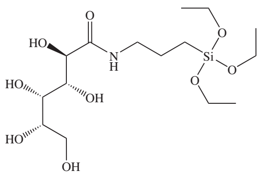


SIT8187.5
N-(3-TRIETHOXYSILYLPROPYL)-4,5-DIHYDROIMIDAZOLE
3-(2-IMIDAZOLIN-1-YL)PROPYLTRIETHOXYSILANE, IMEO
$C_{12}H_{26}N_2O_3Si$ — 274.43 — 134° / 2 — 1.005 — 1.452
Viscosity: 5 cSt. Flashpoint: >110°C (>230°F)
Coupling agent for elevated temperature-cure epoxies
Utilized in HPLC of metal chelates.[1]
Forms proton vacancy conducting polymers with sulfonamides by sol-gel.[2]
Ligand for molecular imprinting of silica with chymotrypsin transition state analog.[3]
1. Suzuki, T. et al. *Chem. Lett.* **1994,** 881.
2. De Zea Bermudez, V. et al. *Sol-Gel Optics II, SPIE Proc.* **1992,** *1728*, 180.
3. Markowitz, M. et al. *Langmuir* **2000**, *16*, 1759.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[58068-97-6] TSCA EC 261-093-3 HMIS: 2-1-1-X 25g ¥8,200 100g ¥19,900 2kg ¥171,000
COMMERCIAL

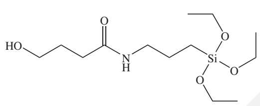
N-[3-(TRIETHOXYSILYL)PROPYL]-2,4-DINITROPHENYLAMINE -
see SID4352.0 3-(2.4-DINITROPHENYLAMINO)PROPYLTRIETHOXYSILANE, 95%



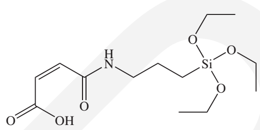
SIT8188.0
TRIETHOXYSILYLPROPYL ETHYLCARBAMATE
$C_{12}H_{27}NO_5Si$ — 293.44 — 124-6° / 0.5 — 1.015 — 1.4321
Flashpoint: 95°C (203°F)
Masked isocyanate
See also SIT8407.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17945-05-0] TSCA EC 241-872-4 HMIS: 2-1-1-X 25g ¥11,900 100g ¥31,000 2kg ¥205,000
COMMERCIAL



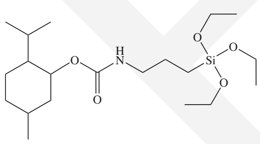
SIT8189.0
N-(3-TRIETHOXYSILYLPROPYL)GLUCONAMIDE, 50% in ethanol
GLUCONAMIDOPROPYLTRIETHOXYSILANE
$C_{15}H_{33}NO_9Si$ — 399.51 — 0.951
Flashpoint: 15°C (59°F)
Water soluble, hydrophilic silane
Modifies silica micro-capillaries to enhance flow of aqueous media.[1]
1. Constable, H. et al. *Colloids Surf., A* **2011***, 380*, 128.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[104275-58-3] HMIS: 2-4-1-X 25g ¥11,900 100g ¥31,000



SIT8189.5
N-(3-TRIETHOXYSILYLPROPYL)-4-HYDROXYBUTYRAMIDE
$C_{13}H_{29}NO_5Si$ — 307.47 — 1.02 — 1.4533
Anchoring reagent for light directed synthesis of DNA on glass.[1]
1. McGall, G. et al. *J. Am. Chem. Soc.* **1997***, 119*, 5081.
See also SIT8189.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[156214-80-1] HMIS: 2-2-1-X 10g ¥12,500 50g ¥39,500

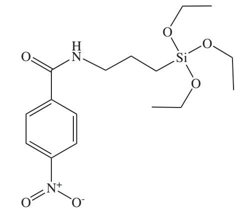


SIT8189.8
TRIETHOXYSILYLPROPYLMALEAMIC ACID, tech-90
$C_{13}H_{25}NO_6Si$ — 319.43 — 1.11 — 1.472
Contains condensation products and 10% ethanol
Viscosity: 600-900 cSt
Reagent for immobilization of anti-bodies on silicon nitride sensor chips.[1]
1. Kurihara, Y, et al. *Langmuir* **2012***, 28*, 13609.
See also SIT8192.6
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[33525-68-7] TSCA EC 251-564-1 HMIS: 3-2-1-X 25g ¥18,300

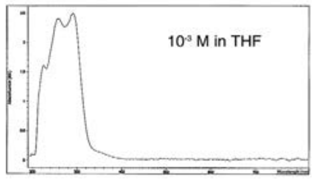


SIT8190.0
(S)-N-TRIETHOXYSILYLPROPYL-O-MENTHOCARBAMATE
$C_{20}H_{41}NO_5Si$ — 406.63 — 0.985^{25} — 1.4526
Flashpoint: >110°C (>230°F)
Optically active
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[68479-61-8] TSCA EC 270-863-8 HMIS: 2-1-1-X 10g ¥25,200

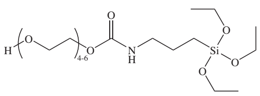
Name | Mw | bp °C/mm | (mp °C) | D_4^{20} | n_D^{20}



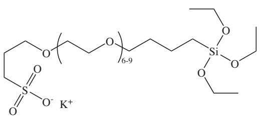
SIT8191.0
3-(TRIETHOXYSILYLPROPYL)-p-NITROBENZAMIDE
$C_{16}H_{26}N_2O_6Si$ 370.48 (54-5°) 1.5127
UV max: 224, 260, 292(s)
Used to prepare diazotizable supports for enzyme immobilization.[1]



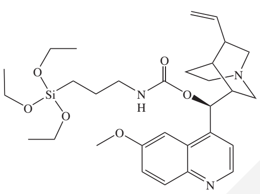
1. Weetall, H. U.S. Patent 3,652,761, 1972.
See also SIN6597.25
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[60871-86-5] TSCA EC 262-508-0 HMIS: 2-1-1-X 25g ¥24,100



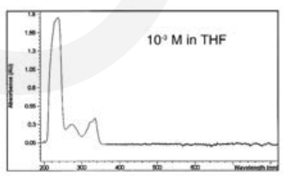
SIT8192.0
N-(TRIETHOXYSILYLPROPYL)-O-POLYETHYLENE OXIDE URETHANE, 95%
$C_{10}H_{22}NO_4SiO(CH_2CH_2O)_{4-6}H$ 400-500 1.09 1.4540[25]
Contains some bis(urethane) analog
Viscosity: 75-125 cSt
Hydrophilic surface modifier
Forms PEGylated glass surfaces suitable for capillary electrophoresis.[1]
1. Razunguzwa, T. et al. *Anal. Chem.* **2006**, *78*, 4326
See also SIB1824.82
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[74695-91-3] TSCA HMIS: 2-1-1-X 25g ¥7,700 100g ¥17,200 2kg ¥161,000
COMMERCIAL



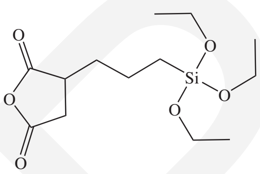
SIT8192.2
TRIETHOXYSILYLPROPYL(POLYETHYLENEOXY)PROPYLPOTASSIUM SULFATE, 50% in ethanol
$C_{25}H_{53}KO_{13}SSi$ - $C_{31}H_{65}KO_{16}SSi$ 661 - 793
Flashpoint: 15°C (59°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 2-2-1-X 2.5g ¥51,700



SIT8192.4
(R)-N-TRIETHOXYSILYLPROPYL-O-QUININEURETHANE, 95%
$C_{30}H_{45}N_3O_6Si$ 571.79 (82-4°)
Soluble: warm toluene
UV max: 236(s), 274, 324, 334
Fluorescent, optically active silane

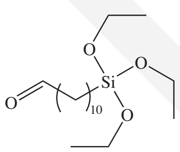


HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[200946-85-6] HMIS: 2-1-1-X 5g ¥36,900



SIT8192.6
(3-TRIETHOXYSILYL)PROPYLSUCCINIC ANHYDRIDE, 95%
$C_{13}H_{24}O_6Si$ 304.41 135° / 0.2 1.070 1.4405
Viscosity: 20 cSt
Flashpoint: >100°C (>212°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Autoignition temperature: 250˚C
Coupling agent for dibasic surfaces
Acetic acid-catalyzed hydrolysis yields succinic acid derivatives
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[93642-68-3] TSCA EC 297-566-6 HMIS: 2-1-1-X 25g ¥13,800 100g ¥36,900 2kg ¥192,000
COMMERCIAL

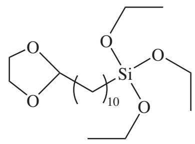
(TRIETHOXYSILYLPROPYL)UREA - see SIU9055.0 UREIDOPROPYLTRIETHOXYSILANE



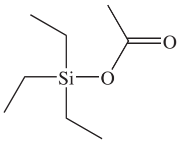
SIT8194.0
TRIETHOXYSILYLUNDECANAL, tech-95
$C_{17}H_{36}O_4Si$ 332.56 150-5° / 0.5 0.930 1.4343
Treated surface contact angle, water: 70°
Long chain coupling agent for DNA
Provides greater stability for coupled proteins than shorter alkyl homologs.[1]
1. Seitz, O. et al. *J. Mater. Chem.* **2011**, *21*, 4384.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[116047-42-8] HMIS: 2-2-1-X 5g ¥32,600

SILICON COMPOUNDS

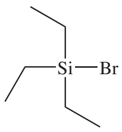
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



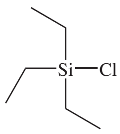
SIT8194.5
TRIETHOXYSILYLUNDECANAL, ETHYLENE GLYCOL ACETAL
$C_{19}H_{40}O_5Si$ 366.61 160-5° / 0.25
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[866935-66-2] HMIS: 2-2-1-X 5g ¥38,500



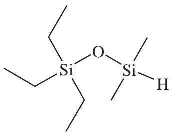
SIT8195.0
TRIETHYLACETOXYSILANE
$C_8H_{18}O_2Si$ 174.31 173-4° 0.893 1.4190
Surface tension: 24.5 mN/m
Flashpoint: 41°C (106°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5290-29-9] (既) 9-1939 TSCA EC 226-128-9 HMIS: 2-2-1-X 10g ¥15,600



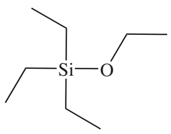
SIT8210.0
TRIETHYLBROMOSILANE
$C_6H_{15}BrSi$ 195.17 66-7° / 24 (-50°) 1.140 1.4561
Flashpoint: 39°C (102°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1112-48-7] TSCA EC 214-191-5 HMIS: 3-2-1-X 10g ¥17,200



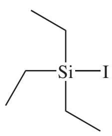
SIT8250.0
TRIETHYLCHLOROSILANE
$C_6H_{15}ClSi$ 150.72 144-5° (-50°) 0.8968 1.4313
ΔHvap: 41.0 kJ/mole
Flashpoint: 30°C (86°F)
Autoignition temperature: 280°C
Vapor pressure, 25°: 7 mm
Forms silylated derivatives of alcohols stable to Grignard conditions.[1]
1. Arkles, B. In *Handbook of Grignard Reagents;* Silverman, G., Ed; Marcel Dekker: 1996; p667.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[994-30-9] (既) 2-2041 TSCA EC 213-615-6 HMIS: 3-3-1-X 10g ¥6,800 50g ¥18,800 750g ¥122,000
COMMERCIAL



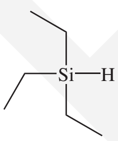
SIT8280.0
1,1,1-TRIETHYL-3,3-DIMETHYLDISILOXANE
$C_8H_{22}OSi_2$ 190.43
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[80907-11-5] HMIS: 2-3-1-X 10g ¥16,200



SIT8285.0
TRIETHYLETHOXYSILANE
$C_8H_{20}OSi$ 160.33 154-5° 0.816 1.4140
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[597-67-1] HMIS: 2-3-1-X 10g ¥27,300

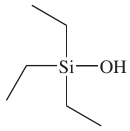


SIT8290.0
TRIETHYLIODOSILANE
$C_6H_{15}ISi$ 242.18 40-5° / 2
Dark amber liquid
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1112-49-8] HMIS: 3-2-1-X 5g ¥18,000



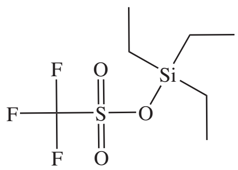
SIT8330.0
TRIETHYLSILANE, 98%
$C_6H_{16}Si$ 116.28 107-8° (-157°) 0.7309 1.4123
Viscosity: 4.9 cSt.
ΔHcomb: -5,324 kJ/mole
ΔHform: -172 kJ/mole
Dipole moment: 0.75 debye
Surface tension: 20.7 mN/m
Flashpoint: -3°C (27°F)
Autoignition temperature: 250°C
Vapor pressure, 20°: 40 mm
Versatile reducing agent; key reviews.[1,2,3,4]
Silylates tertiary alcohols in presence of tris(pentafluorophenyl)borane.[5]
Silylates arenes in presence of Ru catalyst and t-butylethylene.[6]
Used in reductive cyclization of ynals.[7]
Readily converted directly to triethylsilyl carboxylates.[8]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 506-514.
2. Nagai, Y. *Org. Prep. Proc. Int.* **1980,** *12*, 13.
3. F&F: Vol. 1, p 1218; Vol. 2, p 433; Vol. 3, p 304; Vol. 4, p 562; Vol. 6, p 652; Vol. 7, p 387; Vol. 8, p 501; Vol. 9, p 418; Vol. 10, p 483; Vol. 11, p 482; Vol. 15, p 338; Vol. 16, p 356; Vol. 17, p 367.
4. Larson, G. L.; Fry, J. L. *Ionic and Organometallic-Catalyzed Organosilane Reductions*, Volume 71, Denmark, S. E., Ed. John WIley and Sons, 2008
5. Blackwell, J. M. et al. *J. Org. Chem.* **1999,** *64*, 4887.
6. Ezbiansky, K. et al. *J. Organometal. Chem.* **1998,** *17*, 1455.
7. Tang, X.-Q.; Montgomery, J. *J. Am. Chem. Soc.* **1999,** *121*, 6098.
8. Chahan, M. et al. *Org. Lett.* **2000,** *2*, 1027.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[617-86-7] TSCA EC 210-535-3 HMIS: 2-4-1-X 25g ¥6,500 250g ¥32,300 2.5kg ¥189,000
COMMERCIAL

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



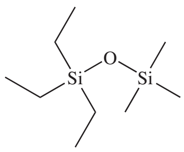
SIT8332.0
TRIETHYLSILANOL
$C_6H_{16}OSi$ 132.27 75° / 24 0.8647 1.4329
ΔHvap: 50.6 kJ/mole — Flashpoint: 57°C (135°F)
Dielectric constant: 2.66 — Vapor pressure, 25.8°: 1 mm
pKa: 13.6 — Dipole moment: 0.62 debye
Employed in phosphorodiamidate synthesis.[1]
1. Evans, D. et al. *J. Am. Chem. Soc.* **1978,** *100*, 3467.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[597-52-4] TSCA EC 209-903-6 HMIS: 1-2-0-X 5g ¥10,900 25g ¥33,200

TRIETHYLSILYLACETYLENE - see SIE4902.0 ETHYNYLTRIETHYLSILANE

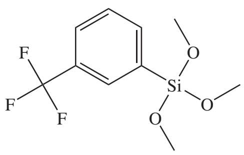


SIT8335.0
TRIETHYLSILYLTRIFLUOROMETHANESULFONATE
$C_7H_{15}F_3O_3SSi$ 264.34 85-6° / 12 1.169 1.3892
Flashpoint: 72°C (162°F)
Review of synthetic utility.[1]
Triethylsilylation reagent.[2]
In combination with lutidine selectively converts acetals to aldehydes without affecting silyl ethers.[3]
Reacts with esters to form both the silyl ketene acetal and the α-triethylsilyl ester.[4]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 517-518.
2. Emde, H. et al. *Synthesis* **1982,** 1.
3. Fujioka, H. et al. *J. Am. Chem. Soc.* **2006**, *128*, 5930.
4. Emde, H. et al. *Liebigs Ann. Chem.***1981**, 1643.
See also SIT8387.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[79271-56-0] EC 279-124-4 HMIS: 4-2-1-X 10g ¥11,100 50g ¥38,700 2kg ¥385,000

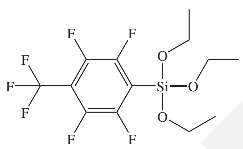
COMMERCIAL



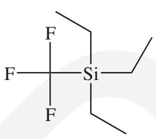
SIT8339.0
1,1,1-TRIETHYL-3,3,3-TRIMETHYLDISILOXANE
$C_9H_{24}OSi_2$ 204.46 171-2° 0.811 1.4108
Volatile siloxane with good range of solubility with organics and silicones
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[2652-41-7] HMIS: 1-3-0-X 100g ¥35,300



SIT8343.0
m-(TRIFLUOROMETHYL)PHENYLTRIMETHOXYSILANE
$C_{10}H_{13}F_3O_3Si$ 266.29
Cross-coupling reagent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[53883-59-3] HMIS: 3-2-1-X 2.5g ¥59,100



SIT8345.0
p-TRIFLUOROMETHYLTETRAFLUOROPHENYLTRIETHOXYSILANE
$C_{13}H_{15}F_7O_3Si$ 380.33 1.29 1.4068
Forms H-free resins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[561069-04-3] HMIS: 3-2-1-X 5g ¥30,500 25g ¥111,700

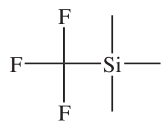


SIT8356.0
TRIFLUOROMETHYLTRIETHYLSILANE
$C_7H_{15}F_3Si$ 184.28 56-7° / 60 0.980 1.3820
Flashpoint: 0°C (32°F)
Trifluoromethylates aryl chlorides under mild conditions.[1]
1. Cho, E. J. et al. *Science*, **2010**, *328*, 1679.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[120120-26-5] HMIS: 3-4-0-X 2.5g ¥34,200

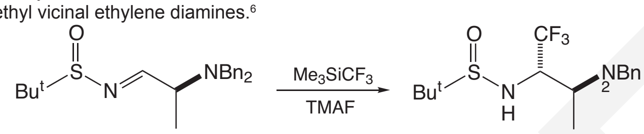
SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

SIT8362.0
TRIFLUOROMETHYLTRIMETHYLSILANE
RUPPERT'S REAGENT
$C_4H_9F_3Si$ — Mw 142.20 — bp 55° — D_4^{20} 0.9626 — n_D^{20} 1.3304
Flashpoint: -10°C (14°F)

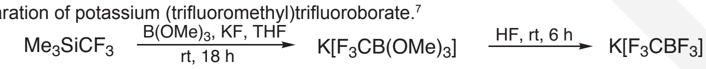


Key reviews.[1,2,3]
Trifluoromethylates carbonyl compounds.[4]
Converts esters to trifluoromethyl ketones.[5]
Used to prepare trifluoromethyl vicinal ethylene diamines.[6]

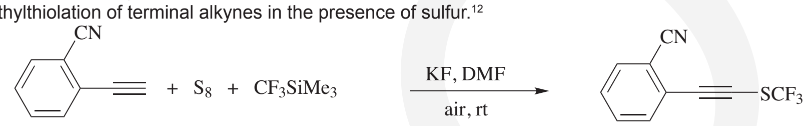


86% >99:1

Used in a simple preparation of potassium (trifluoromethyl)trifluoroborate.[7]



Used to prepare trifluoromethyltitanium complexes.[8]
Trifluoromethylates aldehydes, ketones and imines in good yield.[9]
Silylates cyclopropenes to give cyclopropenyltrimethylsilanes.[10]
Trifluoromethylates terminal acetylenes.[11]
Gives trifluoromethylthiolation of terminal alkynes in the presence of sulfur.[12]



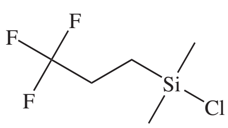
75%

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 539-546.
2. Prakash, G. et al. *Chem. Rev.* **1997,** *97*, 757.
3. Singh, R. P.; Shreeve. J. M. *Tetrahedron* **2000**, *56,* 7613.
4. Prakash, G. et al. *J. Am. Chem. Soc.* **1989,** *111*, 393.
5. Singh, R. et al. *J. Org. Chem.* **1999,** *64*, 2873.
6. Prakash, G. K. S.; Mandal, M. *J. Am. Chem. Soc.* **2002,** *124*, 6538.
7. Molander, G. A.; Hoag, B. P. *Organometallics* **2003,** *22*, 3313.
8. Taw, F. L. et al. *J. Am. Chem. Soc.* **2003**, *125*, 14712.
9. Matsukawa, S.; Saijo, M. *Tetrahedron Lett.* **2008***, 49*, 4655.
10. Fordyce, E. A. F. et al. *J. Chem. Soc., Chem. Commun.* **2008**, 1124.
11. Chu, L.; Qing, F.-L. *J. Am. Chem. Soc.* **2010**, *132*, 7262.
12. Chen, C. et al. *J. Am. Chem. Soc.* **2012**, *134*, 12454.

HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[81290-20-2] HMIS: 3-4-0-X 5g ¥24,100 25g ¥86,200

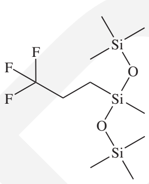
TRIFLUOROMETHYLVINYLDIMETHYLSILANE - see SIV9205.0 VINYL(TRIFLUOROMETHYL)DIMETHYLSILANE

SIT8364.0



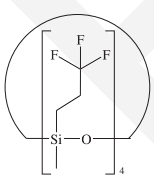
(3,3,3-TRIFLUOROPROPYL)DIMETHYLCHLOROSILANE
$C_5H_{10}ClF_3Si$ — Mw 190.67 — bp 118° — D_4^{20} 1.113 — n_D^{20} 1.3727
Flashpoint: 20°C (68°F)
See also SIB1828.4
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1481-41-0] (既) 2-2047 TSCA EC 216-039-3 HMIS: 3-4-1-X 5g ¥13,500 25g ¥43,800

SIT8365.0



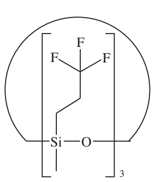
3-(3,3,3-TRIFLUOROPROPYL)HEPTAMETHYLTRISILOXANE
$C_{10}H_{25}F_3O_2Si_3$ — Mw 318.56 — bp 66-8° / 10 — (<-76°) — D_4^{20} 0.959[24] — n_D^{20} 1.3754[20]
Viscosity, 25°: 2 cSt
Flashpoint: 69°C (156°F)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[27703-88-4] (既) 7-500 HMIS: 2-2-0-X 100g ¥50,900

SIT8365.5



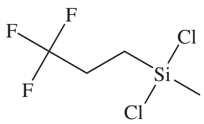
(3,3,3-TRIFLUOROPROPYL)METHYLCYCLOTETRASILOXANE
$C_{16}H_{28}F_{12}O_4Si_4$ — Mw 624.73 — bp 288° — D_4^{20} 1.2735 — n_D^{20} 1.3720
TOXICITY: oral rat, LD50: >2,000 mg/kg
See also SIT8366.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[429-67-4] TSCA EC 207-060-9 HMIS: 1-1-0-X 25g ¥19,400

SIT8366.0

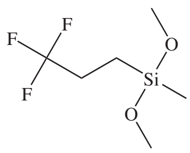


(3,3,3-TRIFLUOROPROPYL)METHYLCYCLOTRISILOXANE
$C_{12}H_{21}F_9O_3Si_3$ — Mw 468.55 — bp 95° / 3 — (35°) — D_4^{20} 1.24 — n_D^{20} 1.371
Primarily trans isomer
Flashpoint: 121°C (250°F)
Octanol/water partition coefficient, log K_{ow}: 9.8
TOXICITY: oral rat, LD50: >10,700 mg/kg
Cyclic trimer; undergoes polymerization
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2374-14-3] (既) 7-500 TSCA EC 219-154 7 HMIS: 2-1-0-X 25g ¥12,700 100g ¥33,700 4kg ¥339,000
COMMERCIAL

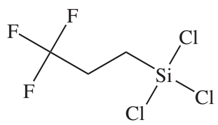
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



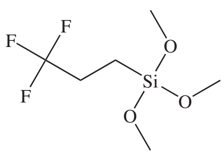
SIT8369.0
(3,3,3-TRIFLUOROPROPYL)METHYLDICHLOROSILANE
$C_4H_7Cl_2F_3Si$ 211.08 121-2° 1.2611 1.3850
ΔHcomb: 2,788 kJ/mole Flashpoint: 15°C (59°F)
TOXICITY: ipr mouse, 254 mg/kg
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[675-62-7] (既) 2-2047 TSCA EC 211-623-4 HMIS: 3-4-1-X 10g ¥13,000 50g ¥41,600



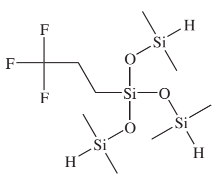
SIT8370.0
(3,3,3-TRIFLUOROPROPYL)METHYLDIMETHOXYSILANE
$C_6H_{13}F_3O_2Si$ 202.25 131-2° 1.089 1.358
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[358-67-8] (既) 2-2078 TSCA EC 206-619-4 HMIS: 3-4-1-X 10g ¥12,500 50g ¥38,500



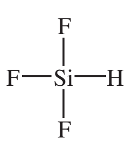
SIT8371.0
(3,3,3-TRIFLUOROPROPYL)TRICHLOROSILANE
$C_3H_4Cl_3F_3Si$ 231.50 113-4° 1.395 1.385
Flashpoint: 15°C (59°F)
See also SIN6597.6
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[592-09-6] (既) 2-2046 TSCA EC 209-744-2 HMIS: 3-4-1-X 10g ¥11,900 50g ¥37,400



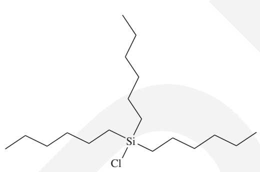
SIT8372.0
(3,3,3-TRIFLUOROPROPYL)TRIMETHOXYSILANE, 98%
$C_6H_{13}F_3O_3Si$ 218.25 144° 1.137 1.3546
γc of treated surface: 33.5 mN/m Flashpoint: 38°C (100°F)
Forms catalytic gels for aerobic oxidation of alcohols in combination with tetrapropylammonium perrhenate.[1]
1. Cirminna, R. et al. *Org. Biomol. Chem.* **2006**, *4*, 2637.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[429-60-7] (既) 2-2079 TSCA EC 207-059-3 HMIS: 3-3-1-X 25g ¥22,400 100g ¥44,800 2.5kg ¥314,000
COMMERCIAL



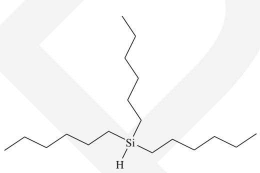
SIT8372.4
TRIFLUOROPROPYLTRIS(DIMETHYLSILOXY)SILANE
$C_9H_{25}F_3O_3Si_4$ 350.63 98-9° / 40 0.962 1.3753
Crosslinker for Pt cure 2-component fluorosilicone RTVs
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[3410-32-0] HMIS: 2-2-0-X 25g ¥24,100



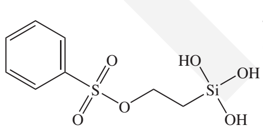
SIT8373.0
TRIFLUOROSILANE, 50-75%
HF_3Si 86.09 -97.5° (-131°)
AIR TRANSPORT FORBIDDEN
Balance tetrafluorosilane and difluorosilane
ΔHvap: 14.1 kJ/mole
Dipole moment: 1.26 debye
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13465-71-9] HMIS: 4-2-2-X 25g inquire
** includes gas dispensing cylinder zCYL-G-0900*



SIT8374.0
TRI-n-HEXYLCHLOROSILANE
$C_{18}H_{39}ClSi$ 319.04 154-5° / 5 0.871 1.456
Flashpoint: >110°C (>230°F)
See also SIT8091.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[3634-67-1] (既) 2-2041 TSCA EC 222-851-9 HMIS: 3-1-1-X 10g ¥17,800



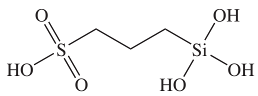
SIT8376.0
TRI-n-HEXYLSILANE
$C_{18}H_{40}Si$ 284.61 160-1° / 5 0.799 1.4480
Flashpoint: 113°C (235°F)
See also SIT8378.7, SIT8625.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[2929-52-4] TSCA EC 220-893-2 HMIS: 2-2-1-X 25g ¥19,900 100g ¥57,000



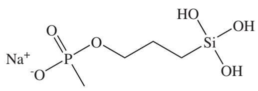
SIT8378.1
TRIHYDROXYSILYLETHYL PHENYLSULPHONIC ACID, 25% in water
$C_8H_{12}O_6SSi$ 264.33
Mixed isomers
Forms hybrid organic-inorganic ionic membranes
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[143282-00-2]/[876338-08-8] HMIS: 3-0-0-X 25g ¥24,700

SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

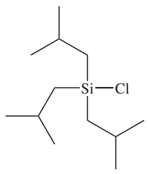


SIT8378.3
3-(TRIHYDROXYSILYL)-1-PROPANESULFONIC ACID, 30-35% in water
$C_3H_{10}O_6SSi$ — Mw 202.26 — D_4^{20} 1.12
pH: <1
Example of a silane with primary amine - condenses at elevated temperature to a disilazane
Employed in preparation of nanoscale ionic silicas.[1]
Forms sulfonated fuel cell electrodes.[2]
1. Giannelis, E. et al. *Appl. Organomet. Chem.* **2010**, *24*, 581.
2. Eastcott, J. et al. *J. Power Sources* **2012**,*197*,102.
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[70942-24-4] TSCA HMIS: 3-0-0-X 25g ¥17,000 100g ¥47,500

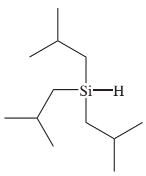


SIT8378.5
3-(TRIHYDROXYSILYL)PROPYL METHYLPHOSPHONATE, MONOSODIUM SALT, 42% in water
$C_4H_{12}NaO_6PSi$ — Mw 238.18 — D_4^{20} 1.25
Contains 4-5% methanol, sodium methylphosphonate — Flashpoint: 79°C (174°F)
Forms functionalized silica nanoparticles employed in amperometric glucose sensor.[1]
1. Zhao, W. et al. *Electrochim. Acta* **2013**, *89*, 278.
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[84962-98-1] TSCA EC 284-799-3 HMIS: 1-2-0-X 100g ¥8,500 500g ¥24,700 2.5kg ¥95,000

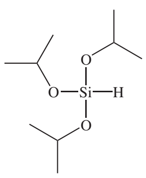
COMMERCIAL



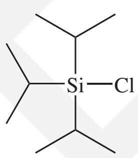
SIT8378.6
TRIISOBUTYLCHLOROSILANE
$C_{12}H_{27}ClSi$ — Mw 234.89 — bp 225-8° — D_4^{20} 0.877 — n_D^{20} 1.449
Flashpoint: 109°C (228°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13154-25-1] HMIS: 3-1-1-X 10g ¥24,100



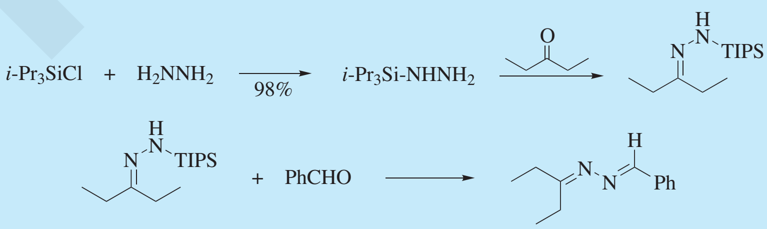
SIT8378.7
TRIISOBUTYLSILANE
$C_{12}H_{28}Si$ — Mw 200.44 — bp 204-6° — D_4^{20} 0.764 — n_D^{20} 1.4350
Flashpoint: 87°C (189°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[6485-81-0] HMIS: 2-2-1-X 10g ¥23,100



SIT8379.0
TRIISOPROPOXYSILANE, 95%
$C_9H_{22}O_3Si$ — Mw 206.35 — bp 35° / 5 — D_4^{20} 0.854 — n_D^{20} 1.3839
Hydrolysis yields hydride functional polymers with greater linearity than triethoxysilane
Treatment with KH yields pentacoordinate dihydrosilicate.[1]
1. Corriu, R. et al. *Organometallics* **1992,** *10*, 3564.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[6675-79-2] HMIS: 3-3-1-X 25g ¥36,300



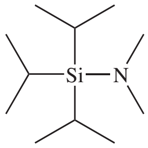
SIT8384.0
TRIISOPROPYLCHLOROSILANE
TIPS-CHLORIDE
$C_9H_{21}ClSi$ — Mw 192.81 — bp 79-80° / 10 — D_4^{20} 0.903 — n_D^{20} 1.4520
Flashpoint: 62°C (144°F)
Autoignition temperature: 255˚C
Review of synthetic utility.[1]
Employed in nucleotide synthesis.[2]
Protection and stereocontrol of reaction of pyrroles.[3]
Quantitatively converts O-acetyl-protected glycosylthiomethyl phosphonate esters to their phosphonates.[4]
Used to form stable enol silyl ethers that can be oxidized to enones or β-TIPS-enones.[5]
Reacts with hydrazine to form the mono-TIPShydrazine, which can be converted to TIPS-protected hydrazones and further to unsymmetrical azines.[6]



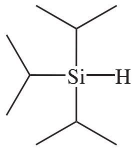
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 554-558.
2. Ogilvie, K. et al. *Tetrahedron Lett.* **1974,** 2861. Ogilvie, K. et al. *Carbohyd., Nucleosides, Nucleotides* **1976**, *3,* 197.
3. Pattenden, G.; Robertson, G. M. *Tetrahedron Lett.* **1986,** *27*, 399.
4. Zhu, X. et al. *J. Org. Chem.* **2004,** *69*, 6843.
5. Yu, J.-Q. et al. *Org. Lett.* **2005,** *7*, 1415.
6. Justo de Pomar, J. C.; Soderquist, J. A. *Tetrahedron Lett.* **2000**, *41*, 3285.
F&F: Vol. 5, p 75.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13154-24-0] (既) 2-2041 HMIS: 3-2-1-X 25g ¥11,200 100g ¥36,700 750g ¥183,000

COMMERCIAL

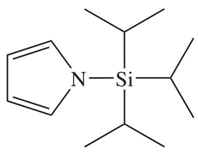
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



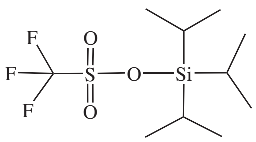
SIT8384.5
TRIISOPROPYLDIMETHYLAMINOSILANE
N,N-DIMETHYLTRIS(1-METHYLETHYL)SILANAMINE
$C_{11}H_{27}NSi$ 201.43 76-8° / 8 (27-30°) 0.833 1.451
Flashpoint: 67°C (153°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[181231-66-3] HMIS: 3-2-1-X 10g ¥27,800



SIT8385.0
TRIISOPROPYLSILANE, 98%
$C_9H_{22}Si$ 158.36 169-70° 0.772 1.4358
Flashpoint: 37°C (99°F)
Blocking agent forming derivatives stable in presence of Grignard reagents.
Selectively silylates primary alcohols in presence of secondary alcohols.[1]
1. Horner, L. et al. *J. Organomet. Chem.* **1985,** 282, 155.
See also SIT8330.0, SIT8387.7
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[6485-79-6] EC 613-702-2 HMIS: 2-3-1-X 25g ¥10,000 100g ¥22,600 1.5kg ¥220,000
COMMERCIAL

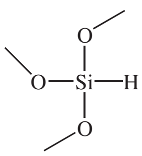


SIT8384.8
1-(TRIISOPROPYLSILYL)PYRROLE
$C_{13}H_{25}NSi$ 223.43 78° / 0.4 0.904 1.492
Flashpoint: 107°C (224°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[87630-35-1] HMIS: 2-2-1-X 5g ¥23,600

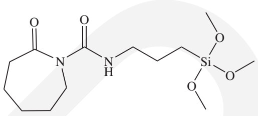


SIT8387.0
TRIISOPROPYLSILYLTRIFLUOROMETHANESULFONATE
$C_{10}H_{21}F_3O_3SSi$ 306.41 45-6° / 0.03 1.136 1.4140
Flashpoint: 100°C (212°F)
Reactive form of TIPS protecting group
Review of synthetic utility.[1]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 559-562.
2. Rucker, C. *Chem. Rev.* **1995**, *95*, 1009.
F&F: Vol. 11, p 567; Vol. 13, p 11; Vol. 21, p 254.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[80522-42-5] HMIS: 3-1-1-X 10g ¥16,400 50g ¥55,400

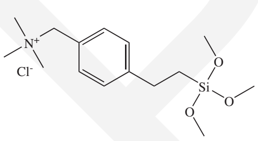
TRIMETHOXYPROPYLSILANE - see SIP6918.0 n-PROPYLTRIMETHOXYSILANE



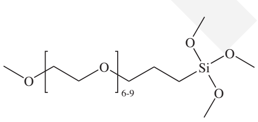
SIT8392.0
TRIMETHOXYSILANE, 95%
$C_3H_{10}O_3Si$ 122.20 86-7° (-114°) 0.860 1.3687
CAUTION: VAPORS CAUSE BLINDNESS - GOGGLES MUST BE WORN
DISPROPORTIONATES IN PRESENCE OF BASE TO PYROPHORIC PRODUCTS
SURFACE TRANSPORT ONLY, UPS FORBIDDEN. AIR TRANSPORT FORBIDDEN
Contains Si-Cl for stability — Flashpoint: -24°C (-11°F)
ΔHcomb: -2,679 kJ/mole — TOXICITY: oral rat, LD50: 8,024 mg/kg
ΔHform: -599 kJ/mole
F&F: Vol. 19, p 167.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2487-90-3] (既) 2-2048 TSCA EC 219-637-2 HMIS: 4-4-2-X 25g inquire 500g inquire
** includes liquid dispensing cylinder zCYL-L-0900*



SIT8394.0
N-[5-(TRIMETHOXYSILYL)-2-AZA-1-OXOPENTYL]CAPROLACTAM, 95%
N-TRIMETHOXYSILYLPROPYLCARBAMOYLCAPROLACTAM
$C_{13}H_{26}N_2O_5Si$ 318.45 (-39°) 1.14 1.4739
Flashpoint: 136°C (277°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[106996-32-1] HMIS: 3-1-1-X 25g ¥16,200



SIT8395.0
4-(TRIMETHOXYSILYLETHYL)BENZYLTRIMETHYLAMMONIUM CHLORIDE, 60% in methanol
$C_{15}H_{28}ClNO_3Si$ 333.93 0.966
Flashpoint: 11°C (52°F)
Candidate for exchange resins and extraction phases
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-3-1-X 25g ¥26,300



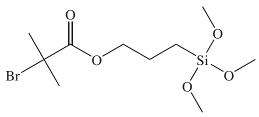
SIT8408.0
TRIMETHOXYSILYLPROPOXYPOLYETHYLENEOXIDE, METHYL ETHER, tech-85
$CH_3O(C_2H_4O)_{6\text{-}9}(CH_2)_3Si(OCH_3)_3$ 459 - 591 (-8°) 1.076 1.403
Flashpoint: 88°C (190°F)
Hydrophilic surface treatment
Stabilizes colloidal silica sols in aqueous alcohol and aqueous glycol systems
See also SIT7122.6
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[65994-07-2] TSCA HMIS: 2-2-1-X 100g ¥8,800 2kg ¥72,300 20kg ¥385,000
COMMERCIAL

TRIMETHOXYSILYLPROPYLANILINE - see SIP6724.0 N-PHENYLAMINOPROPYLTRIMETHOXYSILANE

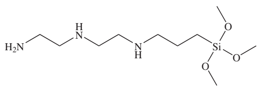
SILICON COMPOUNDS

Gelest

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

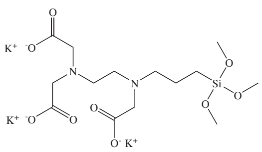


SIT8397.0
(3-TRIMETHOXYSILYL)PROPYL 2-BROMO-2-METHYLPROPIONATE
$C_{10}H_{21}BrO_5Si$ 329.27 90-5° / 0.5 1.243^{25}
For surface initiated ATRP polymerization.[1,2]
1. Mulvihill, M. et al. *J. Am. Chem. Soc.* **2005**, *127*, 16040.
2. Huck, J. et al. *J. Mater. Chem.* **2004**, *14*, 730.
See also SIB1891.6
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[314021-97-1] HMIS: 2-2-1-X 5g ¥51,200

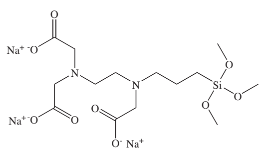


SIT8398.0
(3-TRIMETHOXYSILYLPROPYL)DIETHYLENETRIAMINE, tech-95
$C_{10}H_{27}N_3O_3Si$ 265.43 114-8° / 2 1.030 1.4590
γc of treated surface: 37.5 mN/m
Flashpoint: 137°C (279°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Hardener, coupling agent for epoxies
See also SSP060, SIS6944.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[35141-30-1] TSCA EC 252-390-9 HMIS: 3-1-1-X 100g ¥9,000 2kg ¥87,000 18kg ¥311,000
COMMERCIAL

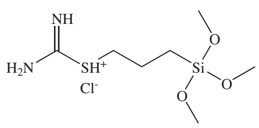
N-[3-(TRIMETHOXYSILYL)PROPYL]ETHYLENEDIAMINE - see SIA0591.0 (2-AMINOETHYL)-3-AMINOPROPYLTRIMETHOXYSILANE



SIT8401.0
N-(TRIMETHOXYSILYLPROPYL)ETHYLENEDIAMINETRIACETATE, TRIPOTASSIUM SALT, 30% in water
$C_{14}H_{25}K_3N_2O_9Si$ 510.75
Essentially silanetriol, contains KCl
Chelates metal ions
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[1309595-29-6] HMIS: 2-0-0-X 25g ¥31,600

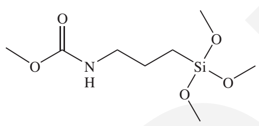


SIT8402.0
N-(TRIMETHOXYSILYLPROPYL)ETHYLENEDIAMINETRIACETATE, TRISODIUM SALT, 35% in water
$C_{14}H_{25}N_2Na_3O_9Si$ 462.42 1.26
Essentially silanetriol, contains NaCl
Chelates metal ions
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[128850-89-5]/[1138444-28-6] HMIS: 2-0-0-X 25g ¥16,200 100g ¥44,800

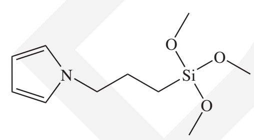


SIT8405.0
S-(TRIMETHOXYSILYLPROPYL)ISOTHIOURONIUM CHLORIDE, 50% in water
TRIHYDROXYPROPYLCARBAMIDOTHIOIC ACID HYDROCHLORIDE
$C_7H_{19}ClN_2O_3SSi$ 274.84 1.190 1.441
pH: 6
Essentially silanetriol
Antimicrobial activity reported
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[84682-36-0] TSCA EC 283-599-3 HMIS: 2-0-0-X 25g ¥17,800

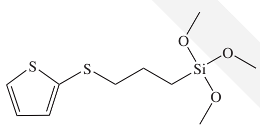
TRIMETHOXYSILYLPROPYLMETHACRYLATE - see SIM6487.4 METHACRYLOXYPROPYLTRIMETHOXYSILANE



SIT8407.0
N-TRIMETHOXYSILYLPROPYLMETHYLCARBAMATE
METHYL [3-(TRIMETHOXYSILYL)PROPYL]CARBAMATE
$C_8H_{19}NO_5Si$ 237.32 102° / 0.75 1.1087
Viscosity: 12 cSt
Flashpoint: 99°C (210°F)
Autoignition temperature: 385˚C
See also SIT8188.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[23432-62-4] HMIS: 3-2-1-X 25g ¥20,400

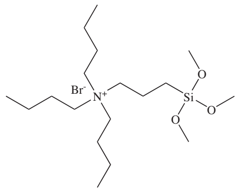


SIT8410.0
N-(3-TRIMETHOXYSILYLPROPYL)PYRROLE
$C_{10}H_{19}NO_3Si$ 229.35 105-7° / 1 1.017 1.463
Flashpoint: >110°C (>230°F)
For electrode modification, polypyrrole adhesion.[1]
1. Simon, R. et al. *J. Am. Chem. Soc.* **1982,** *104*, 2031.
See also SIT8187.5
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[80906-67-8] HMIS: 3-1-1-X 5g ¥33,200

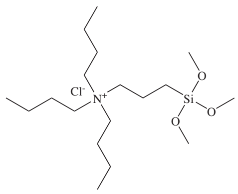


SIT8411.0
2-(3-TRIMETHOXYSILYLPROPYLTHIO)THIOPHENE
$C_{10}H_{18}O_3S_2Si$ 278.46 125-7° / 0.4 1.136^{25} 1.5123^{25}
Contact angle, water on treated silica surface: 76˚
See also SIP6926.4
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1364140-50-0] HMIS: 3-2-1-X 10g ¥36,300

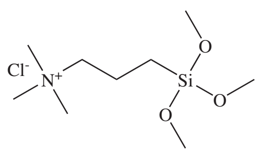
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT8412.0
N-TRIMETHOXYSILYLPROPYL-N,N,N-TRI-n-BUTYLAMMONIUM BROMIDE, 50% in methanol
$C_{18}H_{42}BrNO_3Si$ 428.52 0.92
Flashpoint: 11°C (52°F)
Immobilizable phase transfer catalyst
See also SIT8422.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-4-1-X 25g ¥28,400

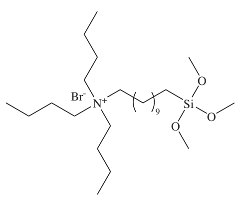


SIT8414.0
N-TRIMETHOXYSILYLPROPYL-N,N,N-TRI-n-BUTYLAMMONIUM CHLORIDE, 50% in methanol
$C_{18}H_{42}ClNO_3Si$ 384.08 0.88
Flashpoint: 11°C (52°F)
Contains 3-5% chloropropyltrimethoxysilane and $Bu_3NH^+Cl^-$
Component in hybrid organic-inorganic exchange resins.[1]
1. Lee, B. et al. *Langmuir* **2003**, *19*, 4246.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[143203-33-2] HMIS: 3-4-1-X 25g ¥24,900

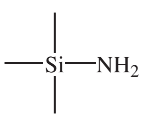


SIT8415.0
N-TRIMETHOXYSILYLPROPYL-N,N,N-TRIMETHYLAMMONIUM CHLORIDE, 50% in methanol
N,N,N-TRIMETHYL-3-(TRIMETHOXYSILYL)-1-PROPANAMINIUM CHLORIDE
$C_9H_{24}ClNO_3Si$ 257.83 0.927 1.3966
Flashpoint: 11°C (52°F)
Employed for bonded chromatographic phases
Anti-static agent
Used to treat glass substrates employed in electroblotting
Prevents contact electrification.[1]
1. Thomas, S. et al. *J. Am. Chem. Soc.* **2009**, *131*, 8746.
See also SIT8395.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[35141-36-7] (既) 2-2095 TSCA EC 252-393-5 HMIS: 2-4-1-X 25g ¥8,200 2kg ¥113,000 15kg ¥454,000

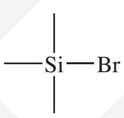
COMMERCIAL



SIT8422.0
N-TRIMETHOXYSILYLUNDECYL-N,N,N-TRI-n-BUTYLAMMONIUM BROMIDE, 25% in dimethylformamide
$C_{26}H_{58}BrNO_3Si$ 540.74 0.965^{25} 1.4428
Flashpoint: 58°C (136°F)
Immobilizable phase transfer catalyst
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-4-1-X 25g ¥25,700



Reference Compound 11
TRIMETHYLAMINOSILANE
$C_3H_{11}NSi$ 89.21 (-90°)
Unstable - loses NH_3 at room temperature to form hexamethyldisilazane
Reference compound. Data is provided for investigators. Not offered for sale by Gelest.
[7379-79-5]

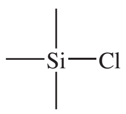


SIT8430.0
TRIMETHYLBROMOSILANE
BROMOTRIMETHYLSILANE
C_3H_9BrSi 153.09 80° (-44°) 1.1725 1.422
ΔHform: -294 kJ/mole
ΔHvap: 30.8 kJ/mole
Dipole moment: 2.34 debye
Flashpoint: -3°C (27°F)
Ionization potential: 10.24 eV
Review of synthetic utility.[1]
Converts acid chlorides to acid bromides.[2]
Deesterifies phosphorus esters.[3]
Converts nitroalkanes to nitroalkenes.[4]
Catalyzes the cross-coupling of heteroaromatics.[5]
Used in the synthesis of unsymmetrical phosphine oxides.[6]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 92-100.
2. Schmidt, A. H. et al. *Synthesis* **1981,** 216.
3. Chovinard, P. M.; Bartlett, P. A. *J. Org. Chem.* **1986,** *51*, 75.
4. Kunetsky, R. A. et al. *Tetrahedron Lett.* **2005**, *46*, 5203.
5. Kita, Y. et al. *J. Am. Chem. Soc.* **2009**, *131*, 1668.
6. Fougére, C. et al. *Eur. J. Org. Chem.* **2009**, 6048.
F&F: Vol. 9, p 73; Vol. 10, p 59; Vol. 11, p 59; Vol. 12, p 799; Vol. 15, p 51; Vol. 16, p 50; Vol. 18, p 380; Vol. 19, p 373; Vol. 20, p 404.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2857-97-8] TSCA EC 220-672-0 HMIS: 3-4-2-X 25g ¥7,600 2.5kg ¥189,000

COMMERCIAL

SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



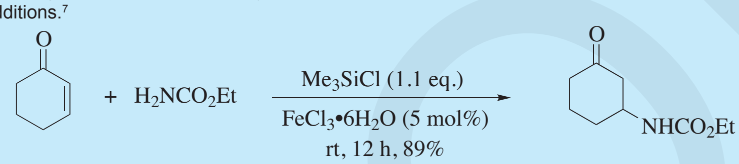
SIT8510.0
TRIMETHYLCHLOROSILANE
TMCS

C_3H_9ClSi	108.64	57.6°	(-57.7°)	0.8580	1.3885

Viscosity: 0.47 cSt
ΔHcomb: -2,989 kJ/mole
ΔHform: -354 kJ/mole
ΔHvap: 27.6 kJ/mole
Dipole moment: 2.09 debye
Surface tension: 17.8 mN/m
Specific heat: 1.76 J/g/°
Coefficient of thermal expansion: 1.2 x 10^{-3}

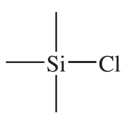
Flashpoint: -27°C (-17°F)
TOXICITY: ihl mouse, LDLo: 500 mg/m^3/10M
Autoignition temperature: 395°C
Vapor pressure, 20°: 190 mm
Vapor pressure, 50°: 591 mm
Critical temperature: 224.6°C
Critical pressure: 31.6 atm

Most economical and broadly used silylation reagent
Review of synthetic utility.[1]
Enhances Claisen rearrangement.[2]
Enhances the deprotection of tBOC-protected amino acids.[3]
Enhances ethylene glycol ketalization reaction.[4]
Catalyzes the formation of chlorohydrin esters from diols.[5]
Reviewed as water scavenger in reactions of carbonyl compounds.[6]
Facilitates Michael additions.[7]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 170-182.
2. Snider, B. B.; Hawryluk, N. A. *Org. Synth.* **2000,** *2*, 635.
3. Chen, B. C. et al. *J. Org. Chem.* **1999,** *64*, 9294.
4. Chan, T. H. et al. *Synthesis* **1983,** 203.
5. Eras, J. et al. *J. Org. Chem.* **2002,** I, 8631.
6. Volochnuk, D. M. et al. *Synthesis* **2009**, 3719.
7. Xu, L. W. et al. *Chem. Commun.* **2003**, 2570.
F&F: Vol. 1, p 1232; Vol. 2, p 435; Vol.3, p 310; Vol. 4, p 32, p 537; Vol.5, p 709; Vol. 6, p 25; Vol. 7, p 66; Vol. 8, p 107; Vol. 9, p 112; Vol. 10, p 96; Vol. 11, p 125; Vol. 12, p 126; Vol. 13, p 165; Vol. 14, p 175; Vol. 15, p 89; Vol. 16, p 85; Vol. 17, p 79; Vol. 19, p 374; Vol. 20, p 348, p 380, p 404; Vol.21, p 453.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[75-77-4] (既) 2-2041 TSCA EC 200-900-5 HMIS: 3-4-2-X 25g ¥3,400 750g ¥14,400 3kg ¥60,000

COMMERCIAL

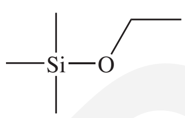


SIT8510.1
TRIMETHYLCHLOROSILANE, 99+%

C_3H_9ClSi	108.64	57.6°		0.8580	1.3885

Flashpoint: -27°C (-17°F)

Redistilled “silylation” grade
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[75-77-4] (既) 2-2041 TSCA EC 200-900-5 HMIS: 3-4-2-X 25g ¥5,300 750g ¥25,100



SIT8515.0
TRIMETHYLETHOXYSILANE
ETHOXYTRIMETHYLSILANE

$C_5H_{14}OSi$	118.25	75-6°	(-83°)	0.7573	1.3742

ΔHcomb: 4,062 kJ/mole
ΔHvap: 140.2 kJ/mole
Dipole moment: 1.2 debye

Flashpoint: -27°C (-17°F)
TOXICITY: oral rat, LDLo: 1,400 mg/kg
Vapor pressure, 22°: 111 mm
Critical temperature: 233°C

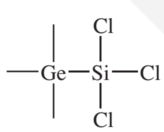
Anti-structuring additive for silicone rubber
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1825-62-3] (既) 2-2052 TSCA EC 217-370-6 HMIS: 2-4-1-X 25g ¥3,400 1.5kg ¥37,000 14kg ¥229,000

COMMERCIAL

SIT8525.0
TRIMETHYLFLUOROSILANE

C_3H_9FSi	92.19	16-8°	(-74°)	0.793^0	

AIR TRANSPORT FORBIDDEN
Flashpoint: -35°C (-31°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[420-56-4] TSCA EC 206-997-0 HMIS: 3-4-1-X 100g inquire
** includes gas dispensing cylinder zCYL-G-0325*

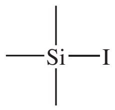


GET8561
TRIMETHYLGERMYLTRICHLOROSILANE

$C_3H_9Cl_3GeSi$	252.14	65-6° / 22			

HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[150112-38-2] HMIS: 3-2-1-X 10g ¥41,500

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT8564.0
TRIMETHYLIODOSILANE
TRIMETHYLSILYL IODIDE

C_3H_9ISi	200.10	106-7°		1.470	1.4742

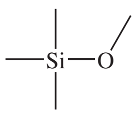
Stabilized with copper granules — Flashpoint: -2°C (28°F)
ΔHform: -218 kJ/mole — Vapor pressure, 25°: 40 mm
Dipole moment: 2.46 debye

Key reviews.[1,2,3,4]
Reagent for cleavage of ethers, esters, lactones.[3]
Used to dechlorinate aryl chlorides.[4]
Allylates aldehydes in the presence of allyl chloride and tin tetraiodide (SNT7946).[5]

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 325-336.
2. Olah, G. et al. In *Advances in Silicon Chemistry;* Larson, G., Ed.; JAI Press: Greenwich, Co, 1991; Vol. 1, p.1.
3. DePew, K. M. et al. *J. Org. Chem.* **1999,** *121*, 11953.
4. Sako, M. et al. *J. Org. Chem.* **2001,** *66*, 3610.
5. Masuyama, Y. et al. *Tetrahedron Lett.* **2005**, *46*, 2861.

F&F: Vol. 8, p 261;Vol. 9, p 19, p 55, p 113, p 151, p 216; Vol. 11, p 253, p 271, p 481; Vol. 12, p 259; Vol. 16, p 188; Vol. 18, p 383; Vol. 19, p 119, p 376; Vol. 20, p 407; Vol.21, p 458.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[16029-98-4] TSCA EC 240-171-0 HMIS: 3-4-1-X 25g ¥8,300 100g ¥31,800 2.5kg ¥260,000

COMMERCIAL



SIT8566.0
TRIMETHYLMETHOXYSILANE

$C_4H_{12}OSi$	104.22	57-8°		0.7560	1.3678

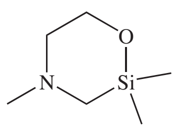
ΔHcomb: 3,801 kJ/mole — Flashpoint: -11°C (12°F)
Dipole moment: 1.18 debye

Forms lithiomethyl(methoxy)dimethylsilane upon reaction w/ tert-butyllithium.[1]

1. Bates, T. F. et al. *J. Organometal. Chem.* **2000,** *595*, 87.

F&F: Vol. 14, p 119.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1825-61-2] (既) 2-2052 TSCA EC 217-369-0 HMIS: 3-4-1-X 25g ¥5,900 100g ¥16,700 1.5kg ¥57,000

COMMERCIAL



SIT8567.0
2,2,4-TRIMETHYL-1-OXA-4-AZA-2-SILACYCLOHEXANE
TRIMETHYLSILAMORPHOLINE

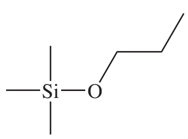
$C_6H_{15}NOSi$	145.28	63° / 47		0.907	1.435

Masked hydroxyl group
Catalyst for urethane foams.[1]

1. Dahm, M. et al. U.S. Patent 3,620,984, 1971.

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[10196-49-3] TSCA EC 233-487-5 HMIS: 3-3-1-X 25g ¥16,200

2,4,4-TRIMETHYLPENTYLTRICHLOROSILANE - see SII6457.0 ISOOCTYLTRICHLOROSILANE

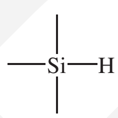


SIT8568.0
TRIMETHYL-n-PROPOXYSILANE

$C_6H_{16}OSi$	132.28	101-2°		0.768	1.384

Flashpoint: 10°C (50°F)

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1825-63-4] (既) 2-2052 TSCA EC 217-371-1 HMIS: 2-4-1-X 100g ¥44,300



SIT8570.0
TRIMETHYLSILANE
3MS

$C_3H_{10}Si$	74.20	6.7°	(-135.9°)	0.638[6,7]	

ΔHcomb: -3,206 kJ/mole — Flashpoint: <-20°C (<-4°F)
ΔHform: -163 kJ/mole — TOXICITY: ihl rat, LC50: >5,000 ppm/1H
ΔHvap: 24.3 kJ/mole — Autoignition temperature: 320˚C
Dipole moment: 0.52 debye — Vapor pressure, 25˚: 1,218 mm
Critical temperature: 158.85°C
Critical pressure: 31.48 atm

Forms trimethylsilylalkanes from olefins w/Pt catalyst
Employed in plasma treatment of surfaces.[1]
Treatment of titanium alloys and stainless steel surfaces inhibits biofilm formation.[2]

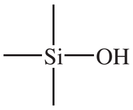
1. Hendricks, N. et al. *Semiconductor Int'l.* **2000,** *23*, 95.
2. Ma, Y. et al. *Antimicrob. Agents Chemother.* **2012**, *56*, 5923.

F&F: Vol. 1, p 1235; Vol. 2, p 441; Vol. 13, p 101; Vol. 16, p 292.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[993-07-7] TSCA EC 213-603-0 HMIS: 2-4-1-X 100g inquire 1kg inquire
** Prices include gas dispensing cylinder*

COMMERCIAL

SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

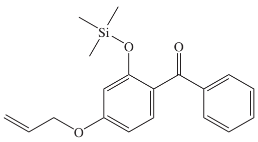


SIT8570.3
TRIMETHYLSILANOL, tech-95
HYDOXYTRIMETHYLSILANE
$C_3H_{10}OSi$ — 90.20 — 99° — (9.5°) — 0.8139 — 1.3889

Contains hexamethyldisiloxane
ΔHform: 603 kJ/mole
ΔHvap: 41.6 kJ/mole
Surface tension: 18.4 mN/m
Flashpoint: 1°C (34°F)
Autoignition temperature: 395˚C

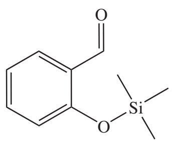
Condenses to form hexamethyldisiloxane
Camphor-like odor
See also SIP6729.2, SIT8332.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[1066-40-6] (既) 2-589 TSCA HMIS: 2-3-1-X store <5°C 25g ¥22,500 100g ¥65,500

TRIMETHYLSILANOL, POTASSIUM SALT - see SIP6901.0 POTASSIUM TRIMETHYLSILANOLATE



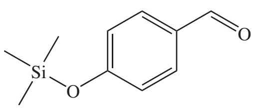
SIT8570.5
2-TRIMETHYLSILOXY-4-ALLYLOXYDIPHENYLKETONE
$C_{19}H_{22}O_3Si$ — 326.47 — 182-4° / 0.4 — 1.08 — 1.5627

Polymerizeable UV blocking agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[106359-89-1] HMIS: 2-1-1-X 10g ¥12,500 50g ¥39,500



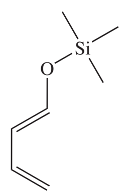
SIT8570.7
2-TRIMETHYLSILOXYBENZALDEHYDE
$C_{10}H_{14}O_2Si$ — 194.31 — 142° / 25 — 1.013 — 1.5095

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1078-31-5] TSCA EC 241-831-0 HMIS: 2-2-1-X 5g ¥25,200



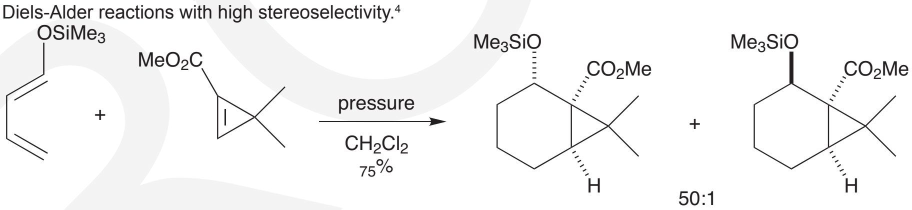
SIT8570.8
4-TRIMETHYLSILOXYBENZALDEHYDE
$C_{10}H_{14}O_2Si$ — 194.31 — 83-4° / 3 — 1.518

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1012-12-0] EC 213-789-3 HMIS: 2-2-1-X 5g ¥28,900



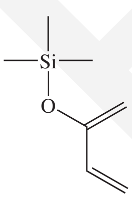
SIT8571.0
1-(TRIMETHYLSILOXY)-1,3-BUTADIENE
$C_7H_{14}OSi$ — 142.27 — 131° — 0.811 — 1.4480
Flashpoint: 25°C (77°F)

Review of synthetic utility.[1]
Reacts with phenylsulfenyl chlorides at γ-position.[2]
Used in efficient enantioselective synthesis of tamiflu.[3]
Undergoes Diels-Alder reactions with high stereoselectivity.[4]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 677-680.
2. Fleming, I. et al. *Tetrahedron Lett.* **1979,** *20*, 3205.
3. Yamatsugu, K. et al. *Angew. Chem., Int. Ed. Engl.* **2009**, *48*, 1070.
4. Rigby, J. H.; Kierkus, P. C. *J. Am. Chem. Soc.* **1989**, *111*, 4125.

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[6651-43-0] HMIS: 2-3-1-X 25g ¥53,800



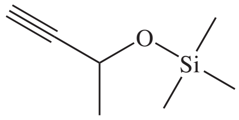
SIT8571.2
2-(TRIMETHYLSILOXY)-1,3-BUTADIENE
VINYLMETHYLKETONE, TRIMETHYLSILYLENOL ETHER
$C_7H_{14}OSi$ — 144.27 — 50-5° / 50 — 0.807 — 1.4290
Flashpoint: 12°C (54°F)

Review of synthetic utility.[1]
Undergoes photocyclization to 2-cycloalkenones, yielding bicyclic vinylcyclobutanols.[2]
Copolymerizes with styrene using AIBN.[3]
Useful Diels-Alder diene yielding substituted cyclohexanones.[4]

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 681-684.
2. Demuth, M. et al. *Helv. Chim. Acta* **1988,** *71*, 1392; *F&F* 15: 346.
3. Penelle, J. et al. *Polymer Preprints* **1996,** *37*, 521.
4. F&F: Vol. 7, p 401; Vol. 12, p 539.

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[38053-91-7] HMIS: 3-4-1-X store <5°C 5g ¥17,800 25g ¥60,700

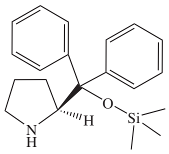
	Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT8571.25
3-(TRIMETHYLSILOXY)-1-BUTYNE
$C_7H_{14}OSi$ — 142.27 — (111°) — 0.819 — 1.4043
Flashpoint: 6°C (43°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17869-76-0] HMIS: 2-3-1-X 5g ¥12,500

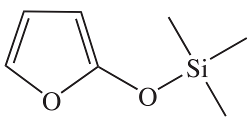
TRIMETHYLSILOXYCYCLOHEXENE - see SIC2462.0 (CYCLOHEXENYLOXY)TRIMETHYLSILANE

TRIMETHYLSILOXYCYCLOPENTENE - see SIC2552.0 (CYCLOPENTENYLOXY)TRIMETHYLSILANE

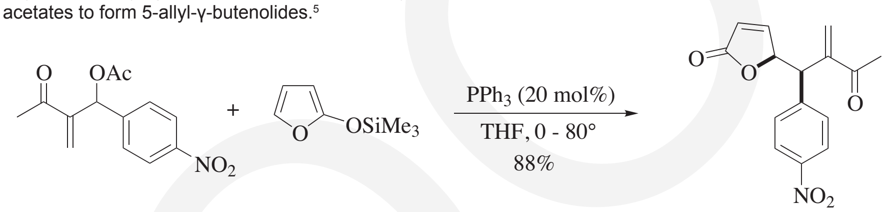


SIT8571.28
(S)-2-[TRIMETHYLSILOXY(DIPHENYL)METHYL]PYRROLIDINE
$C_{20}H_{27}NOSi$ — 325.52 — (73°)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[937202-23-8] HMIS: 3-2-1-X 0.5g ¥61,800

(TRIMETHYLSILOXYETHYL) METHACRYLATE - see SIM6481.0 METHACRYLOXYETHOXYTRIMETHYLSILANE

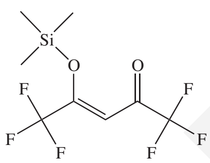


SIT8571.3
2-(TRIMETHYLSILOXY)FURAN
$C_7H_{12}O_2Si$ — 156.26 — 40-2° / 25 — 0.950 — 1.436
Inhibited with BHT
Flashpoint: 18°C (64°F)
Review of synthetic utility.[1]
Reviewed with other similar heterocycles.[2]
Used in a vinylogous Mannich reaction to form aminomethyl butenolides.[3]
Employed in asymmetric vinylogous aldol reaction with aldehydes.[4]
Adds to allyl acetates to form 5-allyl-γ-butenolides.[5]

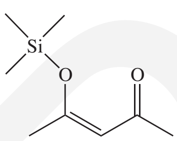


1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 684-693.
2. Casiraghi, G. et al. *Synlett* **2009**, 1525.
3. Akiyama, T. et al. *Adv. Synth. Catal.* **2008**, *350*, 399.
4. Singh, R. P. et al. *J. Am. Chem. Soc.* **2010**, *132*, 9558.
5. Cho, C.-W.; Krische, M. J. *Angew. Chem., Int. Ed. Engl.* **2004**, *43*, 6689.

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[61550-02-5] HMIS: 2-4-1-X 5g ¥46,900



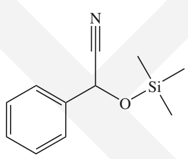
SIT8571.5
2-TRIMETHYLSILOXY-1,1,1,5,5,5-HEXAFLUOROPENT-2-ENE-4-ONE
$C_8H_{10}F_6O_2Si$ — 280.25 — 125-7° — (> 150˚C dec.)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[75108-40-6] HMIS: 4-3-1-X 10g ¥28,600



SIT8572.0
2-TRIMETHYLSILOXYPENT-2-ENE-4-ONE
4-(TRIMETHYLSILOXY)-3-PENTEN-2-ONE
$C_8H_{16}O_2Si$ — 172.30 — 63° / 3 — 0.912 — 1.4530
Flashpoint: 58°C (136°F)
Adhesion promoter for photoresists on silicon nitride and titanium nitride.[1]

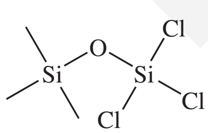
1. Endo, M. et al. *Micro- and Nanopattering Polymers ACS Symposium;* **1998,** *706*, 337.

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13257-81-3] TSCA EC 236-252-5 HMIS: 3-2-1-X 25g ¥21,500



SIT8572.3
1-(TRIMETHYLSILOXY)PHENYLACETONITRILE
$C_{11}H_{15}NOSi$ 劇物 — 205.33 — 91° / 0.5 — 0.978
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[25438-37-3] HMIS: 3-2-1-X 1.0g ¥23,100

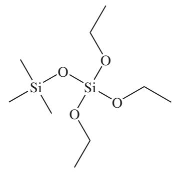
2-TRIMETHYLSILOXYPROPENE - see SII6460.0 ISOPROPENOXYTRIMETHYLSILANE



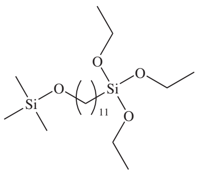
SIT8572.6
TRIMETHYLSILOXYTRICHLOROSILANE
$C_3H_9Cl_3OSi_2$ — 223.63 — 128° — 1.1405 — 1.4032
Flashpoint: 16°C (61°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2750-45-0] HMIS: 3-4-1-X 25g ¥22,500

SILICON COMPOUNDS

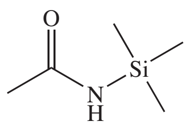
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT8572.7
TRIMETHYLSILOXYTRIETHOXYSILANE
$C_9H_{24}O_4Si_2$ — 252.46 — 62° / 9 — 0.897 — 1.3866^{25}
Flashpoint: >65°C (>150°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17861-35-7] HMIS: 2-2-1-X 25g ¥22,500

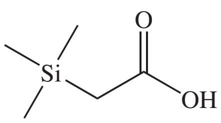


SIT8572.8
11-(TRIMETHYLSILOXY)UNDECYLTRIETHOXYSILANE
$C_{20}H_{46}O_4Si_2$ — 406.75 — 145° / 0.3 — 0.887^{25} — 1.4264^{25}
Masked hydroxyl - deprotected after deposition with acidic aqueous ethanol
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[75389-03-6] HMIS: 2-1-1-X 5g ¥42,700



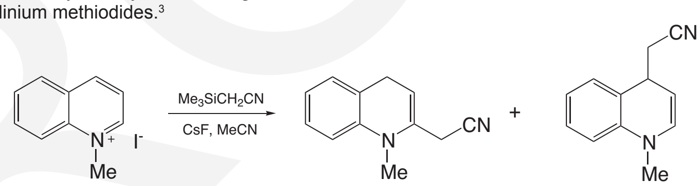
SIT8575.0
N-(TRIMETHYLSILYL)ACETAMIDE
$C_5H_{13}NOSi$ — 131.25 — 104° / 35 — (46-9°)
Flashpoint: 70°C (158°F)
TOXICITY: ipr mouse, LDLo: 350 mg/kg
Forms volatile TMS ethers from alcohols and sugars.
F&F: Vol. 1, p 1235.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13435-12-6] TSCA EC 236-565-7 HMIS: 3-2-1-X 25g ¥16,200 100g ¥44,800

TRIMETHYLSILYL ACETATE - see SIA0110.0 ACETOXYTRIMETHYLSILANE

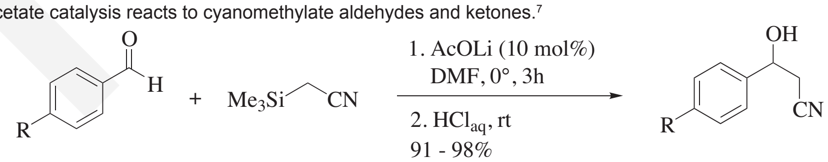


SIT8577.0
2-(TRIMETHYLSILYL)ACETIC ACID
$C_5H_{12}O_2Si$ — 132.24 — 90-95° / 10 — (40-2°)
Dissociation constant (Ka): 0.60 x 10^5
Flashpoint: 73°C (163°F)
Intermediate for preparation of trimethylsilylketene.[1]
1. Olah, G. et al. *Synthesis* **1989,** 568.
F&F: Vol. 6, p 631.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2345-38-2] TSCA EC 219-067-4 HMIS: 2-2-0-X 2.5g ¥33,200

SIT8579.0
TRIMETHYLSILYLACETONITRILE
TMSAN
$C_5H_{11}NSi$ 劇物 — 113.23 — 49-51° / 10 — 0.829 — 1.4204
Flashpoint: 50°C (122°F)
Review of synthetic utility.[1]
Following lithiation with LDA may be alkylated with organobromides.[2]
Cyanomethylates quinolinium methiodides.[3]



α-lithio derivative reacts with aldehydes to give (Z)-α,β-unsaturated nitriles.[4]
Used to cyanomethylation of aryl bromides.[5]
Minireview.[6]
Under lithium acetate catalysis reacts to cyanomethylate aldehydes and ketones.[7]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 564-569.
2. Mauze, B. et al. *J. Organomet. Chem.* **1980,** *411*, 69.
3. Diaba, F. et al. *J. Org. Chem.* **2000,** *65*, 907.
4. Furuta, K. et al. *Bull. Chem. Soc. Jpn.* **1984,** *57*, 2768.
5. Wu, L.; Hartwig, J. F. *J. Am. Chem. Soc.* 2005, 127, 15824.
6. Merino-Montiel, P. *Synlett* **2009**, 507.
7. Kawano, Y. et al. *Chem. Lett.* **2005**, *34*, 1508.

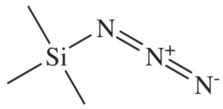
F&F: Vol. 10, p 427; Vol. 11, p 571, p 591.
See also SIC2446.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[18293-53-3] EC 242-169-5 HMIS: 3-3-0-X 5g ¥25,200 25g ¥90,400

TRIMETHYLSILYLACETYLENE - see SIE4904.0 ETHYNYLTRIMETHYLSILANE

TRIMETHYLSILYLALLYLAMINE - see SIA0402.0 ALLYLAMINOTRIMETHYLSILANE

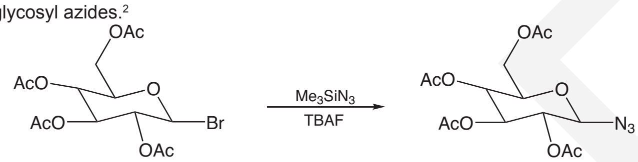
TRIMETHYLSILYLALLYL ALCOHOL - see SIA0480.0 ALLYLOXYTRIMETHYLSILANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT8580.0
TRIMETHYLSILYL AZIDE, 96%
AZIDOTRIMETHYLSILANE
$C_3H_9N_3Si$ — 115.21 — 95-6° — (-95°) — 0.876 — 1.4140
CAUTION: HIGHLY TOXIC
CAN FORM EXPLOSIVE PRODUCTS WITH MONOVALENT HEAVY METALS (Cu, Ag, Pb) AND VINYLSILANES
Flashpoint: 30°C (86°F)
Autoignition temperature: 300˚C

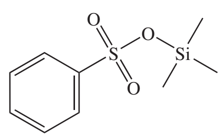
Replaces hydrazoic acid
Soluble in hydrocarbons
Review of synthetic utility.[1]
Used in the preparation of glycosyl azides.[2]



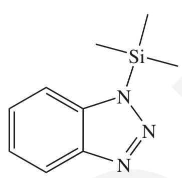
Reacts with terminal acetylenes and allyl carbonates to give 1-allyl-3-substituted 1,2,3-triazoles.[3]
Used to prepare the energetically unstable 2,5,8-triazido-s-heptazine.[4]
Converts alcohols directly to azides with complete inversion.[5]
Used in a one-pot, click-conversion of amines to triazoles.[6]
Converts allyl alcohols to allyl azides.[7]
Reaction with bridged bicyclic olefins leads to 1,2,3-triazoles by retro-Diels-Alder reaction.[8]

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 26-31.
2. Soli, E. D.; DeShong, P. *J. Org. Chem.* **1999**, *64*, 9724.
3. Kamijo, S. et al. *J. Am. Chem. Soc.* **2003**, *125*, 7786.
4. Miller, D. R. et al. *J. Am. Chem. Soc.* **2004,** *126*, 5372.
5. Mukaiyama, T. et al. *Chem. Lett.* **2008**, *37*, 1072.
6. Savonnet, M. et al. *J. Am. Chem. Soc.* **2010**, *132*, 4418.
7. Ruepling, M. et al. *Org. Lett.* **2012,** *15,* 768.
8. Peterson, W. et al. *J. Organomet. Chem.* **1976**, *121*, 285.

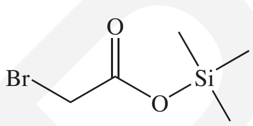
F&F: Vol. 1, p 1236; Vol. 3, p 316; Vol. 5, p 354, p 719; Vol. 6, p 561, p 632; Vol. 9, p 21; Vol. 10, p 14, p 113; Vol. 11, p 32; Vol. 12, p 37; Vol. 13, p 34; Vol. 14, p 25; Vol. 15, p 16, p 342; Vol. 16, p 17; Vol. 17, p 23,p 157,p 378; Vol. 18, p 379, p 380; Vol. 19, p 371; Vol. 20, p 201,p 403; Vol. 21, p 151.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4648-54-8] TSCA EC 225-078-5 HMIS: 4-3-2-X 10g ¥12,500 50g ¥39,500



SIT8580.7
TRIMETHYLSILYL BENZENESULFONATE
$C_9H_{14}O_3SSi$ — 230.36 — 154-6° / 12 — 1.138 — 1.4930
Flashpoint: 8°C (48°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17882-06-3] EC 241-833-1 HMIS: 3-4-1-X 25g ¥33,200



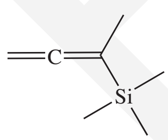
SIT8581.0
1-TRIMETHYLSILYLBENZOTRIAZOLE
$C_9H_{13}N_3Si$ — 191.31 — 125-6° / 3 — 1.054 — 1.5450
Flashpoint: 26°C (79°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[48183-36-4] HMIS: 2-3-1-X 10g ¥31,000



SIT8582.0
TRIMETHYLSILYL BROMOACETATE
$C_5H_{11}BrO_2Si$ — 211.13 — 57° / 9 — 1.299 — 1.444
Flashpoint: 47°C (117°F)
Undergoes Reformatsky reactions.[1]

1. Boldrini, G. et al. *J. Org. Chem.* **1983,** *48*, 4108.

HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18291-80-0] EC 242-165-3 HMIS: 3-2-1-X 25g ¥19,900



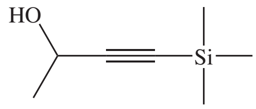
SIT8582.5
3-(TRIMETHYLSILYL)-1,2-BUTADIENE, 95%
1-METHYL-1-(TRIMETHYLSILYL)ALLENE
$C_7H_{14}Si$ — 126.27 — 111-2° — 0.760 — 1.444
Contains 1-trimethylsilyl-1-butyne
Employed in [3+2] annulations of five-membered rings.[1]

1. Danheiser, R. et al. *J. Am. Chem. Soc.* **1981**, *103*, 1604.

HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[74542-82-8] HMIS: 2-4-1-X store <5°C 1.0g ¥51,200

SILICON COMPOUNDS

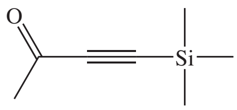
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT8583.0
1-TRIMETHYLSILYLBUT-1-YNE-3-OL

$C_7H_{14}OSi$	142.27	82° / 35 Flashpoint: 50°C (122°F)		0.85	1.4449

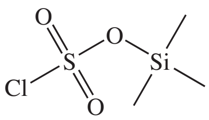
Phosphate ester adds to α,β-unsaturated malonates.[1]
Useful in silicon-mediated Sonogashira cross-coupling reactions to give substituted propargyl alcohols.[2]
1. Song, Y. et al. *Org. Lett.* **2001,** *3*, 3543.
2. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[6999-19-5] HMIS: 2-2-1-X 10g ¥18,300



SIT8583.2
4-TRIMETHYLSILYLBUT-3-YN-2-ONE

$C_7H_{12}OSi$	140.26	156° Flashpoint: 28°C (83°F)		0.854	1.4415

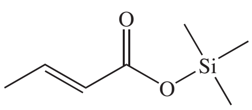
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[5930-98-3] HMIS: 2-3-0-X 5g ¥21,500



SIT8584.0
TRIMETHYLSILYLCHLOROSULFONATE, 95%

$C_3H_9ClO_3SSi$	188.71	62-4° / 10 Flashpoint: 42°C (108°F)		1.23	1.424

Sulfonation reagent.[1]
1. Schmidt, M. et al. *Chem. Ber.* **1962,** *95*, 47.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[4353-77-9] EC 224-425-8 HMIS: 3-2-1-X 50g ¥23,600

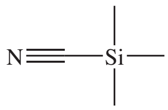


SIT8584.5
TRIMETHYLSILYL CROTONATE
TRIMETHYLSILYL-2-BUTENOIC ACID

$C_7H_{14}O_2Si$	158.27	49-50° / 10 Flashpoint: 30°C (86°F)		0.897	1.4252

See also SIA0320.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18269-64-2] HMIS: 3-3-1-X 5g ¥27,800

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8585.0 TRIMETHYLSILYLCYANIDE *TRIMETHYLSILYLNITRILE* C_4H_9NSi 劇物	99.21	118-9°	(11-12°)	0.744	1.3920

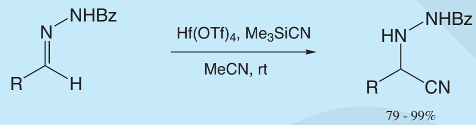


CAUTION: HIGHLY TOXIC
AIR TRANSPORT FORBIDDEN

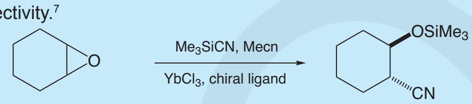
Contains trimethylchlorosilane

Flashpoint: 1°C (34°F)
Vapor pressure, 37°: 37.3 mm

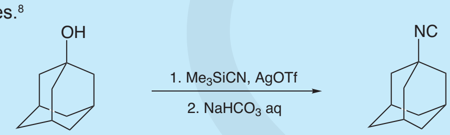
Yields cyanohydrins by reaction w/ ketones in the presence of Lewis acid catalysts
Reviews.[1,2]
Efficient conversion of carbonyls to cyanohydrins catalyzed by Cu(II) trifluoromethanesulfonate.[3]
Treatment with methanol generates HCN solutions.[4]
Adds to aldehydes with high stereoselectivity.[5]
Adds HCN to benzylhydrazones.[6]



Opens epoxides with high enantioselectivity.[7]



Converts tertiary alcohols to isocyanides.[8]

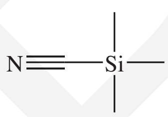


Used to protect aldehydes in formation of aldehyde-functional Grignard reagents.[9]
Undergoes very rapid Al-MCM-41-catalyzed reactions with aldehydes and ketones.[10]
Converts alcohols to isocyanides in good yields.[11]
Oxidatively α-cyanates tertiary amines.[12]
Employed in 3-component, one-pot Strecker conversion of aldehydes to α-amino nitriles.[13,14]

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 184-189.
2. Rasmussen, J. et al. In *Advances in Silicon Chemistry;* Larson, G., Ed.; JAI Press: Greenwich, Co, 1991; Vol. 1, p65.
3. Saravanan, D. et al. *Tetrahedron Lett.* **1998,** *39*, 3823.
4. Vachel, P.; Jacobsen, E. N. *Org. Lett.* **2000,** *2*, 867.
5. Belokon, Y. N.; North, M. *Org. Lett.* **2000,** *2*, 1617.
6. Manabe, K. et al. *J. Org. Chem.* **1999,** *64*, 8054.
7. Schaus, S. E.; Jacobsen, E. N. *Org. Lett.* **2000,** *2*, 1001.
8. Kitano, Y. et al. *Synthesis* **2001,** 437.
9. Liu, C.-Y. et al. *Org. Lett.* **2006**, *8*, 617.
10. Iwanami, K. et al. *J. Chem. Soc., Chem. Commun.* **2008**, 1002.
11. Okada, I.; Kitano, Y. *Synthesis,* **2011**, 3997.
12. Han. W.; Ofial, A. R. *J. Chem. Soc., Chem. Commun.* **2009**, 5024.
13. Karmekar, B.; Banerji, J. *Tetrahedron Lett.* **2010**, *51*, 2748.
14. Niknam, K. et al. *Tetrahedron Lett.* **2010**, *51*, 2959.

F&F: Vol. 4, p 542; Vol. 5, p 720; Vol. 6, p 632; Vol. 7, p 397; Vol. 8, p 133; Vol. 9, p 127; Vol. 10, p 1, p 112; Vol. 11, p 147; Vol. 12, p 148; Vol. 13, p 87; Vol. 14, p 107; Vol.15, p 102; Vol. 16, p 100, p 33, p 339; Vol. 18, p 381; Vol. 19, p 375; Vol. 20, p 405; Vol. 21, p 455.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7677-24-9] TSCA EC 231-657-3 HMIS: 4-4-1-X 25g inquire 1.5kg inquire
** includes liquid dispensing cylinder zCYL-L-2400*

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8585.1 TRIMETHYLSILYLCYANIDE, 99% *TRIMETHYLSILYLNITRILE* C_4H_9NSi 劇物	99.21	118-9°	(11-12°)	0.744	1.3920



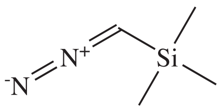
CAUTION: HIGHLY TOXIC
AIR TRANSPORT FORBIDDEN

Flashpoint: 1°C (34°F)

HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7677-24-9] TSCA EC 231-657-3 HMIS: 4-4-1-X 25g inquire 250g inquire

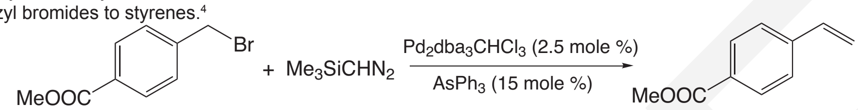
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

SIT8588.0



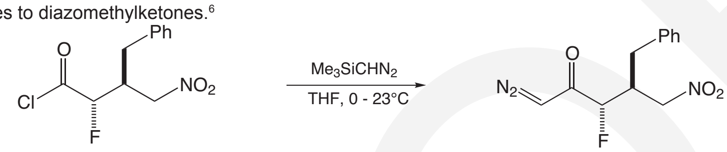
TRIMETHYLSILYLDIAZOMETHANE, 2.0M in hexanes					
$C_4H_{10}N_2Si$	114.22	96°		0.72	1.436
29-32 wgt %		Flashpoint: -22°C (-8°F)			
ΔHform: 24 kJ/mole					

Decomposes on exposure to UV
Review.[1]
Methenylates α-fluoro ketones.[2]
Converts aldehydes to acrylonitriles.[3]
Converts benzyl bromides to styrenes.[4]



56%

Homologates organoboranes.[5]
Converts acid chlorides to diazomethylketones.[6]



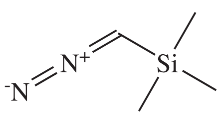
Converts aldehydes to terminal olefins.[7]
Chloromagnesium reagent reacts with α-keto esters to give t-butylpropiolates.[8]
Forms trimethylsilylcyclopropanes with enones.[9]
Converts alcohols to terminal olefins in a tandem oxidation-olefination sequence.[10]
Reacts with propargylic esters to form functionalized (Z)-1-trimethylsilyl-1,3-dienes.[11]

1. Anderson, R.; Anderson, S. Trimethylsilyldiazomethane. In *Advances in Silicon Chemistry;* Larson, G., Ed.; JAI Press: Greenwich, Co, 1991; Vol. 1, p 303.
2. Label, H.; Paquet, V. *Org. Lett.* **2002,** *4*, 1671.
3. Furuta, K. et al. *Bull. Chem. Soc. Jpn.* **1984,** *57*, 2768.
4. Greenman, K. L. et al. *Tetrahedron* **2001,** *57*, 5219.
5. Goddard, W. J.-P. et al. *Org. Lett.* **2000,** *2*, 1455.
6. Myers, A. G. et al. *J. Am. Chem. Soc.* **2001,** *123*, 7207.
7. Lebel, H.; Paquet, V. *J. Am. Chem. Soc.* **2004**, *126*, 320.
8. Hari, Y. et al. *Tetrahedron Lett.* **2008**, *49*, 4965.
9. Glass, A. C. et al. *Org. Lett..* **2008**, *10*, 4855.
10. Davi, M.; Lebel, H. *Org. Lett.* **2009**, *11*, 41
11. Bray, C. V.-L. et al. *Angew. Chem., Int. Ed. Engl.* **2009**, *48*, 1439.
F&F: Vol. 4, p 543; Vol. 8, p 198; Vol. 10, p 431; Vol. 11, p 573; Vol. 12, p 538; Vol. 13, p 327; Vol. 15, p 344; Vol. 16, p 361; Vol. 19, p 55; Vol. 20, p 405, p 406; Vol. 21, p 128, p 239, p 456.

HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions

[18107-18-1] TSCA-L HMIS: 4-3-1-X 25g ¥31,800

SIT8588.3

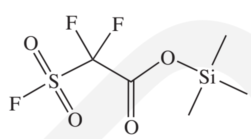


TRIMETHYLSILYLDIAZOMETHANE, 2M in diethyl ether					
$C_4H_{10}N_2Si$	114.22			0.773	
28-32 wgt %		Flashpoint: -40°C (-40°F)			
		TOXICITY: dermal rbt, LD50: >1,000 mg/kg			

HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions

[18107-18-1] TSCA-L HMIS: 4-4-1-X 25g ¥29,700

SIT8588.4



TRIMETHYLSILYL 2,2-DIFLUORO-2-(FLUOROSULFONYL)ACETATE					
$C_5H_9F_3O_4SSi$	250.27	156°		1.28	1.367
		Flashpoint: 26°C (79°F)			

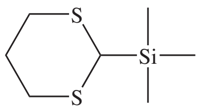
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water

[120801-75-4] HMIS: 3-3-1-X 25g ¥40,600

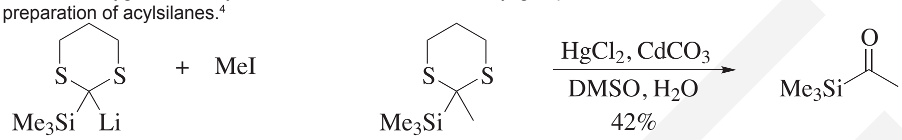
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

SIT8589.0
2-TRIMETHYLSILYL-1,3-DITHIANE

$C_7H_{16}S_2Si$	192.42	85° / 1 Flashpoint: 96°C (205°F)		1.014	1.5330



Review of synthetic utility.[1]
Employed in synthesis of acylsilanes.[2]
With BrF_3 converts the oxygen of aldehydes and ketones to difluoromethyl groups.[3]
Used in the preparation of acylsilanes.[4]



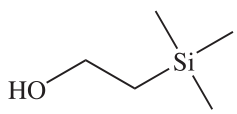
Used in the preparation of unsaturated dithioketene acetals in a Peterson reaction.[5]
Important reagent for Type I Anion Relay Chemistry (ARC).[6]

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 604-609.
2. Corey, E. J. et al. *J. Am. Chem. Soc.* **1967,** *89*, 434.
3. Cohen, O. et al. *Tetrahedron* **2009**, *65*, 1361.
4. Brinkmeyer, R. S. *Tetrahedron Lett.* **1979**, *20*, 207.
5. Carey, F. A.; Court, A. S. *J. Org. Chem.* **1972**, *37*, 4474.
6. Smith, A. B., III; Wuest, W. M. *Chem. Commun.* **2008**, 5883.

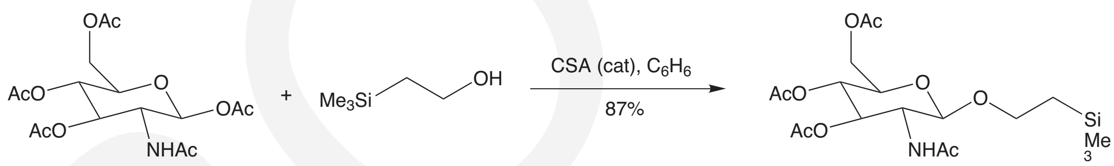
F&F: Vol. 4, p 284; Vol. 10, p 380.
See also SIB1857.7
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[13411-42-2] EC 236-504-4 HMIS: 2-1-1-X 5g ¥22,500

SIT8589.2
2-(TRIMETHYLSILYL)ETHANOL

$C_5H_{14}OSi$	118.25	53-5° / 11 Flashpoint: 56°C (133°F) Decomposes >120˚C		0.945	1.436



Eliminates ethylene in presence of acid or base
Review of synthetic utility.[1]
Serves as an alcohol equivalent in reaction with aryl iodides.[2]
Can provide protection for the anomeric center of carbohydrates.[3]



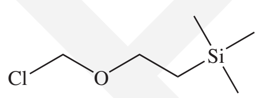
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 622-627.
2. Dibakar, M. et al. *Tetrahedron Lett.* **2011**, *41*, 5338.
3. Sowell, C. G. et al. *Tetrahedron Lett.* **1996**, *37*, 609.

F&F: Vol. 8, p 510.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2916-68-9] EC 220-844-5 HMIS: 2-3-0-X 10g ¥28,400 50g ¥103,200

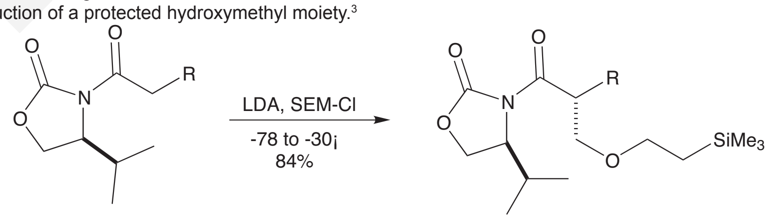
SIT8588.5
2-(TRIMETHYLSILYL)ETHOXYMETHYL CHLORIDE, 95%
SEM-CHLORIDE

$C_6H_{15}ClOSi$	166.72	57-9° / 8 Flashpoint: 46°C (115°F)		0.942	1.4350

Stabilized with iPr_2MeN



Review of synthetic utility.[1]
Hydroxyl group protection reagent, cleaved with fluoride.[2]
Useful in the introduction of a protected hydroxymethyl moiety.[3]

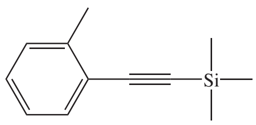


1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 628-632.
2. Lipshutz, B. et al. *Tetrahedron Lett.* **1980,** *21*, 3343.
3. Eichelberger, U. et al. *Tetrahedron* **2002**, *58*, 545.

F&F: Vol. 10, p 431; Vol. 15, p 344; Vol. 16, p 361.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[76513-69-4] EC 278-483-4 HMIS: 4-3-1-X store <5°C 5g ¥27,800 25g ¥101,000

SILICON COMPOUNDS

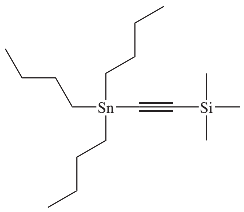
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT8588.7
2-[(TRIMETHYLSILYL)ETHYNYL]TOLUENE

$C_{12}H_{16}Si$	188.34	50-8° / 0.5 Flashpoint: 90°C (194°F)		0.88	1.5320

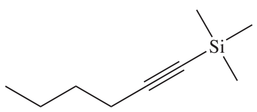
See also SIP6736.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[3989-15-9] HMIS: 2-2-0-X store <5°C 5g ¥31,000



SIT8588.8
TRIMETHYLSILYLETHYNYLTRI-n-BUTYLTIN
1-TRIBUTYLSTANNYL-2-TRIMETHYLSILYLACETYLENE

$C_{17}H_{36}SiSn$ 劇物	387.26	128-8° / 22		1.055	1.475

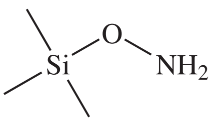
Converts vinyl mesylates to enynes.[1]
1. Barret, D. et al. *J. Antibiotics* **1997,** *50*, 100.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[81353-38-0] HMIS: 3-1-0-X 10g ¥29,400



SIT8589.7
1-TRIMETHYLSILYL-1-HEXYNE

$C_9H_{18}Si$	154.33	155° Flashpoint: 37°C (99°F)		0.770	1.431

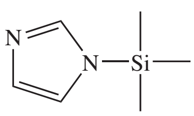
Undergoes Pd-catalyzed hydroesterification to form β-ethoxyvinylsilanes.[1]
1. Takeuchi, R. *J. Chem. Soc., Perkin. Trans. 1* **1993,** 1031.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[3844-94-8] HMIS: 2-4-1-X 5g ¥16,400



SIT8589.8
O-TRIMETHYLSILYLHYDROXYLAMINE, 95%

$C_3H_{11}NOSi$	105.21	98-9° Flashpoint: 8°C (48°F)		0.860	1.4050

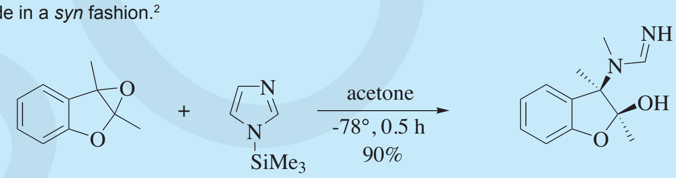
See also SIB1963.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[22737-36-6] HMIS: 3-4-1-X 10g ¥49,100



SIT8590.0
N-(TRIMETHYLSILYL)IMIDAZOLE

$C_6H_{12}N_2Si$	140.26	99° / 14 Flashpoint: 40°C (104°F)		0.956	1.4756

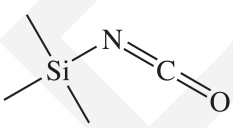
Dipole moment: 4.64 debye
pKb: 15.07
Trimethylsilylation reagent specific to hydroxyl groups
Review of synthetic utility.[1]
Shown to open an epoxide in a *syn* fashion.[2]



COMMERCIAL

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 640-645.
2. Adam, W. et al. *J. Am. Chem. Soc.* **1991**, *113*, 8005.
F&F: Vol. 2, p 412; Vol. 3, p 148; Vol. 7, p 399; Vol. 11, p 575.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18156-74-6] TSCA EC 242-040-3 HMIS: 2-3-1-X 25g ¥6,100 100g ¥21,400 2kg ¥170,000

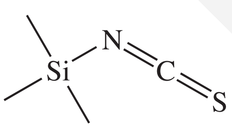
TRIMETHYLSILYL IODIDE - see SIT8564.0 TRIMETHYLIODOSILANE



SIT8591.0
TRIMETHYLSILYLISOCYANATE, 85%

C_4H_9NOSi	115.21	91° Flashpoint: -2°C (28°F)		0.867	1.396

Hazy liquid; contains hexamethyldisiloxane
Converts Grignards to amides.[1]
Reacts with diamines under pressure to form polyureas.[2]
1. *Zh. Obshch. Khim.* **1989,** *59*, 1202; *F&F*: *6*, 634.
2. DiSalvo, A. U.S. Patent 3,940,370, 1976.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1118-02-1] TSCA EC 214-256-8 HMIS: 3-4-1-X 25g ¥51,200



SIT8592.0
TRIMETHYLSILYLISOTHIOCYANATE

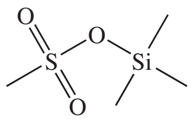
C_4H_9NSSi	131.27	144° Flashpoint: 35°C (95°F)	(-33°)	0.931	1.4820

Insecticidal, fungistatic activity
Heterocumulene reagent.[1]
Forms 1,2-diisothiocyanates from olefins with [bis(acetoxy)iodo]benzene.[2]
1. Neidelhein, R. et al. *Synthesis* **1975,** 51.
2. Bruno, M. et al. *Tetrahedron Lett.* **1998,** *39*, 3847.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[2290-65-5] TSCA EC 218-929-7 HMIS: 3-3-1-X 10g ¥14,600 50g ¥48,000

N-TRIMETHYLSILYLMETHACRYLAMIDE - see SIM6480.6 METHACRYLAMIDOTRIMETHYLSILANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

TRIMETHYLSILYLMETHACRYLATE - see SIM6491.0 METHACRYLOXYTRIMETHYLSILANE



SIT8593.0
TRIMETHYLSILYL METHANESULFONATE
$C_4H_{12}O_3SSi$ — Mw 168.29 — bp 103-4° / 25 — D_4^{20} 0.826 — n_D^{20} 1.4190
Flashpoint: 30°C (86°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[10090-05-8] EC 233-220-2 HMIS: 3-3-1-X 10g ¥17,800

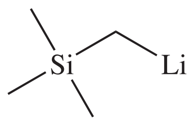
TRIMETHYLSILYLMETHANOL - see SIH6177.0 HYDROXYMETHYLTRIMETHYLSILANE

TRIMETHYLSILYLMETHYL ACETATE - see SIA0060.0 ACETOXYMETHYLTRIMETHYLSILANE

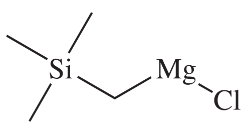
TRIMETHYLSILYLMETHYLAMINE - see SIA0596.0 AMINOMETHYLTRIMETHYLSILANE

N-(TRIMETHYLSILYL)METHYLCARBAMATE - see SIM6574.0 METHYL-N-TRIMETHYLSILYLCARBAMATE

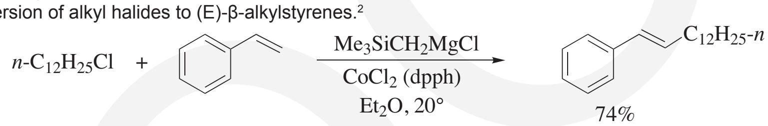
TRIMETHYLSILYL METHYL KETONE - see SIA0130.0 ACETYLTRIMETHYLSILANE



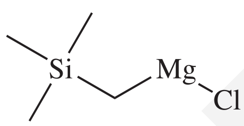
SIT8593.5
TRIMETHYLSILYLMETHYLLITHIUM, 1M in hexane
$C_4H_{11}LiSi$ — Mw 94.16 — D_4^{20} 0.66
13-14 wgt % — Flashpoint: -23°C (-9°F)
Selective base for the metallation of pyridines
F&F: Vol. 6, p 635; Vol. 9, p 495; Vol. 10, p 443; Vol. 11, p 581.
See also SIT8594.1
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1822-00-0] HMIS: 4-4-1-X 100g ¥38,500



SIT8594.0
TRIMETHYLSILYLMETHYLMAGNESIUM CHLORIDE, 1.0M in diethyl ether
$C_4H_{11}ClMgSi$ — Mw 146.98 — D_4^{20} 0.777
19 wgt % — Flashpoint: -45°C (-49°F)
Converts carbonyl compounds to olefins - Peterson reaction
Review of synthetic utility.[1]
Promotes the conversion of alkyl halides to (E)-β-alkylstyrenes.[2]

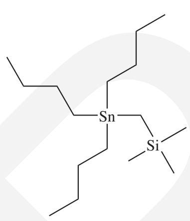


Highly useful inert ligand for the addition of Grignard reagents to aldehydes and ketones without enolization side reactions.[3]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 666-674.
2. Ikeda, Y. et al. *J. Am. Chem. Soc.* **2002,** *124*, 6514.
3. Hatano, M. et al. *J. Org. Chem.* **2010**, *75*, 5008.
F&F: Vol. 6, p 636; Vol. 10, p 433; Vol. 15, p 343; Vol. 16, p 118; Vol. 18, p 384.
See also SIT8594.1
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13170-43-9] HMIS: 3-4-2-X 100g ¥28,400

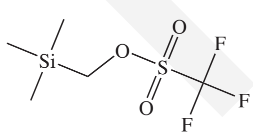


SIT8594.1
TRIMETHYLSILYLMETHYLMAGNESIUM CHLORIDE, 3M in methyltetrahydrofuran
$C_4H_{11}ClMgSi$ — Mw 146.98 — D_4^{20} 0.912
46-48 wgt % — Flashpoint: -11°C (12°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13170-43-9] HMIS: 3-3-2-X 100g ¥40,600

TRIMETHYLSILYLMETHYL METHACRYLATE - see SIM6485.6 METHACRYLOXYMETHYLTRIMETHYLSILANE



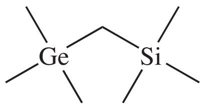
SIT8594.5
(TRIMETHYLSILYLMETHYL)TRI-n-BUTYLTIN
$C_{16}H_{38}SiSn$ 劇物 — Mw 377.27 — bp 146° / 2.5
Treatment with nBuLi affords Me_3SiCH_2Li, methenylation reagent.[1]
1. Seitz, D. et al. *Synthesis* **1981,** 557.
F&F: Vol. 11, p 581.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[77425-85-5] HMIS: 3-1-0-X 10g ¥27,100



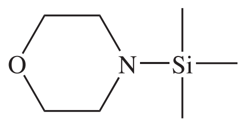
SIT8595.0
TRIMETHYLSILYLMETHYLTRIFLUOROMETHANESULFONATE, 96%
$C_5H_{11}F_3O_3SSi$ — Mw 236.29 — bp 49-51° / 9 — D_4^{20} 1.182 — n_D^{20} 1.3760
Flashpoint: 48°C (118°F)
Generation of azomethine ylides.[1]
Review on ylides from α-silylonium salts.[2]
Ylide precursor.[3]
Used to prepare imino[60]fullerenes.[4]
1. Padwa, A. et al. *J. Org. Chem.* **1979,** *49*, 3314.
2. Vedejs, E.; West, F. G. *Chem. Rev.* **1986,** *86*, 941.
3. F&F: Vol. 10, p 434; Vol.12, p 541; Vol. 13, p 329; Vol. 14, p 332.
4. Matsuo, K. et al. *Org. Lett.* **2009**, *11*, 4192.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[64035-64-9] HMIS: 4-2-1-X 5g ¥40,000

SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



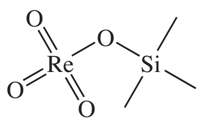
GET8595.5
TRIMETHYLSILYLMETHYLTRIMETHYLGERMANE
$C_7H_{20}GeSi$ 204.91 140° (-74°)
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2290-62-2] HMIS: 2-3-0-X 5g ¥40,500



SIT8596.0
N-(TRIMETHYLSILYL)MORPHOLINE
$C_7H_{17}NOSi$ 159.30 160° 0.897 1.4410
Flashpoint: 27°C (81°F)
Reagent for deoxynucleoside synthesis
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13368-42-8] HMIS: 3-3-1-X 25g ¥29,400

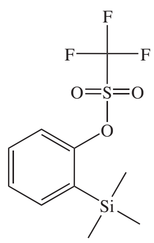
TRIMETHYLSILYLNITRILE - see SIT8585.0 TRIMETHYLSILYLCYANIDE

TRIMETHYLSILYLPEROXIDE - see SIB1868.0 BIS(TRIMETHYLSILYL)PEROXIDE



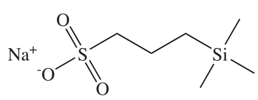
SIT8598.0
TRIMETHYLSILYL PERRHENATE
TRIOXA(TRIMETHYLSILOXY)RHENIUM
$C_3H_9O_4ReSi$ 323.39 65-75° / 1 sub. (79-81°)
Soluble: hydrocarbons, THF, chloroform; moisture sensitive
Reacts with Me_3SiOR to form $ReO_3(OR)$.[1]
Catalyzes Prins cyclization reaction between homoallylic alcohols and aldehydes.[2]
1. Hermann, W. et al. *Inorg. Chem.* **1997,** *36*, 465.
2. Tadpetch, K.; Rychnovsky, S. D. *Org. Lett.* **2008**, *10*, 4839.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[16687-12-0] HMIS: 2-1-1-X store <5°C 2.5g ¥46,400

TRIMETHYLSILYLPHENOXIDE - see SIP6723.5 PHENOXYTRIMETHYLSILANE



SIT8598.5
2-(TRIMETHYLSILYL)PHENYLTRIFLUOROMETHANESULFONATE
$C_{10}H_{13}F_3O_3SSi$ 298.35 70° / 2 1.229 1.456
Flashpoint: 96°C (205°F)
Review of synthetic utility.[1]
Used as a convenient source of in-situ-generated benzyne.[2]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 697-699.
2. Zhang, X.; Larock, R. C. *Org. Lett.* **2005**, *7*, 3973.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[88284-48-4] HMIS: 3-2-1-X 5g ¥35,800

TRIMETHYLSILYLPIPERIDINE - see SIP6828.6 (N-PIPERIDINO)TRIMETHYLSILANE



SIT8599.0
TRIMETHYLSILYLPROPANESULFONIC ACID SODIUM SALT, monohydrate
2,2-DIMETHYL-2-SILAPENTANESULFONIC ACID, SODIUM SALT, DSS
$C_6H_{15}NaO_3SSi\cdot H_2O$ 218.32/*236.34* (125° dec.)
Soluble: hot ethanol, water
Water (D_2O) soluble reference for NMR.[1]
1. Konishi, Y.; Scheraga, H. A. *Biochemistry* **1980,** *19*, 1316.
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[2039-96-5] TSCA EC 218-031-5 HMIS: 2-1-0-X 5g ¥27,800

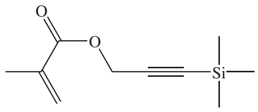
SIT8602.0
3-(TRIMETHYLSILYL)-1-PROPANOL
$C_6H_{16}OSi$ 132.28 96-8° / 80 0.832 1.4280
Flashpoint: 57°C (135°F)
See also SIH6177.0
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[2917-47-7] TSCA HMIS: 3-2-1-X 10g ¥25,700

SIT8604.0
3-TRIMETHYLSILYLPROPARGYL ALCOHOL
3-TRIMETHYLSILYL-2-PROPYN-1-OL
$C_6H_{12}OSi$ 128.25 170-2° 0.875 1.4518
Flashpoint: 65°C (149°F)
TOXICITY: oral rat, LD50: 150 mg/kg
Hydromagnesiation of triple bond yields intermediates for terpene synthesis
Useful in silicon-mediated Sonogashira cross-coupling reactions to give substituted propargyl alcohols.[1]
1. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
F&F: Vol. 10, p 70; Vol. 11, p 164.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[5272-36-6] TSCA EC 226-094-5 HMIS: 3-2-0-X 5g ¥21,500 25g ¥75,600

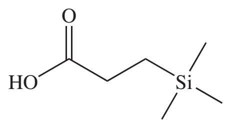
O-TRIMETHYLSILYLPROPARGYL ALCOHOL - see SIP6903.0 PROPARGYLOXYTRIMETHYLSILANE

3-(TRIMETHYLSILYL)PROPARGYL BROMIDE - see SIB1907.0 3-BROMO-1-(TRIMETHYLSILYL)-1-PROPYNE

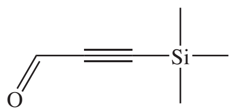
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



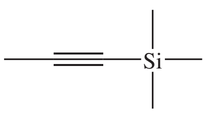
SIT8605.0
3-TRIMETHYLSILYLPROPARGYLMETHACRYLATE, 95%
3-METHACRYLOXYPROP-2-YNYLTRIMETHYLSILANE
$C_{10}H_{16}O_2Si$ — Mw 196.32
CAUTION: SENSITIZER
Forms polymers that undergo "click" chemistry.[1,2]
1. Quemener, D. et al. *J. Polym. Sci., Part A: Polym. Chem.* **2008**, *46*, 155.
2. Ladmiril, V. et al. *J. Am. Chem. Soc.*, **2006**, *128*, 4823.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[214268-06-1] HMIS: 3-3-1-X store <5°C 2.5g ¥42,700



SIT8606.0
3-TRIMETHYLSILYLPROPIONIC ACID
2,2-DIMETHYL-2-SILAPENTANOIC ACID
$C_6H_{14}O_2Si$ — Mw 142.26 — bp 130-1° / 34 — D_4^{20} 0.920 — n_D^{20} 1.4280
Flashpoint: 74°C (165°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[5683-30-7] TSCA EC 227-145-4 HMIS: 3-2-0-X 10g ¥31,000

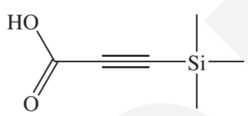


SIT8606.3
3-TRIMETHYLSILYLPROPYNAL
$C_6H_{10}OSi$ — Mw 126.23 — bp 52° / 30 — D_4^{20} 0.862 — n_D^{20} 1.4432
Flashpoint: >25°C (>77°F)
Used in the preparation of 1,3,5-triynes.[1]
Potential for the synthesis of 3-subsubstituted alkynals.[2]
1. Mukai, C. et al. *J. Org. Chem.* **2001,** *66*, 5875.
2. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[2975-46-4] HMIS: 2-3-0-X 25g ¥42,700

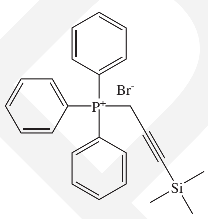


SIT8606.5
1-TRIMETHYLSILYLPROPYNE
$C_6H_{12}Si$ — Mw 112.25 — bp 99-100° — mp (-69°) — D_4^{20} 0.758 — n_D^{20} 1.4091
Flashpoint: -3°C (27°F)
Forms polymers with very high oxygen permeability.[1] (See SSP-070 for polymer)
Polymerization catalyzed with $TaCl_5/(C_6H_5)_3Bi$.[2]
Converts aldehydes to 1,3-dienes in presence of $Cp_2Zr(H)Cl$.[3]
Synthetic reagent.[4]
Used in the preparation of alkynylxenon fluoride.[5]
Useful in silicon-mediated Sonogashira cross-coupling reactions.[6]
1. Masuda, T. et al. *J. Am. Chem. Soc.* **1983,** *105*, 7473.
2. Masuda, T. et al. *J. Polym. Sci., Part A: Polym. Chem.* **1987,** *25*, 1353.
3. Maeta, H. et al. *Tetrahedron Lett.* **1992,** *33*, 5969.
4. F&F: Vol. 2, p 239; Vol. 6, p 638.
5. Schmidt, H. et al. *Inorg. Chem.* **2004**, *43*, 1837.
6. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[6224-91-5] TSCA EC 228-314-5 HMIS: 2-4-0-X 5g ¥5,900 25g ¥20,000 1.5kg ¥327,000

COMMERCIAL

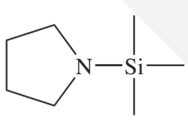


SIT8606.6
3-TRIMETHYLSILYLPROPYNOIC ACID
$C_6H_{10}O_2Si$ — Mw 142.23 — bp 105-9° / 10 — mp (47-9°)
Flashpoint: 96°C (205°F)
Potential for the preparation of propiolic acid derivatives.[1]
1. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
See also SIT8623.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[5683-31-8] HMIS: 3-1-1-X 5g ¥38,500



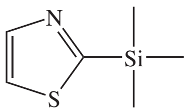
SIT8606.7
(3-TRIMETHYLSILYL-2-PROPYNYL)TRIPHENYLPHOSPHONIUM BROMIDE
$C_{24}H_{26}BrPSi$ — Mw 453.44 — mp (166-7° dec.)
Wittig Reagent
Employed in synthesis of terminal enynes.[1,2]
1. Corey, E. J.; Ruden, R. A. *Tetrahedron Lett.* **1973,** *14*, 1495.
2. Corey, E. J. et al. *Tetrahedron Lett.* **1973,** *14*, 3963.
HYDROLYTIC SENSITIVITY: 6: forms irreversible hydrate
[42134-49-6] HMIS: 3-2-1-X 5g ¥62,900

2-TRIMETHYLSILYLPYRIDINE - see SIP6942.0 2-PYRIDYLTRIMETHYLSILANE



SIT8609.0
1-TRIMETHYLSILYLPYRROLIDINE, 95%
$C_7H_{17}NSi$ — Mw 143.30 — bp 139-40° — D_4^{20} 0.821 — n_D^{20} 1.4330
Flashpoint: 4°C (39°F)
Building block in synthesis of nornicotine
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[15097-49-1] TSCA EC 239-149-3 HMIS: 3-4-1-X 10g ¥25,700

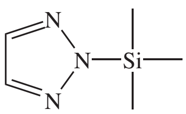
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8612.0 2-TRIMETHYLSILYLTHIAZOLE *DONDONI REAGENT* $C_6H_{11}NSSi$	157.31	51-3° / 10 Flashpoint: 62°C (144°F)		0.986	1.498



Review of synthetic utility.[1]
Convenient substitute for 2-lithiothiazole for introducing various substituents at C-2 of the thiazole ring.[2]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 712-719.
2. Dondoni, A. et al. *J. Org. Chem.* **1988**, *53*, 1748.
F&F: Vol. 16, p 362.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[79265-30-8] HMIS: 2-3-1-X 5g ¥51,200

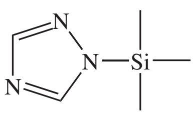
2-(TRIMETHYLSILYLTHIOPHENE - see SIT7907.0 2-THIENYLTRIMETHYLSILANE

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8612.9 2-TRIMETHYLSILYL-1,2,3-TRIAZOLE $C_5H_{11}N_3Si$	141.25	145-6° Flashpoint: 8°C (47°F)		0.952	



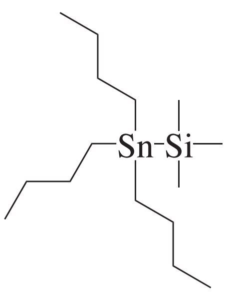
Undergoes Diels-Alder reactions.[1]
1. Peterson, W. et al. *J.Organomet. Chem.* **1976**, *121*, 285.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[13518-80-4] HMIS: 3-3-1-X 10g ¥61,800

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8613.0 1-TRIMETHYLSILYL-1,2,4-TRIAZOLE $C_5H_{11}N_3Si$	141.25	74° / 12 Flashpoint: 18°C (64°F)		0.989	1.461



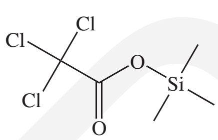
Reagent for preparation of phosphorus triazolides.[1]
1. Kricheldorf, M. et al. *Angew. Chem.* **1976**, *88,* 337.
F&F: Vol. 4, p 66.
See also SIT8612.9
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18293-54-4] TSCA EC 242-170-0 HMIS: 2-3-1-X 5g ¥14,600

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SNT8585 TRI-n-BUTYLSTANNYLTRIMETHYLSILANE *TRIMETHYLSILYLTRI-n-BUTYLTIN* $C_{15}H_{36}SiSn$	363.22	102-3° / 0.5		1.040	1.4880



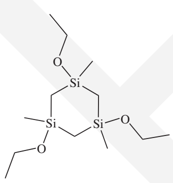
Review of synthetic utility.[1]
Undergoes cis addition to terminal acetylenes with Bu_3Sn internal.[2]
Intermediate for 3-substituted cyclobutenone.[3]
Sn-Si bond shown to react with COD $Pt(cod)_2$ and phosphines to form bis((phosphino)silyl)tinplatinum(II) complexes, which insert into acetylenes.[4]
Used in the synthesis of α-amidotributylstannanes.[5]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 719-723.
2. Chenard, B. et al. *J. Org. Chem.* **1986**, *51*, 3561.
3. Liebeskind, L. S. et al. *J. Org. Chem.* **1994**, *59*, 7917.
4. Sagawa, T. et al. *Organometallics* **2003**, *22*, 4433.
5. Mita, T.; et al. *Synthesis* **2012**, 194.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[17955-46-3] HMIS: 2-1-1-X 2.5g ¥13,500 10g ¥33,800

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8616.0 TRIMETHYLSILYL TRICHLOROACETATE $C_5H_9Cl_3O_2Si$	235.57	70-3° / 12 Flashpoint: 28°C (82°F)		1.237	1.441



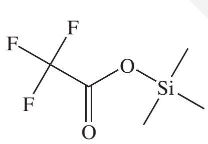
Reagent for trichloromethylation of ketones.[1]
1. DeJesus, M. et al. *Synth. Commun.* **1987,** *17*, 1047.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[25436-07-1] EC 246-980-5 HMIS: 3-3-1-X 10g ¥36,300

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8617.0 1,3,5-TRIMETHYL-1,3,5-TRIETHOXY-1,3,5-TRISILACYCLOHEXANE $C_{12}H_{30}O_3Si_3$	306.63	75-6° / 0.05		0.949	1.4505



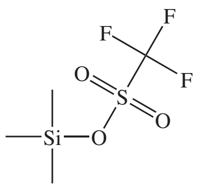
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1747-56-4] HMIS: 2-2-1-X 10g ¥28,900

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
SIT8618.0 TRIMETHYLSILYL TRIFLUOROACETATE $C_5H_9F_3O_2Si$	186.21	88-90° Flashpoint: 0°C (32°F)		1.078	1.3370



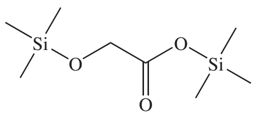
For ring opening of cyclopropyl ketones.[1]
1. Demuth. M. et al. *Helv. Chim. Acta* **1981,** *64*, 2759.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[400-53-3] TSCA EC 206-923-7 HMIS: 3-4-1-X 10g ¥9,300 50g ¥26,800

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

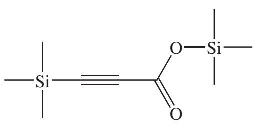


SIT8620.0
TRIMETHYLSILYL TRIFLUOROMETHANESULFONATE
TRIMETHYLSILYLTRIFLATE
$C_4H_9F_3O_3SSi$ 222.25 140-1° 1.225 1.360
Flashpoint: 40°C (104°F)
Autoignition temperature: 405˚C
Vapor pressure, 26°: 14 mm

Review of synthetic utility.[1]
Reacts with ketones to form silyl enol ethers; Review.[2]
Enhances the addition of terminal acetylenes to aldehydes.[3]
Used in the nickel-catalyzed direct phenylation of C-H bonds in heteroaromatic system such as benzoxazoles.[4]
1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 518-537.
2. Simchen, G. In *Advances in Silicon Chemistry;* Larson, G., Ed.; JAI Press: Greenwich, Co, 1991; Vol. 1, p189.
3. Downey, C. W. et al. *J. Org. Chem.* **2009**, *74*, 2904.
4. Hachilya, H. et al. *Angew. Chem., Int. Ed. Engl.* **2010**, *49*, 2202.
F&F: Vol. 6, p 639; Vol. 8, p 497; Vol. 10, p 438; Vol. 11, p 584; Vol. 12, p 543; Vol. 13, p 118, p 149, p 187, p 321, p 329; Vol. 14, p 119, p 202, p 259, p 321, p 333; Vol. 15, p 66, p 102, p 108, p 346; Vol. 16, p 49, p 112, p 138, p 278, p 363; Vol. 17, p 26, p 379; Vol. 18, p 23, p 57, p 383; Vol. 20, p 408; Vol. 21, p 460.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[27607-77-8] (既) 2-3617 TSCA EC 248-565-4 HMIS: 3-2-1-X 25g ¥8,600 100g ¥28,400 2.5kg ¥230,000



SIT8622.0
TRIMETHYLSILYL (TRIMETHYLSILOXY)ACETATE
$C_8H_{20}O_3Si_2$ 220.42 82-3° / 15 0.918 1.412
Flashpoint: 35°C (95°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[33581-77-0] EC 251-580-9 HMIS: 2-3-1-X 50g ¥32,100

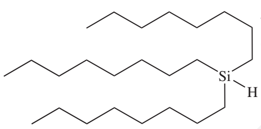


SIT8623.0
TRIMETHYLSILYL (TRIMETHYLSILYL)PROPYNOATE
$C_9H_{18}O_2Si_2$ 214.42 64-5° / 1.5 1.4400
Flashpoint: 43°C (109°F)
Potential for the synthesis of 3-substituted propiolic acid derivatives.[1]
1. Larson, G. L. "*Silicon-Based Cross-Coupling Reagents*" Gelest, Inc. 2011.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[97927-35-0] HMIS: 3-2-1-X store <5°C 2.5g ¥46,900

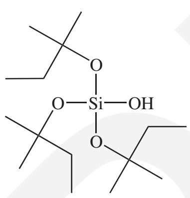
1,3,5-TRIMETHYL-1,3,5-TRIVINYLCYCLOTRISILAZANE - see SIT8736.0 1,3,5-TRIVINYL-1,3,5-TRIMETHYLCYCLOTRISILAZANE

TRIMETHYLVINYLSILANE - see SIV9250.0 VINYLTRIMETHYLSILANE

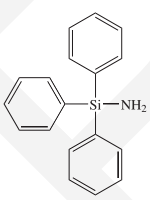
TRIOCTYLMETHYLSILANE - see SIM6577.0 METHYLTRI-n-OCTYLSILANE



SIT8625.0
TRIOCTYLSILANE
$C_{24}H_{52}Si$ 368.76 163-5° / 0.15 0.821 1.454
Flashpoint: >110°C (>230°F)
See also SIT8376.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18765-09-8] TSCA EC 242-559-5 HMIS: 2-1-1-X 10g ¥16,200 50g ¥54,400

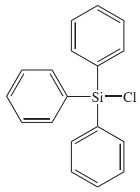


SIT8627.0
TRI-t-PENTOXYSILANOL, 99%
$C_{15}H_{34}O_4Si$ 306.51 96-9° / 2.5 0.944
Flashpoint: 106°C (223°F)
Employed in ALD
See also SIT8088.0 TRI-t-BUTOXYSILANOL
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17906-35-3] TSCA HMIS: 2-1-1-X 10g ¥35,800 50g ¥122,300

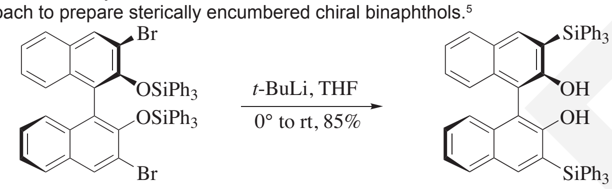


SIT8628.0
TRIPHENYLAMINOSILANE
AMINOTRIPHENYLSILANE
$C_{18}H_{17}NSi$ 275.43 (60-2°)
Converts aryl chlorides to anilines.[1]
1. Huang, X.; Buchwald, S. L. *Org. Lett.* **2001,** *3*, 3417.
See also SIT8378.0 TRI-n-HEXYLSILYLAMINE
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4215-80-9] EC 224-147-7 HMIS: 2-1-1-X 5g ¥26,300

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

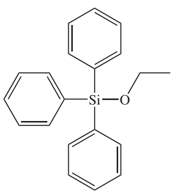


SIT8645.0
TRIPHENYLCHLOROSILANE, 95%
$C_{18}H_{15}ClSi$ 294.85 188-9° / 3 (91-2°) 1.16
Contains triphenylsilanol — Flashpoint: >200°C (>392°F)
Dipole moment: 2.14 debye — TOXICITY: ivn mouse, LD50: 56 mg/kg
Review of synthetic utility.[1]
Ether derivatives hydrolyze in acid at 0.25% the rate of corresponding Me_3Si ethers.[2]
Reacts with $AlBr_3$ and CO_2 to directly form carboxylic acids from arenes and aryl halides.[3]
Used in the kinetic resolution of secondary alcohols.[4]
Used In an anion-relay approach to prepare sterically encumbered chiral binaphthols.[5]

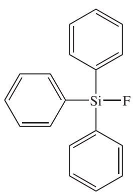


1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 182-184.
2. Sommer, L. H. *Stereochemistry, Mechanism and Silicon;* McGraw-Hill: 1965; p. 126.
3. Nemoto, K. et al. *J. Org. Chem.* **2010**, *75*, 7855.
4. Sheppard, C. I. et al. *Org. Lett.* **2011**, *13*, 3794.
5. Maruoka, K. et al. *Bull. Chem. Soc. Jpn.* **1988**, *61*, 2975.

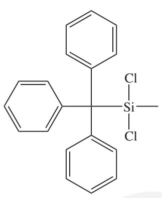
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[76-86-8] (既) 3-2634 TSCA EC 200-989-0 HMIS: 3-1-1-X 25g ¥17,800 100g ¥50,100



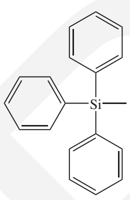
SIT8652.0
TRIPHENYLETHOXYSILANE, tech-95
$C_{20}H_{20}OSi$ 304.45 (63-5°)
Contains triphenylsilanol — Flashpoint: >200°C (>392°F)
ΔHcomb: -10,967 kJ/mole — Vapor pressure, 200°: 5 mm
ΔHform: -671 kJ/mole — Dipole moment: 1.25 debye
ΔHvap: 84.6 kJ/mole
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1516-80-9] (既) 3-2635 TSCA EC 216-170-6 HMIS: 1-1-1-X 10g ¥25,200



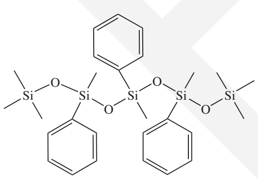
SIT8655.0
TRIPHENYLFLUOROSILANE
$C_{18}H_{15}FSi$ 278.40 207-10° / 12 (61-2°) 1.212
Dipole moment: 1.84 debye — Flashpoint: >200°C (>392°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[379-50-0] TSCA EC 206-832-2 HMIS: 3-1-1-X 10g ¥21,500



SIT8686.0
(TRIPHENYLMETHYL)METHYLDICHLOROSILANE
TRITYLMETHYLDICHLOROSILANE
$C_{20}H_{18}Cl_2Si$ 357.35 (196-7°)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[256343-28-9] HMIS: 3-1-1-X 5g ¥26,800

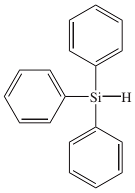


SIT8689.0
TRIPHENYLMETHYLSILANE
$C_{19}H_{18}Si$ 274.44 196-8° / 9 (65-7°) 1.088
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[791-29-7] HMIS: 1-1-0-X 25g ¥26,800



SIT8662.0
3,5,7-TRIPHENYLNONAMETHYLPENTASILOXANE, tech-95
$C_{27}H_{42}O_4Si_5$ 571.06 210-230° / 0.3 1.144 1.501
Viscosity: 15 cSt
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[6689-19-6] HMIS: 2-1-0-X 25g ¥25,200

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

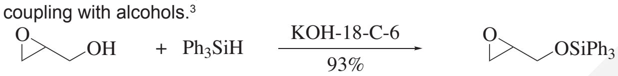


SIT8665.0
TRIPHENYLSILANE

$C_{18}H_{16}Si$	260.41	160-5° / 3	(42-4°)		1.6160

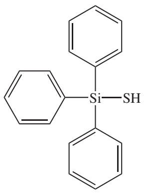
Flashpoint: >200°C (>392°F)

Review of synthetic utility.[1]
In presence of di-t-butylperoxide reduces esters to hydrocarbons.[2]
Undergoes dehydrogenative coupling with alcohols.[3]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 733-739.
2. Sano, H. et al. *Chem. Lett.* **1986**, 77.
3. Yamanoi, Y. *J. Org. Chem.* **2005**, *70*, 9607.

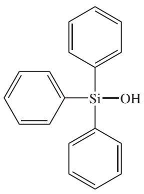
F&F: Vol. 12, p 209; Vol. 13, p 334.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[789-25-3] TSCA EC 212-333-0 HMIS: 2-1-1-X 25g ¥17,200 100g ¥55,400



SIT8690.0
TRIPHENYLSILANETHIOL
MERCAPTOTRIPHENYLSILANE

$C_{18}H_{16}SSi$	292.47	152° / 0.06	(101-4°)		

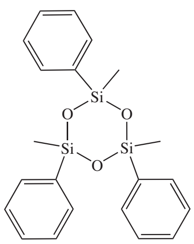
Soluble: toluene
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[14606-42-9] HMIS: 2-2-1-X 5g ¥22,000



SIT8695.0
TRIPHENYLSILANOL

$C_{18}H_{16}OSi$	276.41		(153-5°)		

Dipole moment: 1.51 debye
Flashpoint: >200°C (>392°F)
Forms catalytic complex with vanadium oxychloride
Soluble: methylene chloride
Shifts double bond in terpenes.[1]
1. F&F: Vol. 6, p 655.
See also SIT8562.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[791-31-1] (既) 3-2638 TSCA EC 212-339-3 HMIS: 2-1-0-X 25g ¥13,000 100g ¥34,500

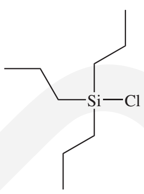


SIT8705.0
1,3,5-TRIPHENYLTRIMETHYLCYCLOTRISILOXANE, 90%

$C_{21}H_{24}O_3Si_3$	408.68	160-90° / 5		1.102	1.5402

Mixed cis/trans isomers
Flashpoint: >200°C (>392°F)
Hazy liquid, contains other cyclics
Silicone monomer
Suppresses male hormonal response
See also SIP6737.5 PHENYLMETHYLCYCLOSILOXANES
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[546-45-2] TSCA EC 208-900-7 HMIS: 3-1-0-X 25g ¥32,600

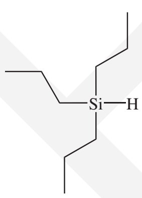
TRIPHENYLVINYLSILANE - see SIV9265.0 VINYLTRIPHENYLSILANE



SIT8707.0
TRI-n-PROPYLCHLOROSILANE

$C_9H_{21}ClSi$	192.80	199-201°		0.8821	1.4401

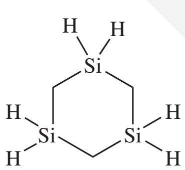
Flashpoint: 76°C (169°F)
See also SIT8250.0, SIT8384.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[995-25-5] (既) 2-2041 TSCA EC 213-624-5 HMIS: 3-2-1-X 10g ¥14,600



SIT8709.0
TRI-n-PROPYLSILANE

$C_9H_{22}Si$	158.36	173°		0.758	1.4272

ΔHvap: 48.2 kJ/mole
Flashpoint: 43°C (109°F)
Surface tension: 23.0 mN/m
Vapor pressure, 100°: 16 mm
See also SIT8091.6, SIT8378.7, SIT8385.0
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[998-29-8] TSCA EC 213-649-1 HMIS: 2-2-1-X 10g ¥13,000 50g ¥34,500



SIT8709.3
1,3,5-TRISILACYCLOHEXANE
CYCLOTRISILMETHYLENE

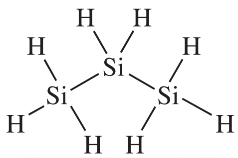
$C_3H_{12}Si_3$	132.38	135°	(-10°)	0.9001	1.5059

Single source precursor for beta-SiC by LPCVD at 800-1,000°.[1]
1. Lienhard, M. et al. in "*Chemical Aspects of Electronic Ceramics Processing*" Arkles, B. ed., MRS Proc. **1998**, *495*, 139.
See also SIT8709.8
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[291-27-0] HMIS: 3-4-1-X 25g ¥114,800

SILICON COMPOUNDS

Gelest

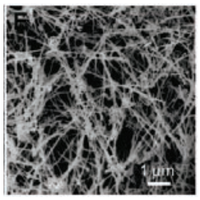
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

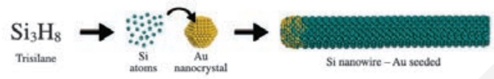


SIT8709.6
TRISILANE

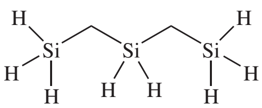
H_8Si_3	92.32	52.9°	(-117°)	0.7430	1.4978

PYROPHORIC
ΔHform: 121 kJ/mole — Vapor pressure, 0°: 95.5 mm
ΔHvap: 27.9 kJ/mole
Bond dissociation energy (Si-Si): 313 kJ/mole
Employed in low-temperature CVD of silicon and silicon alloys.[1,2]
Forms silicon nanowires initiated by gold seeds.[3]





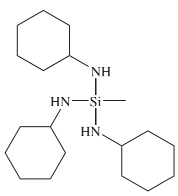
1. Akhtar, M. et al. *MRS Proc.* **1986**, 70.
2. Todd, M. et al. U.S. Patent 6,821,825, 2004.
3. Heitsch, A. et al. *J. Am. Chem. Soc.* **2008**, *130*, 5436.
See also SII6463.4, SIN6597.07
HYDROLYTIC SENSITIVITY: 10: reacts extremely rapidly with moisture and oxygen - pyrophoric - sealed system required
[7783-26-8] TSCA (L) HMIS: 3-4-3-X 5g ¥158,000*
** includes cylinder*



SIT8709.8
1,3,5-TRISILAPENTANE
BIS(SILYLMETHYL)SILANE

$C_2H_{12}Si_3$	120.37	100°		0.7628	1.4491

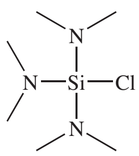
Flashpoint: -16°C (3°F)
Employed in ALD of SiC films
Employed in PECVD of silicon carbide and silicon carbonitride “seed” layers.[1]
1. Weidman, T. et al. US Patent Appl. 2012/0122302 A1, 2012.
See also SID4592.0, SIT8709.3
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5637-99-0] TSCA (L) HMIS: 3-4-2-X 25g ¥179,000*
** includes zCYL-HPS-0050 cylinder*



SIT8710.0
TRIS(CYCLOHEXYLAMINO)METHYLSILANE, tech-95

$C_{19}H_{39}N_3Si$	337.62	169° / 3	(19-20)	0.96	1.4868^{25}

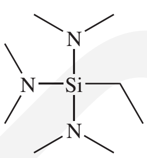
Flashpoint: 72°C (161°F)
TOXICITY: oral rat, LD50: 637 mg/kg
Crosslinker for moisture-cure silicone RTVs
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[15901-40-3] (既) 3-3503 TSCA EC 240-040-8 HMIS: 3-1-1-X 25g ¥18,300 100g ¥51,700



SIT8711.0
TRIS(DIMETHYLAMINO)CHLOROSILANE, 95%

$C_6H_{18}ClN_3Si$	195.77	62-3° / 12		0.975	1.442

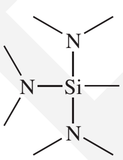
Cloudy liquid — Flashpoint: 28°C (82°F)
See also SIT8715.55
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[13307-05-6] TSCA EC 236-331-4 HMIS: 3-3-2-X 25g ¥26,300



SIT8711.6
TRIS(DIMETHYLAMINO)ETHYLSILANE

$C_8H_{23}N_3Si$	189.38	66-7° / 12		0.8762	1.4399

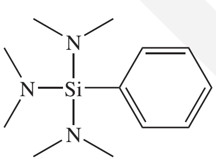
Flashpoint: 32°C (90°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[29489-57-4] HMIS: 3-3-1-X 50g ¥59,100



SIT8712.0
TRIS(DIMETHYLAMINO)METHYLSILANE

$C_7H_{21}N_3Si$	175.35	55-6° / 17	(-11°)	0.850^{22}	1.432^{22}

Flashpoint: 30°C (86°F)
See also SIT8710.0, SIT8711.6
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[3768-57-8] TSCA EC 223-199-8 HMIS: 3-3-1-X 10g ¥15,400 50g ¥51,200

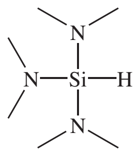


SIT8713.0
TRIS(DIMETHYLAMINO)PHENYLSILANE

$C_{12}H_{23}N_3Si$	237.42	143-4° / 32		0.965	1.5039

Flashpoint: 46°C (115°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4840-75-9] TSCA EC 225-427-1 HMIS: 3-2-1-X 10g ¥21,500

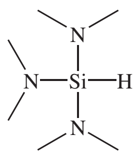
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT8714.0
TRIS(DIMETHYLAMINO)SILANE

$C_6H_{19}N_3Si$	161.32	145-8°	(-90°)	0.838	

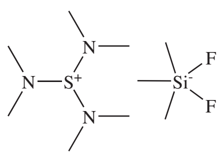
AIR TRANSPORT FORBIDDEN
Vapor pressure, 4°: 1 6 mm
Flashpoint: 25°C (77°F)
TOXICITY: oral rat, LD50: 595 mg/kg
TOXICITY: ihl rat, LC50: 38 ppm/4H
Hydrosilylates olefins in presence of $Rh_2Cl_2(CO)_4$1; reacts with ammonia to form silicon nitride prepolymers.[1]
Employed in low pressure CVD of silicon nitride.[2]
1. Review: Kanner, B. et al. In *Silicon Chemistry;* Corey, J. et al. Ed.; Wiley, 1988; p.123.
2. Levy, R. et al. *J. Mater. Res.* **1996,** *11*, 1483.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[15112-89-7] TSCA EC 239-165-0 HMIS: 4-3-2-X 10g inquire 50g inquire



SIT8714.1
TRIS(DIMETHYLAMINO)SILANE, 99.9+%

$C_6H_{19}N_3Si$	161.32	145-8°	(-90°)	0.838	

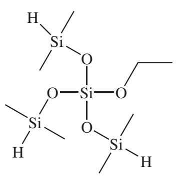
AIR TRANSPORT FORBIDDEN
Flashpoint: 25°C (77°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[15112-89-7] TSCA EC 239-165-0 HMIS: 4-3-2-X 25g inquire
** includes cylinder zCYL-HPS-0050*



SIT8715.0
TRIS(DIMETHYLAMINO)SULFUR(TRIMETHYLSILYL)DIFLUORIDE, tech-95
TAS-F

$C_9H_{27}F_2N_3SSi$	275.48				

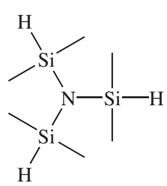
Contains tris(dimethylamino)sulfonium bifluoride
Soluble source for anhydrous fluoride ion.[1]
1. Middleton, W. J. U.S. Patent 3,940,402, 1976.
F&F: Vol. 10, p 452.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[59218-87-0] HMIS: 3-3-2-X store <5°C 5g ¥77,700



SIT8715.4
TRIS(DIMETHYLSILOXY)ETHOXYSILANE, tech-95

$C_8H_{26}O_4Si_4$	298.63	108-9° / 40		0.834	1.5875

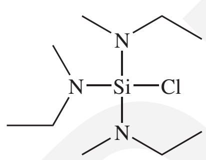
Mixed mode cure agent for silicone elastomers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[865811-55-8] HMIS: 2-2-1-X 10g ¥22,500



SIT8715.5
TRIS(DIMETHYLSILYL)AMINE, 95%

$C_6H_{21}NSi_3$	191.50	152-5°		0.804	1.423

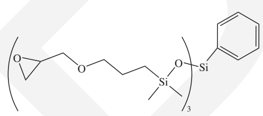
Flashpoint: 55°C (131°F)
Forms SiCN passivation coatings by CVD
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[21331-86-2] TSCA EC 244-336-8 HMIS: 3-3-1-X 25g ¥37,900



SIT8715.55
TRIS(ETHYLMETHYLAMINO)CHLOROSILANE

$C_9H_{24}ClN_3Si$	237.84	75° / 3		0.934	

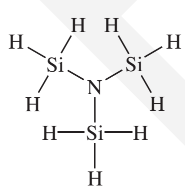
Cloudy liquid
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-3-1-X 10g ¥39,300



SIT8715.6
TRIS(GLYCIDOXYPROPYLDIMETHYLSILOXY)PHENYLSILANE, 95%

$C_{30}H_{56}O_9Si_4$	673.11		(-73°)	1.05	1.4742

Viscosity: 30-35 cSt.
Flashpoint: >110°C (>230°F)
Forms flexible epoxy resins with low dielectric constant
See also SIB1115.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[90393-83-2] TSCA HMIS: 2-1-0-X 25g ¥18,000 100g ¥50,700



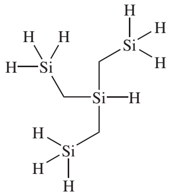
SIT8715.8
TRISILYLAMINE

H_9NSi_3	107.33	52°	(-106°)	0.895^{-106}	

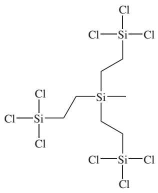
PYROPHORIC
See also SIC2268.5, SIH5905.1
HYDROLYTIC SENSITIVITY: 10: reacts extremely rapidly with moisture and oxygen - pyrophoric - sealed system required
[13862-16-3] HMIS: 4-4-3-X 25g ¥187,000*
** includes stainless steel cylinder zCYL-HPS-0420-35*

SILICON COMPOUNDS

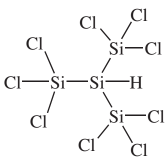
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



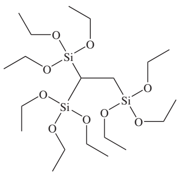
SIT8715.9
TRIS(SILYLMETHYL)SILANE
$C_3H_{16}Si_4$ — 164.48 — 61-2° / 30 — 0.806 — 1.4669[25]
Flashpoint: 35°C (95°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1385027-19-9] HMIS: 3-3-2-X 25g ¥191,000*
** includes cylinder zCYL-HPS-0050*



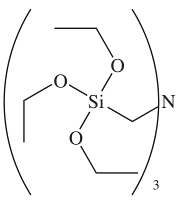
SIT8716.0
TRIS(TRICHLOROSILYLETHYL)METHYLSILANE, tech-95
$C_7H_{15}Cl_9Si_4$ — 530.61 — 175-9° / 5 — (>25°)
9 point terminator for living polymers yielding star polymers
See also SIT7292.0 TETRAKIS(TRICHLOROSILYLETHYL)SILANE
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[211945-95-8] HMIS: 3-1-1-X 1.0g ¥19,400



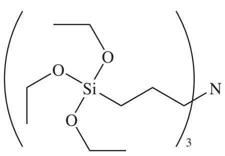
SIT8716.1
TRIS(TRICHLOROSILYL)SILANE
HCl_9Si_4 — 432.43 — 60-2° / 0.2
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[62257-60-7] TSCA-L HMIS: 3-2-1-X 5g ¥59,100



SIT8716.6
1,1,2-TRIS(TRIETHOXYSILYL)ETHANE, tech-95
$C_{20}H_{48}O_9Si_3$ — 516.85 — 114-6° / 0.1 — 0.993
Intermediate for sol-gel derived abrasion resistant coatings
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[151198-82-2] HMIS: 3-2-1-X 5g ¥42,700

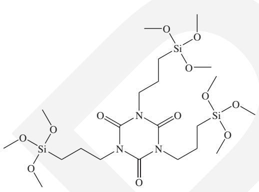


SIT8716.2
TRIS(TRIETHOXYSILYLMETHYL)AMINE, tech-90
$C_{21}H_{51}NO_9Si_3$ — 545.90 — 156° / 0.7 — 0.99
Contains ~5% bis(triethoxysilylmethyl)amine
Forms immobilized quaternary salts
see also SIT8716.3
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1250435-76-7] HMIS: 2-2-1-X 5g ¥42,700

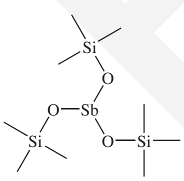


SIT8716.3
TRIS(TRIETHOXYSILYLPROPYL)AMINE, tech-95
$C_{27}H_{63}NO_9Si_3$ — 630.06 — 200-5° / 1 — 1.4322[25]
Coupling agent/primer for metal substrates
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18784-74-2] HMIS: 2-2-1-X 25g ¥35,300

TRIS(TRIFLUOROPROPYL)METHYLCYCLOTRISILOXANE -
see SIT8366.0 (3,3,3-TRIFLUOROPROPYL)METHYLCYCLOTRISILOXANE

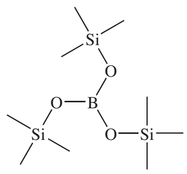


SIT8717.0
TRIS(3-TRIMETHOXYSILYLPROPYL)ISOCYANURATE, tech-95
$C_{21}H_{45}N_3O_{12}Si_3$ — 615.86 — 1.170 — 1.4610
Viscosity: 325-350 cSt. Flashpoint: 102°C (216°F)
Coupling agent for polyimides to silicon metal
Adhesion promoter for hotmelt adhesives
Forms periodic mesoporous silicas.[1]
1. Zhang, W. et al. *Chem. Mater.* **2007**, *19*, 2663.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[26115-70-8] TSCA EC 247-465-8 HMIS: 2-1-1-X 25g ¥6,600 100g ¥13,800 2kg ¥104,100
COMMERCIAL

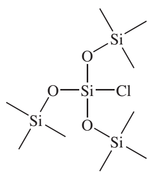


SIT8717.7
TRIS(TRIMETHYLSILOXY)ANTIMONY
ANTIMONY TRIMETHYLSILOXIDE
$C_9H_{27}O_3SbSi_3$ 劇物 — 389.32 — 80° / 3 — 1.1448 — 1.4374
Forms static-charge conductive coatings
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[194033-87-9] HMIS: 3-2-1-X 5g ¥28,400

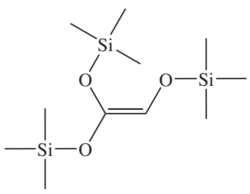
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIT8718.0
TRIS(TRIMETHYLSILOXY)BORON
BORON TRIMETHYLSILOXIDE
$C_9H_{27}BO_3Si_3$ — 273.38 — 184° — (-35°) — 0.825 — 1.3861
ΔHvap: 42.3 kJ/mole — Flashpoint: 42°C (108°F)
Surface tension: 16.6 mN/m
Source for borosilicate glass by CVD at 800°.[1]
1. Treichel, H. et al. *Chem. Abstr.* 109, 241901u; *J. Phys. Colloq. (C4 Solid State Res. Conf.)* **1988**.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4325-85-3] TSCA HMIS: 2-2-1-X 25g ¥13,500 100g ¥36,300



SIT8719.0
TRIS(TRIMETHYLSILOXY)CHLOROSILANE
$C_9H_{27}ClO_3Si_4$ — 331.10 — 78° / 5 — 0.9219 — 1.3941
Flashpoint: 74°C (165°F)
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17905-99-6] HMIS: 3-2-1-X 25g ¥17,200

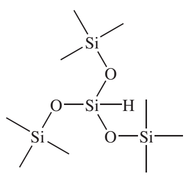


SIT8720.0
TRIS(TRIMETHYLSILOXY)ETHYLENE, 96%
$C_{11}H_{28}O_3Si_3$ — 292.59 — 90° / 1 — 0.885 — 1.4204
Flashpoint: 58°C (136°F)
Converts acid chlorides to hydroxymethylketones.[1]
1. Wissner, A. *J. Org. Chem.* **1979,** *44*, 4617.
F&F: Vol. 8, p 523; Vol. 9, p 512.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[69097-20-7] EC 273-864-1 HMIS: 2-2-1-X 50g ¥47,800 2kg ¥243,000

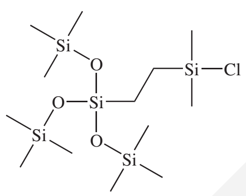
COMMERCIAL

TRIS(TRIMETHYLSILOXY)PHENYLSILANE - see SIP6827.0 PHENYLTRIS(TRIMETHYLSILOXY)SILANE

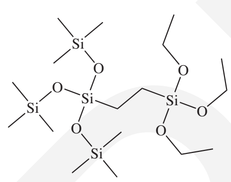
TRIS(TRIMETHYLSILOXY)PROPYL METHACRYLATE - see SIM6487.6 METHACRYLOXYPROPYLTRIS(TRIMETHYLSILOXY)SILANE



SIT8721.0
TRIS(TRIMETHYLSILOXY)SILANE
$C_9H_{28}O_3Si_4$ — 296.66 — 64° / 10 — 0.852 — 1.3865
Flashpoint: 50°C (122°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[1873-89-8] (既) 7-477 EC 217-497-7 HMIS: 2-2-1-X 25g ¥14,100 100g ¥37,900



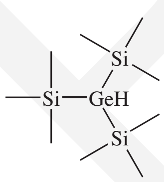
SIT8719.5
[TRIS(TRIMETHYLSILOXY)SILYLETHYL]DIMETHYLCHLOROSILANE
$C_{13}H_{37}ClO_3Si_5$ — 417.32 — 85° / 0.6 — 0.9056 — 1.4135
Forms highly hydrophobic monolayers
Candidate for self-cleaning surfaces
Water contact angle: advancing = receding = 104˚.[1]
1. McCarthy, T. et al. *Langmuir* **1999**, *15*, 7328.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[225794-57-0] HMIS: 3-2-1-X 10g ¥25,700



SIT8721.2
TRIS(TRIMETHYLSILOXY)SILYLETHYLTRIETHOXYSILANE
$C_{17}H_{46}O_6Si_5$ — 486.98 — 140° / 0.2 — 0.919 — 1.4078
Provides non-fluorinated low surface energy coatings
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1356114-66-3] HMIS: 2-2-1-X 10g ¥20,400

TRIS(TRIMETHYLSILYL)AMINE - see SIN6595.0 NONAMETHYLTRISILAZANE

TRIS(TRIMETHYLSILYL)BORATE - see SIT8718.0 TRIS(TRIMETHYLSILOXY)BORON



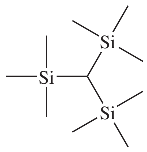
GET8721.5
TRIS(TRIMETHYLSILYL)GERMANE
$C_9H_{28}GeSi_3$ — 293.17 — 80° / 5 — 0.937 — 1.4974
Flashpoint: >110°C (>230°F)
Readily converted to $(Me_3Si)_3GeCl$.[1]
1. Brook, A. et al. *J. Organomet. Chem.* **1986**, *299*, 9.
[104164-54-7] HMIS: 2-1-1-X 1.0g ¥49,500

SILICON COMPOUNDS

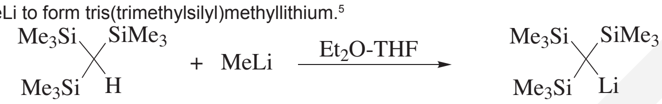
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

SIT8722.0
TRIS(TRIMETHYLSILYL)METHANE

$C_{10}H_{28}Si_3$	232.59	80° / 2		0.827	1.4640
		Flashpoint: 76°C (169°F)			



Review of synthetic utility.[1]
Sterically demanding "trisyl" group.[2,3]
Linear, thermally-induced NMR shifts.[4]
Metalation occurs with MeLi to form tris(trimethylsilyl)methyllithium.[5]



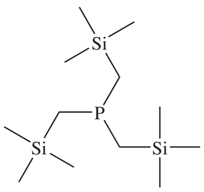
Reacts with LiOMe to form bis(trimethylsilyl)methyllithium.[6]

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 746-747.
2. Cowley, A. *Inorg. Synth.* **1990,** *27*, 235.
3. Eaborn, C. et al. *J. Organomet. Chem.* **1975,** *101*, C40.
4. Sikorsky, W. et al. *Magn. Reson. Chem.* **1998,** *36*, 5118.
5. Cook, M. A. et al. *J. Organomet. Chem.* **1970**, *24*, 529.
6. Sakurai, H. et al. *Tetrahedron Lett.* **1973**, 4193.
F&F: Vol. 20, p 422.

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1068-69-5] HMIS: 2-2-0-X 2.5g ¥31,000

SIT8722.7
TRIS(TRIMETHYLSILYLMETHYL)PHOSPHINE

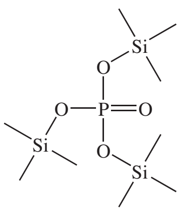
$C_{12}H_{33}PSi_3$	292.62	70° / 1 sub.	(66-70°)		



Soluble: hexane
Sterically hindered electron-rich phosphine ligand
See also SID4589.0
HYDROLYTIC SENSITIVITY: 9: reacts extremely rapidly with atmospheric moisture - may be pyrophoric - glove box or sealed system required
[18077-42-4] EC 241-986-4 HMIS: 3-4-1-X 1.0g ¥54,900

SIT8723.0
TRIS(TRIMETHYLSILYL)PHOSPHATE

$C_9H_{27}O_4PSi_3$	314.54	85-7° / 4	(2-4°)	0.959	1.4089



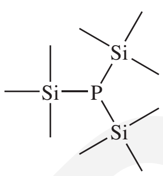
ΔHvap: 40.6 kJ/mole — Flashpoint: >110°C (>230°F)
Surface tension, 20°: 19.5 mN/m — TOXICITY: oral rat, LD50: 3,440 mg/kg
Cocatalyst for epoxidation of allyl-TMS ethers with silylperoxides.[1]

1. Hiyama, T., Obayashi, M. *Tetrahedron Lett.* **1983,** *24*, 395.

HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[10497-05-9] TSCA EC 234-028-1 HMIS: 2-1-0-X 25g ¥14,600 100g ¥39,500

SIT8723.4
TRIS(TRIMETHYLSILYL)PHOSPHINE, 10% in hexane

$C_9H_{27}PSi_3$	250.54	102-5° / 16	(24-6° neat)	0.72	
		Flashpoint: -23°C (-9°F)			



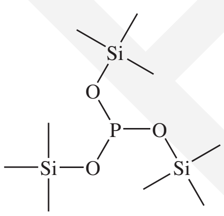
Review of synthetic utility.[1]
In combination with indium acetate forms InP quantum dots.[2,3]
Promotes borylative dienylation/aldeyhyde coupling.[4]
Reaction with methyllithium gives lithium bis(trimethylsilyl)phosphide,[5] which reacts with dialkylformamides to give functional phosphaalkenes.[6]

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 422-427.
2. Bharal, D. et al. *J. Am. Chem. Soc.* **2005,** *127*, 11364.
3. Kim, S. et al. *J. Am. Chem. Soc.* **2005,** *127*, 10526.
4. Cho, H. Y.; Morken, J. P. *J. Am. Chem. Soc.* **2010***, 132*, 7576.
5. Askham, F. R. et al. *J. Am. Chem. Soc.* **1985**, *107*, 7423.
6. Prischenko, A. A. et al. *Heteroatom. Chem.* **2010**, *21*, 441.

HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[15573-38-3] HMIS: 4-4-2-X 10g ¥27,300 50g ¥98,900

SIT8723.6
TRIS(TRIMETHYLSILYL)PHOSPHITE, 95%

$C_9H_{27}O_3PSi$	298.55	90-2° / 20		0.893	1.4072
		Flashpoint: 66°C (151°F)			



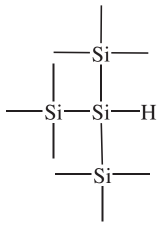
Reacts with aryl bromides yielding arylbis(trimethylsilyl)phosphonic acid esters.[1]
Used for mild preparation of bis(TMS)phosphonates (Arbuzov reaction).[2]

1. Demik, N. N. et al. *Chem. Abstr.* **1991***, 115*, 183.
2. Rosenthol, A. F. et al. *Tetrahedron Lett.* **1975**, *16*, 977.

HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1795-31-9] HMIS: 3-2-1-X 10g ¥22,500

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

SIT8724.0
TRIS(TRIMETHYLSILYL)SILANE
1,1,1,3,3,3-HEXAMETHYL-2-TRIMETHYLSILYLTRISILANE; TTMS
$C_9H_{28}Si_4$ | 248.67 | 82-4° / 12 | 0.806 | 1.489
Flashpoint: 55°C (131°F)

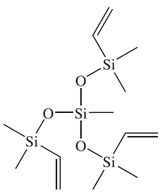


Oxidizes slowly in contact with air at room temperature
Reviews.[1,2]
Efficient mediator in organic radical reactions.[3]
Initiates addition of alkyl iodides to activated olefins.[4]
Initiates and promotes the radical addition of perfluoroalkyl iodides to olefins in water.[5]
Hydrosilylates olefins in aqueous systems in presence of azo initiators.[6]

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 747-754.
2. Chatgilialoglu, C. *Chem. Eur. J.* **2008**, *14*, 2310.
3. Chatgilialoglu, C. *Acc. Chem. Res.* **1992,** *25*, 188.
4. Kishimoto, Y.; Ikariya, T. *J. Org. Chem.* **2000,** *65*, 7656.
5. Barata-Vallejo, S.; Postigo, A. *J. Org. Chem.* **2010**, *75*, 6141.
6. Postigo, A. et al. *Organometallics* **2009***, 28*, 3282.

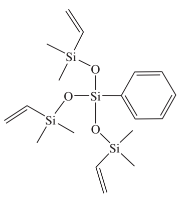
F&F: Vol. 15, p 358; Vol. 16, p 374; Vol. 17, p 395.
See also GET8100, GET8721.5
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1873-77-4] HMIS: 2-2-1-X 2.5g ¥11,900 10g ¥31,000

SIT8725.0
TRIS(VINYLDIMETHYLSILOXY)METHYLSILANE, 95%
$C_{13}H_{30}O_3Si_4$ | 346.72 | 135-40° / 50 | 0.89 | 1.4148
Contains higher homologs — Flashpoint: 179°C (354°F)



Modifier for Pt-cure silicone elastomers
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[60111-52-6] TSCA-L EC 262-060-6 HMIS: 2-1-0-X 10g ¥16,400 50g ¥55,400

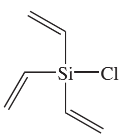
SIT8725.4
TRIS(VINYLDIMETHYLSILOXY)PHENYLSILANE, 95%
$C_{18}H_{32}O_3Si_4$ | 408.78 | 112-5° / 2 | 0.95 | 1.4589
Flashpoint: 130°C (266°F)



Nucleus for hydrosilylation-generated dendrimers
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[60111-47-9] HMIS: 1-1-0-X 10g ¥12,700 50g ¥40,600

TRIS(VINYLDIMETHYLSILYL) BORATE - see AKB159.5 BORON VINYLDIMETHYLSILOXIDE

SIT8729.0
TRIVINYLCHLOROSILANE, 95%
C_6H_9ClSi | 144.67 | 128-9° | 0.934 | 1.4604

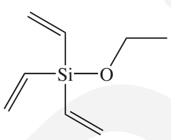


Intermediate for dendritic structures.[1]

1. Hosmane, N. et al. *J. Organomet. Chem.* **2009**, *694*, 1690.

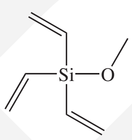
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1871-21-2] HMIS: 3-3-1-X 10g ¥26,800 50g ¥96,800

SIT8730.0
TRIVINYLETHOXYSILANE, 95%
$C_8H_{14}OSi$ | 154.28 | 146-7° | 0.847 | 1.4372



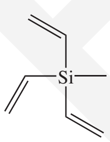
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[70693-56-0] TSCA EC 274-772-4 HMIS: 2-3-1-X 10g ¥25,700 50g ¥92,600

SIT8732.0
TRIVINYLMETHOXYSILANE, 95%
$C_7H_{12}OSi$ | 140.25 | 131-3° | 1.4400
Flashpoint: 26°C (79°F)



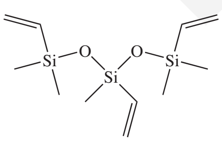
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[193828-96-5] HMIS: 3-4-1-X 2.5g ¥13,500 10g ¥36,300

SIT8734.0
TRIVINYLMETHYLSILANE
$C_7H_{12}Si$ | 124.26 | 102° | 0.769 | 1.4411
Viscosity, 20˚: 0.5 cSt. — Flashpoint: 15°C (59°F)
ΔHform: -212 kJ/mole



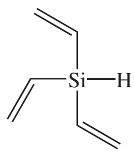
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[18244-95-6] TSCA EC 242-120-8 HMIS: 2-4-0-X 25g ¥19,400

SIT8735.0
1,3,5-TRIVINYL-1,1,3,5,5-PENTAMETHYLTRISILOXANE, 95%
$C_{11}H_{24}O_2Si_3$ | 272.57 | 198-200°
Flashpoint: 40°C (104°F)

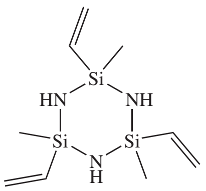


HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1529-65-3] TSCA EC 216-220-7 HMIS: 1-2-0-X 10g ¥17,800 50g ¥60,700

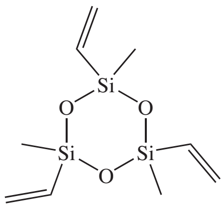
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



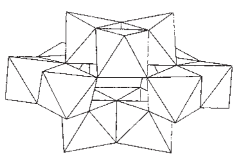
SIT8735.5
TRIVINYLSILANE, tech-95
$C_6H_{10}Si$ — Mw 110.22 — bp 92-3° — D_4 0.7725[25] — n_D 1.4498[25]
Contains ethyldivinylsilane
Intermediate for phosphinoalkylsilanes.[1]
1. Joslin, F. *Inorg. Chem.* **1993,** *32*, 7221.
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[2372-31-8] HMIS: 2-4-1-X 10g ¥38,500



SIT8736.0
1,3,5-TRIVINYL-1,3,5-TRIMETHYLCYCLOTRISILAZANE, 95%
$C_9H_{21}N_3Si_3$ — Mw 255.54 — bp 106-9° / 11 — D_4 0.939 — n_D 1.4802
Flashpoint: 85°C (185°F)
Contains cyclic tetrasilazane analog
Precursor of vinylsilazane preceramic polymers.[1]
Reacts with photoresists to give RIE resistance.[2]
Intermediate for polyborosilazanes.[3]
1. Toreki, W. et al. *Ceram. Eng. Sci. Proc.* **1990**, *11*, 1371.
2. Babich, E. et al. *Microelectron. Eng.* **1990,** *11*, 503.
3. Nghiem, Q.-D.; Kim, D.-P. *J. Mater. Chem.* **2005,** *15*, 2188.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5505-72-6] EC 226-848-3 HMIS: 3-2-1-X 25g ¥10,900 100g ¥27,600



SIT8737.0
1,3,5-TRIVINYL-1,3,5-TRIMETHYLCYCLOTRISILOXANE
$C_9H_{18}O_3Si_3$ — Mw 258.50 — bp 80° / 20 — D_4 0.9669 — n_D 1.4215[25]
Undergoes "living" anion ring-opening polymerization
Reagent for vinylations via cross-coupling protocols.[1,2]
1. Denmark, S. E.; Wang, Z. *J. Organomet. Chem.* **2001**, *624*, 372.
2. Denmark, S. E.; Butler, C. R. *J. Am. Chem. Soc.* **2008**, *130*, 3690.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[3901-77-7] (既) 7-483 TSCA EC 223-458-5 HMIS: 2-1-0-X 5g ¥11,700 25g ¥36,300



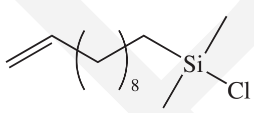
SIT8780.0
TUNGSTOSILICIC ACID hydrate
$H_4O_{40}SiW_{12}\cdot 26H_2O$ / $[(SiO_4\cdot(W_3O_9)_4]H_4$ — Mw 2,878.31 / 3,328.69
Employed in density gradient columns; precipitation of alkaloids.
Soluble: water, methanol
Solution of 20g + 4g H_2O has a density of 2.74
Anions self-assemble in monolayers on silver surfaces.[1]
1. Ge, M. et al. *J. Am. Chem. Soc.* **1996**,*118*, 5812.
HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions
[12027-38-2] TSCA EC 234-719-8 HMIS: 2-0-0-X 50g ¥32,600

WSi_2

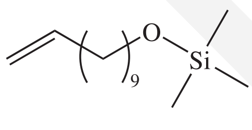
SIT8787.0
TUNGSTEN SILICIDE
Si_2W — Mw 240.02 — (mp 2,165°) — D_4 9.88
ΔHform: 154 kJ/mole
ΔHsub: 72.0 kJ/mole
Resistivity: 11-13 μΩcm
HYDROLYTIC SENSITIVITY: 2: reacts with aqueous acid
[12039-88-2] TSCA EC 234-909-0 HMIS: 1-0-0-X 25g ¥24,100

SIU8850.0
ULTRAMARINE BLUE
SODIUM ALUMINOSULFOSILICATE
$Al_6Na_{8-10}O_{24}S_{2-4}Si_6$ — D_4 2.3
TOXICITY: oral rat, LD50: >5,000 mg/kg
Color: deep blue
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[57455-37-5] TSCA HMIS: 1-0-0-X 500g ¥9,600

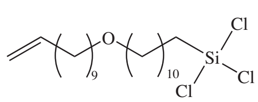
UMBELLIPHERONE-FUNCTIONAL SILANES - see SIC2266.9, SIM6502.0



SIU9045.0
10-UNDECENYLDIMETHYLCHLOROSILANE
$C_{13}H_{27}ClSi$ — Mw 246.90 — bp 100° / 2 — D_4 0.872
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18406-97-8] HMIS: 3-2-1-X 5g ¥35,800

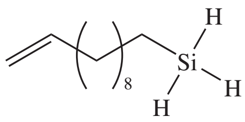


SIU9049.2
10-UNDECENYLOXYTRIMETHYLSILANE
TRIMETHYLSILOXYUNDEC-1-ENE
$C_{14}H_{30}OSi$ — Mw 242.47 — bp 84-6° / 0.5 — D_4 0.8105
Extended double bond
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[14031-97-1] HMIS: 1-2-1-X 25g ¥26,800

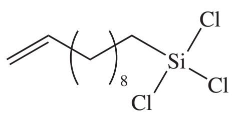


SIU9049.4
11-UNDECENYLOXYUNDECYLTRICHLOROSILANE
$C_{22}H_{43}Cl_3OSi$ — Mw 458.03
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[14031-97-1] HMIS: 3-1-1-X 1.0g ¥63,900

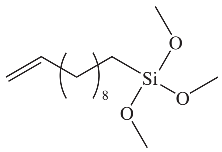
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



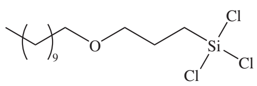
SIU9048.0
10-UNDECENYLSILANE
$C_{11}H_{24}Si$ — Mw 184.40 — D 0.768^{25} — n_D 1.4415^{25}
Forms self-assembled monolayers on gold
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
HMIS: 2-3-1-X — 2.5g ¥39,000



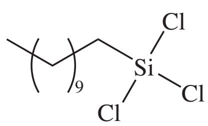
SIU9047.0
10-UNDECENYLTRICHLOROSILANE
$C_{11}H_{21}Cl_3Si$ — Mw 287.74 — bp 100-2° / 0.8 — D 1.04
Flashpoint: 105°C (221°F)
Treated surface contact angle, water: 95°
Derivatizable patterns formed by dip-pen nanolithography.[1]
1. Kooi, S. et al. *Adv. Mater.* **2004**, *16*, 1013
See also SID4623.4, SID4617.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17963-29-0] TSCA HMIS: 3-1-1-X — 1.0g ¥13,500 — 5g ¥43,800



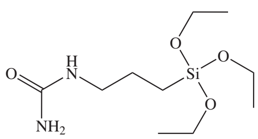
SIU9049.0
10-UNDECENYLTRIMETHOXYSILANE
$C_{14}H_{30}O_3Si$ — Mw 274.48 — bp 102-5° / 1 — D 0.908 — n_D 1.4334
When treated on glass provides a contact angle of 100°
See also SID4623.6, SID4618.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[872575-06-9] HMIS: 2-1-1-X — 5g ¥45,900



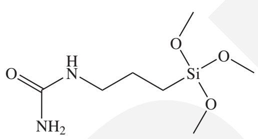
SIU9049.5
UNDECYLOXYPROPYLTRICHLOROSILANE
$C_{14}H_{29}Cl_3OSi$ — Mw 347.81 — bp 195-8° / 10
Hydrophilic silane with embedded polar ether group
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X — 5g ¥40,600



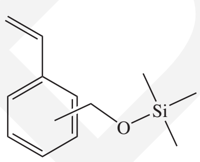
SIU9050.0
UNDECYLTRICHLOROSILANE
$C_{11}H_{23}Cl_3Si$ — Mw 289.75 — bp 155-60° / 15 — D 1.02
Flashpoint: 107°C (225°F)
Employed in SAMS as a spacer molecule for functionally tipped silanes
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18052-07-8] HMIS: 3-1-1-X — 25g ¥38,500



SIU9055.0 — COMMERCIAL
UREIDOPROPYLTRIETHOXYSILANE, 50% in methanol
$C_{10}H_{24}N_2O_4Si$ — Mw 264.40 — mp (-97°) — D 0.92 — n_D 1.386
Flashpoint: 11°C (52°F)
Contains ureidopropyltrimethoxysilane and related transesterification products
Coupling agent for polyamides and urea-formaldehyde resins
See also SIS6944.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[23779-32-0] (既) 2-2968 TSCA EC 245-876-7 HMIS: 2-4-1-X — 25g ¥4,500 — 2kg ¥41,000 — 16kg ¥235,000

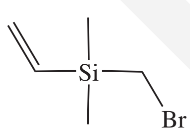


SIU9058.0 — COMMERCIAL
UREIDOPROPYLTRIMETHOXYSILANE
$C_7H_{18}N_2O_4Si$ — Mw 222.32 — bp 217-225° — mp (-5°) — D 1.150 — n_D 1.386^{25}
Flashpoint: 99°C (210°F)
TOXICITY: oral rat, LD50: >5,000 mg/kg
Autoignition temperature: 300°C
Component in primers for tin alloys
Adhesion promoter for foundry resins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[23843-64-3] TSCA EC 245-904-8 HMIS: 2-2-1-X — 25g ¥6,100 — 100g ¥11,900 — 2kg ¥110,000



SIV9061.0
(m,p-VINYLBENZYLOXY)TRIMETHYLSILANE
(TRIMETHYLSILOXYMETHYL)STYRENE
$C_{12}H_{18}OSi$ — Mw 206.35 — bp 56-60° / 0.15 — D 0.96^{25} — n_D 1.537^{25}
Inhibited with BHT; mixed isomers
Forms hydrophilic copolymers
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[112270-66-3] HMIS: 2-2-1-X store <5°C — 10g ¥36,300

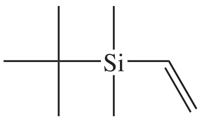
VINYLBENZYL(TRIMETHOXYSILYL)PROPYLETHANEDIAMINE HYDROCHLORIDE -
see SIS6994.0 3-N-(STYRYLMETHYL-2-AMINOETHYLAMINO)PROPYLTRIMETHOXYSILANE HYDROCHLORIDE



SIV9062.0
VINYL(BROMOMETHYL)DIMETHYLSILANE
$C_5H_{11}BrSi$ — Mw 179.13 — bp 142° — D 1.16^{25} — n_D 1.464
See also SIV9065.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[211985-18-1] HMIS: 3-3-0-X — 25g ¥62,900

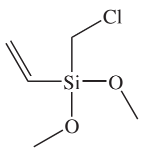
SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



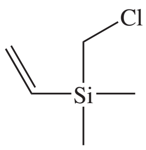
SIV9063.0
VINYL-t-BUTYLDIMETHYLSILANE, 95%
$C_8H_{18}Si$ | 142.32 | 127° | | 0.7565 | 1.4281
Flashpoint: 19°C (66°F)

Precursor to α-silyl acetaldehyde.[1]
1. Cunico, R. *Tetrahedron Lett.* **1986,** *27*, 4269.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[24858-02-4] HMIS: 2-4-0-X 10g ¥26,800



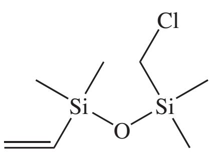
SIV9064.0
VINYL(CHLOROMETHYL)DIMETHOXYSILANE
$C_5H_{11}ClO_2Si$ | 166.68

Multi-functional coupling agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1314981-48-0] HMIS: 3-3-1-X 10g ¥61,800



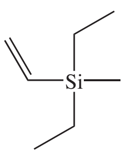
SIV9065.0
VINYL(CHLOROMETHYL)DIMETHYLSILANE
$C_5H_{11}ClSi$ | 134.68 | 121-2° | | 0.893
Flashpoint: 14°C (57°F)

Intermediate for the preparation of photocureable non-linear optical polymers.[1]
Isomerizes in presence of $FeCl_3$ to cyclopropyldimethylchlorosilane.[2]
1. LaBamy, P. et al. *Chem. Abstr.* 116, 107441k; Fr. Demande 2659340, 1991.
2. Zhun, V. et al. *Zh. Obshch. Chem.* **1990,** *60*, 1111.
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[16709-86-7] TSCA EC 240-758-1 HMIS: 3-4-0-X 10g ¥15,600 50g ¥52,200



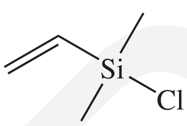
SIV9066.0
1-VINYL-3-(CHLOROMETHYL)-1,1,3,3-TETRAMETHYLDISILOXANE
$C_7H_{17}ClOSi_2$ | 208.84 | 171-2° | | 0.921 | 1.4246
Flashpoint: 46°C (115°F)

HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[88456-93-3] HMIS: 3-2-0-X 25g ¥17,800



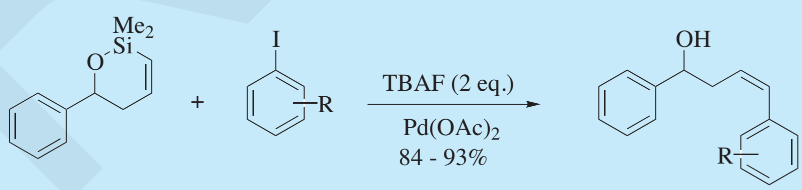
SIV9068.0
VINYLDIETHYLMETHYLSILANE
ETHENYLDIETHYLMETHYLSILANE
$C_7H_{16}Si$ | 128.29 | 120° | | 0.7503 | 1.4230
Flashpoint: 15°C (59°F)

Forms oxygen permeable polymers
See also SIV9073.8
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[18292-29-0] HMIS: 2-4-0-X 10g ¥40,600



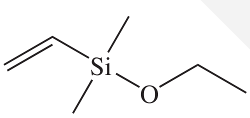
SIV9070.0
VINYLDIMETHYLCHLOROSILANE
C_4H_9ClSi | 120.65 | 82-3° | | 0.884 | 1.4137^{25}
Flashpoint: -5°C (23°F)

Review of synthetic utility.[1]
Used in synthesis of highly substituted unsaturated alcohols.[2]
Reductively cross-couples with allyl alcohols to form butenols after oxidation.[3]
Used to silylate unsaturated alcohols, which can be RCM-cyclized to a vinylsilyl ether, which in turn can be subjected to a silicon-based cross-coupling.[4]



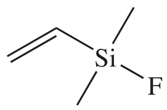
COMMERCIAL

1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 157-161.
2. Denmark, S. E.; Lang, S. M. *Org. Lett.* **2001,** *3*, 1749.
3. Belardi J. K.; Micalizio, G. C. *J. Am. Chem. Soc.* **2008**, *130*, 16870.
4. Denmark, S. E.; Yang, S.-M. *Org. Lett.* **2003**, *3*, 1749.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[1719-58-0] (既) 2-2042 TSCA EC 217-007-1 HMIS: 3-4-1-X 25g ¥7,100 250g ¥45,200



SIV9072.0
VINYLDIMETHYLETHOXYSILANE
$C_6H_{14}OSi$ | 130.26 | 99-100° | | 0.790 | 1.3983
Dipole moment: 1.23 debye
Flashpoint: 4°C (39°F)
Vinylates aryl halides.[1]
1. Denmark, S. E.; Butler, C. R. *J. Am. Chem. Soc.* **2008**, *130*, 3690.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5356-83-2] (既) 2-2055 TSCA EC 226-341-7 HMIS: 2-4-1-X 10g ¥9,800 50g ¥28,900

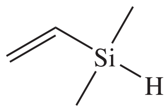
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIV9073.0
VINYLDIMETHYLFLUOROSILANE

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
C_4H_9FSi	104.20	42-4°		0.813	1.3615

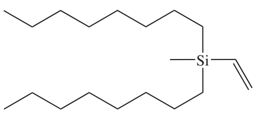
Dipole moment: 2.10 debye
Undergoes photochemical addition of Me_2PH to yield ligand.[1]
1. Grobe, J. et al. *Z. Anorg. Allg. Chem.* **1991,** *592*, 121.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[38755-76-9] HMIS: 3-4-1-X 10g ¥21,500



SIV9073.5
VINYLDIMETHYLSILANE

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_4H_{10}Si$	86.20	36-7°		0.6744^{25}	1.3885^{25}

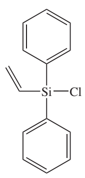
See also SIA0464.0, SIV9096.0, SIV9097.5
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[18243-27-1] HMIS: 3-4-1-X store <5°C 10g ¥42,700



SIV9073.8
VINYLDI-n-OCTYLMETHYLSILANE

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{19}H_{40}Si$	296.61	118-9° / 0.2		0.793	1.4515

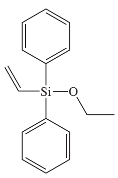
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[475213-01-5] HMIS: 2-1-0-X 10g ¥32,600



SIV9074.0
VINYLDIPHENYLCHLOROSILANE
DIPHENYLVINYLCHLOROSILANE

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{14}H_{13}ClSi$	244.80	125° / 0.5		1.104	1.579

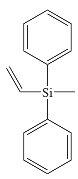
Flashpoint: >110°C (>230°F)
Employed in the conversion of β-haloethanols to homoallylic alcohols.[1]
1. Sugimoto, I. et al. *J. Org. Chem.* **1999,** *64*, 7153.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[18419-53-9] TSCA EC 242-297-1 HMIS: 3-1-1-X 10g ¥14,600 50g ¥48,000



SIV9076.0
VINYLDIPHENYLETHOXYSILANE

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{16}H_{18}OSi$	254.40	135° / 13		1.052	1.5489

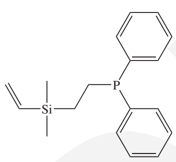
Flashpoint: 97°C (207°F)
Vinyl group will undergo Diels-Alder reaction
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[17933-85-6] TSCA EC 241-870-3 HMIS: 2-1-1-X 10g ¥16,200 50g ¥54,400



SIV9076.5
VINYLDIPHENYLMETHYLSILANE

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{15}H_{16}Si$	224.37	88° / 0.3		1.5705	0.997

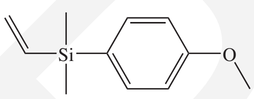
Flashpoint: 125°C (257°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[13107-13-6] HMIS: 2-1-0-X 25g ¥35,300



SIV9077.0
VINYL(DIPHENYLPHOSPHINOETHYL)DIMETHYLSILANE

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{18}H_{23}PSi$	298.43				

HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[76734-22-0] HMIS: 2-2-0-X 5g ¥46,900

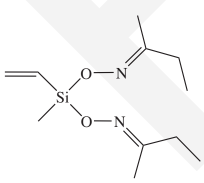


SIV9079.0
VINYL(p-METHOXYPHENYL)DIMETHYLSILANE
p-ANISYLDIMETHYLVINYLSILANE

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{11}H_{16}OSi$	192.33	96-8° / 10		0.94	1.515

See also SIA0469.0
HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions
[55153-99-6] HMIS: 2-2-0-X 10g ¥20,400

VINYLMETHYLBIS(DIMETHYLAMINO)SILANE - see SIB1080.0 BIS(DIMETHYLAMINO)VINYLMETHYLSILANE



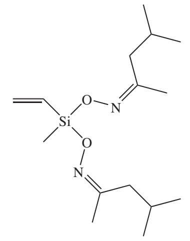
SIV9080.0
VINYLMETHYLBIS(METHYLETHYLKETOXIMINO)SILANE, 95%

Formula	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}
$C_{11}H_{22}N_2O_2Si$	242.39		(-40°)	0.92	

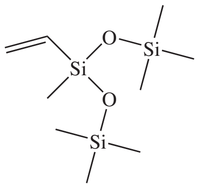
Flashpoint: 31°C (88°F)
TOXICITY: oral rat, LD50: 1,840 mg/kg
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[73160-32-4] HMIS: 3-3-1-X 50g ¥37,400

SILICON COMPOUNDS

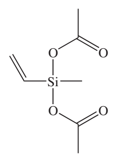
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



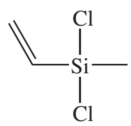
SIV9081.0
VINYLMETHYLBIS(METHYLISOBUTYLKETOXIMINO)SILANE, tech-95
$C_{15}H_{30}N_2O_2Si$ 298.50 89-94° / 1 (-93°) 0.905 1.4505
Contains isomers
Flashpoint: >65°C (>150°F)
TOXICITY: oral rat, LD50: 1,160 mg/kg
Autoignition temperature: 266˚C
Neutral chain extender for moisture-cure silicones
See also SIM6590.2
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[156145-66-3] TSCA HMIS: 3-3-1-X 25g ¥11,100 2kg ¥138,600



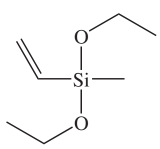
SIV9082.0
VINYLMETHYLBIS(TRIMETHYLSILOXY)SILANE
3-VINYLHEPTAMETHYLTRISILOXANE
$C_9H_{24}O_2Si_3$ 248.54 49° / 8 0.836 1.3951
Dipole moment: 0.93 debye
Copolymerization parameters- e,Q: -0.780, 0.036
Flashpoint: 51°C (124°F)
Vapor pressure, 50°: 8 mm
Polymerization initiated with peroxides or polysilanes.[1]
1. Smenov, V. et al. *Dokl. Akad. Nauk SSSR* **1989,** *309*, 119.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[5356-85-4] TSCA HMIS: 1-2-0-X 25g ¥10,300 100g ¥26,000



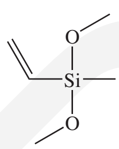
SIV9083.0
VINYLMETHYLDIACETOXYSILANE
$C_7H_{12}O_4Si$ 188.25 56° / 9 1.0635 1.4250
Flashpoint: 42°C (108°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2944-70-9] (既) 2-569 TSCA EC 220-954-3 HMIS: 3-2-1-X 10g ¥10,900 50g ¥33,200



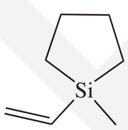
SIV9084.0
VINYLMETHYLDICHLOROSILANE
$C_3H_6Cl_2Si$ 141.07 92-3° (-78°) 1.087 1.4270
Viscosity: 0.70 cSt
ΔHvap: 33.9 kJ/mole
Flashpoint: 4°C (39°F)
TOXICITY: ipr mouse, LD50: 270 mg/kg
Critical temperature: 272˚C
Coefficient of thermal expansion: 1.4×10^{-3}
Used as a tether in synthesis of C-glycosides.[1]
Reacts to vinylate aryl halides under NaOH-moderated conditions.[2]
1. Shuto, S. et al. *J. Org. Chem.* **2000,** *65*, 5547.
2. Hagiwara, E. et al. *Tetrahedron Lett.* **1997**, *38*, 439.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[124-70-9] (既) 2-2042 TSCA EC 204-710-3 HMIS: 3-4-1-X 25g ¥3,400 1kg ¥24,000 18kg ¥261,000
COMMERCIAL



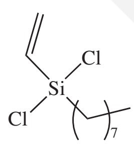
SIV9085.0
VINYLMETHYLDIETHOXYSILANE
$C_7H_{16}O_2Si$ 160.29 133-4° 0.858 1.3998
Dipole moment: 1.27 debye
Copolymerization parameters- e,Q; -0.86, 0.020
Flashpoint: 16°C (61°F)
Chain extender, crosslinker for silicone RTVs and hydroxy-functional resins
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5507-44-8] (既) 2-2055 TSCA EC 226-850-4 HMIS: 2-4-1-X 25g ¥6,300 2kg ¥77,000 15kg ¥361,000
COMMERCIAL



SIV9086.0
VINYLMETHYLDIMETHOXYSILANE
$C_5H_{12}O_2Si$ 132.23 103° 0.889 1.395
Viscosity: 0.7 cSt
Flashpoint: 15°C (59°F)
Autoignition temperature: 245˚C
Vapor pressure, 20°: 38 mm
Additive to moisture-cure silane modified polyurethanes as a water scavenger to prevent premature cure
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[16753-62-1] TSCA EC 240-816-6 HMIS: 3-4-1-X 25g ¥7,700 100g ¥17,200 2kg ¥72,300
COMMERCIAL

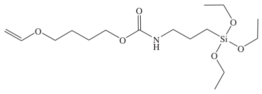


SIV9087.0
1-VINYL-1-METHYLSILACYCLOPENTANE
$C_7H_{14}Si$ 126.27 53° / 50 0.815 1.4571
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[3944-18-1] HMIS: 2-4-0-X 25g ¥65,000

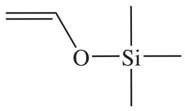


SIV9088.0
VINYLOCTYLDICHLOROSILANE
$C_{10}H_{20}Cl_2Si$ 239.26 95° / 5 0.99
Flashpoint: 99°C (210°F)
Intermediate for hydrocarbon compatible silicones
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[211985-85-2] HMIS: 3-2-1-X 10g ¥25,200

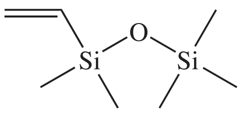
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIV9088.4
O-(VINYLOXYBUTYL)-N-TRIETHOXYSILYLPROPYL CARBAMATE, tech-95
$C_{16}H_{33}NO_6Si$ 363.53 1.015 1.4454
Inhibited with MEHQ
UV reactive coupling agent
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[159856-61-8] HMIS: 3-2-1-X 10g ¥25,200

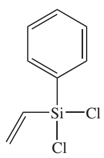


SIV9089.0
VINYLOXYTRIMETHYLSILANE
O-TRIMETHYLSILYLVINYL ALCOHOL
$C_5H_{12}OSi$ 116.23 74-5° 0.77 1.3880
Flashpoint: -10°C (14°F)
Source of acetaldehyde enolate
Polymerized with $SnCl_4$ or $EtAlCl_2$ catalysts.[1,2]
Reacts with benzyl methyl ethers to form β-methoxyaldehydes.[3]
1. Murahasi, S. et al. *J. Polym. Sci., Polym. Lett. Ed.* **1965,** *3*, 245.
2. Nozakura, S. et al. *J. Polym. Sci.* **1973,** *11*, 1053.
3. Ying, B.-P. et al. *Org. Lett.* **2004**, *6*, 1523.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[6213-94-1] (既) 2-2960 TSCA EC 228-281-7 HMIS: 3-4-1-X 5g ¥14,100 25g ¥45,900

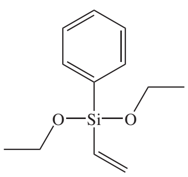


SIV9090.0
VINYLPENTAMETHYLDISILOXANE
$C_7H_{18}OSi_2$ 174.39 120° 0.787 1.3930^{25}
Copolymerization parameters, e,Q: -0.810,0.034
Flashpoint: 12°C (54°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1438-79-5] TSCA HMIS: 2-4-0-X 25g ¥17,200 100g ¥48,300

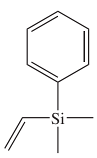
VINYLPHENETHYLTRIMETHOXYSILANE - see SIS6990.0 STYRYLETHYLTRIMETHOXYSILANE



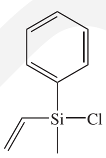
SIV9092.0
VINYLPHENYLDICHLOROSILANE
$C_8H_8Cl_2Si$ 203.14 84-7° / 1.5 (-43°) 1.196^{25} 1.5322
Viscosity, 20°: 1.2 cSt
Flashpoint: 90°C (194°F)
Surface tension, 27°: 32.5 mN/m
Heat capacity, 27°: 1.243 kJ/kg°C
See also SIA0486.0, SIV9092.2
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[7719-02-0] TSCA EC 231-746-7 HMIS: 3-2-1-X 10g ¥11,900 50g ¥37,400



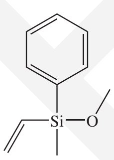
SIV9092.2
VINYLPHENYLDIETHOXYSILANE
$C_{12}H_{18}O_2Si$ 222.36 120° / 17 0.959 1.4812
Flashpoint: 88°C (190°F)
Autoignition temperature: 258°C
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[40195-27-5] HMIS: 2-2-1-X 25g ¥28,900



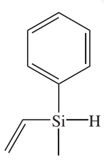
SIV9093.0
VINYLPHENYLDIMETHYLSILANE
$C_{10}H_{14}Si$ 162.30 82° / 20 0.8919 1.5048
Flashpoint: 59°C (140°F)
Undergoes BuLi-catalyzed anionic polymerizations.[1,2]
1. Gan, Y. et al. *Polymer Preprints* **1993,** *34*, 548.
2. Rickle, G. *J. Macromol Sci., Chem.* **1986,** *A23*, 1287.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1125-26-4] HMIS: 2-3-0-X 10g ¥11,900 50g ¥37,400



SIV9094.0
VINYLPHENYLMETHYLCHLOROSILANE
$C_9H_{11}ClSi$ 182.72 79-80° / 3-4 1.034 1.5197
Flashpoint: 72°C (162°F)
Endcapper for thermally stable Pt cure silicone elastomers
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[17306-05-7] (既) 3-1165 TSCA EC 241-333-3 HMIS: 3-2-1-X 10g ¥12,700 50g ¥40,600

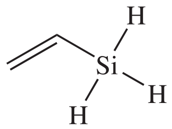


SIV9095.0
VINYLPHENYLMETHYLMETHOXYSILANE
$C_{10}H_{14}OSi$ 178.30 60-2° / 2 0.95 1.5005
Flashpoint: 68°C (154°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[80252-60-4] HMIS: 3-2-1-X 10g ¥13,800 50g ¥44,800



SIV9096.0
VINYLPHENYLMETHYLSILANE
$C_9H_{12}Si$ 148.28 56-7° / 7 0.891 1.5115
Flashpoint: 58°C (136°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[17878-39-6] TSCA EC 241-830-5 HMIS: 2-2-1-X 10g ¥26,300

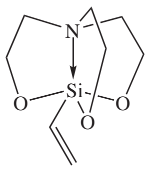
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIV9096.7
VINYLSILANE

C_2H_6Si	58.16	-22.8°	(-171 to -179°)	0.666^{-23}	

ΔHcomb: -2,524 kJ/mole
ΔHvap: 21.4 kJ/mole
Dipole moment: 0.66 debye
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[7291-09-0] EC 230-719-7 HMIS: 3-4-2-X 10g inquire
** includes cylinder*

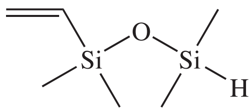


SIV9097.0
VINYLSILATRANE

$C_8H_{15}NO_3Si$	201.30		(163-5°)		

Flashpoint: >110°C (>230°F)
TOXICITY: ipr mouse, LD50: 3,000 mg/kg
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[2097-18-9] TSCA EC 218-262-1 HMIS: 1-1-0-X 10g ¥19,400

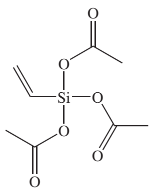
VINYL (MONO) TERMINATED POLYDIMETHYLSILOXANES - see MACROMERS
VINYL (DI) TERMINATED POLYDIMETHYLSILOXANES - see REACTIVE SILICONES



SIV9097.5
VINYL-1,1,3,3-TETRAMETHYLDISILOXANE

$C_6H_{16}OSi_2$	160.36	107-8°		0.784	1.3947

Flashpoint: 12°C (54°F)
HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[55967-52-7] EC 259-923-4 HMIS: 2-3-1-X 25g ¥25,200

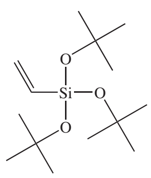


SIV9098.0
VINYLTRIACETOXYSILANE

$C_8H_{12}O_6Si$	232.26	112-3° / 1	(10-13°)	1.167	1.423

Flashpoint: 88°C (190°F)
Crosslinker for moisture-cure silicone RTVs with greater liquid range for formulation, faster moisture-cure rate and better substrate adhesion properties than methyltriacetoxysilane
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[4130-08-9] (既) 2-2036 TSCA EC 223-943-1 HMIS: 3-2-1-X store <5°C 100g ¥5,600 2kg ¥55,000 18kg ¥284,000

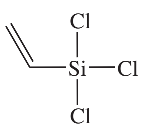
COMMERCIAL



SIV9099.0
VINYLTRI-t-BUTOXYSILANE

$C_{14}H_{30}O_3Si$	274.47	54° / 2		0.869	

Flashpoint: 79°C (174°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[5356-88-7] EC 226-343-8 HMIS: 2-2-1-X 10g ¥21,000 50g ¥73,500

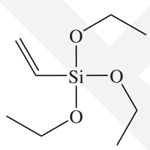


SIV9110.0
VINYLTRICHLOROSILANE

$C_2H_3Cl_3Si$	161.49	93°	(-95°)	1.2426	1.4295

Viscosity: 0.50 cSt
ΔHform: -5,781 kJ/mole
ΔHvap: 33.1 kJ/mole
Flashpoint: 21°C (69°F)
TOXICITY: oral rat, LD50: 3,160 mg/kg
Vapor pressure, 23°: 60 mm
Specific heat: 0.84 J/g/°
Coefficient of thermal expansion: 1.6×10^{-3}
F&F: Vol. 5, p 749.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[75-94-5] (既) 2-2037 TSCA EC 200-917-8 HMIS: 3-4-1-X 25g ¥7,200 1kg ¥26,600 20kg ¥255,000

COMMERCIAL



SIV9112.0 サイラエース **S220**
VINYLTRIETHOXYSILANE

$C_8H_{18}O_3Si$	190.31	160-1°		0.903	1.3960

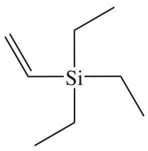
ΔHform: -1,940 kJ/mole
ΔHvap: 28.5 kJ/mole
Dipole moment: 1.69 debye
Specific wetting surface area: 412 m^2/g
Copolymerization parameters- e,Q: -0.42, 0.028
γc of treated glass surface: 25 mN/m
Flashpoint: 44°C (111°F)
TOXICITY: oral rat, LD50: 22,500 mg/kg
Autoignition temperature: 268°C
Vapor pressure, 20°: 5 mm
Specific heat: 1.05 J/g/°
Relative hydrolysis rate versus SIV9220.0, vinyltrimethoxysilane; 0.05
Forms copolymers with ethylene
Couples fillers or fiberglass to resins
Reacts with enamines to give (E)-β-silylenamines, which cross-couple w/ aryl iodides to give β-aryl enamines.[1]
Extensive review on the use in silicon-based cross-coupling reactions.[2]

1. Marciniec, B. et al. *J. Org. Chem.* **2005**, *70*, 8550.
2. Denmark, S. E. et al. *Organic Reactions,* Vol. 75, Denmark, S. E. ed., John Wiley and Sons, 233, **2011**.

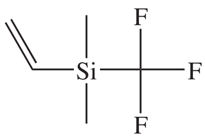
See VEE-005 for polymeric version
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[78-08-0] (既) 2-2066 TSCA EC 201-081-7 HMIS: 1-2-1-X サイラエース S220 100g ¥4,900 1kg ¥9,300 25g inquire 2kg inquire 16kg inquire

COMMERCIAL

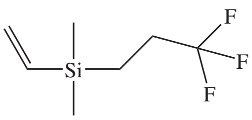
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



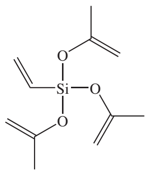
SIV9116.0
VINYLTRIETHYLSILANE
$C_8H_{18}Si$ — 142.32 — 146-7° — 0.771 — 1.4340
Flashpoint: 25°C (77°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[1112-54-5] HMIS: 2-3-0-X 25g ¥60,700



SIV9205.0
VINYL(TRIFLUOROMETHYL)DIMETHYLSILANE, 96%
$C_5H_9F_3Si$ — 154.21 — 80° — 0.978 — 1.3549
Flashpoint: -10°C (14°F)
Monomer for high permeability membranes
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[211985-86-3] HMIS: 3-4-0-X 2.5g ¥22,500 10g ¥65,500

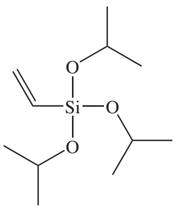


SIV9208.0
VINYL(3,3,3-TRIFLUOROPROPYL)DIMETHYLSILANE
$C_7H_{13}F_3Si$ — 182.26 — 113-5° — 0.968^{25} — 1.3765^{25}
Flashpoint: 22°C (72°F)
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[84442-77-3] HMIS: 2-4-0-X 2.5g ¥19,900 10g ¥57,000



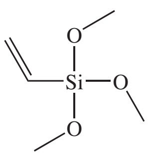
SIV9209.0
VINYLTRIISOPROPENOXYSILANE, tech-95
$C_{11}H_{18}O_3Si$ — 226.35 — 73-5° / 12 — 0.926 — 1.4373
Employed as a cross-linker and in vapor phase derivatization; byproduct is acetone
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[15332-99-7] (既) 2-3197 TSCA EC 239-362-1 HMIS: 1-3-1-X 25g ¥8,500 100g ¥19,900 2kg ¥121,000

COMMERCIAL



SIV9210.0
VINYLTRIISOPROPOXYSILANE
$C_{11}H_{24}O_3Si$ — 232.39 — 179-81° — 0.8659 — 1.3961^{25}
Copolymerization parameters- e,Q: -0.36, 0.031
Flashpoint: 51°C (124°F)
Vapor pressure, 60°: 4 mm
Used for free-radical cure water-borne resin systems
Adhesion promotor for vinyl acetate/ethylene latex
Relative hydrolysis rate versus vinyltrimethoxysilane; 0.0015
See also SIV9089.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18023-33-1] (既) 2-2066 TSCA EC 241-931-4 HMIS: 1-2-1-X 25g ¥6,100 100g ¥11,900 2kg ¥83,000

COMMERCIAL



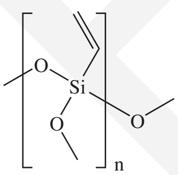
SIV9220.0 サイラエース **S210**
VINYLTRIMETHOXYSILANE
$C_5H_{12}O_3Si$ — 148.23 — 123° — 0.970 — 1.3930
Viscosity: 0.6 cSt
Copolymerization parameters- e,Q: -0.38, 0.031
Specific wetting surface area: 528 m²/g
Flashpoint: 28°C (82°F)
TOXICITY: oral rat, LD50: 8,000 mg/kg
Autoignition temperature: 235°C
Vapor pressure, 20°: 9 mm
Employed in two-stage[1] and one-stage[2] graft polymerization/crosslinking for PE
Copolymerizes with ethylene to form moisture crosslinkable polymers.[3]
Converts arylselenyl bromides to arylvinylselenides.[4]
Reacts with anhydrides to transfer both vinyl and methoxy and thus form the mixed diester.[5]
Cross-couples w/ α-bromo esters to give α-vinyl esters in high ee.[6]

1. Scott, H. U.S. Patent 3,646,155, 1972.
2. Swarbrick, P. et al. U.S. Patent 4,117,195, 1978.
3. Isaka, T. et al. U.S. Patent 4,413,066, 1983.
4. Bhadra, S. et al. *J. Org. Chem.* **2010**, *75*, 4864.
5. Luo, F. et al. *J. Org. Chem.* **2010**, *75*, 5379.
6. Strotman, N. A.; Sommer, S.; Fu, G. C. *Angew. Chem., Int. Ed. Engl.* **2007**, *46*, 3556.

See also SIV9220.2
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
サイラエース S210 100g ¥4,900 1kg ¥9,300
[2768-02-7] (既) 2-2066 TSCA EC 220-449-8 HMIS: 3-3-1-X 25g inquire 2kg inquire 16kg inquire

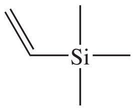
COMMERCIAL

Vinylsilanes are used in PE and EPDM insulated wire and cable



SIV9220.2
VINYLTRIMETHOXYSILANE, oligomeric hydrolysate
1.10 — 1.428
Viscosity: 8-10 cSt
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[131298-48-1] TSCA HMIS: 2-2-1-X 100g ¥7,000 2kg ¥80,000

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}

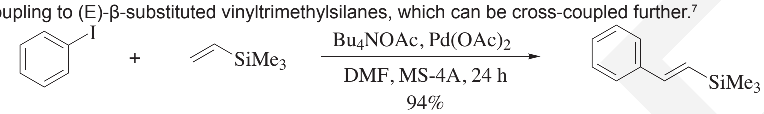


SIV9250.0
VINYLTRIMETHYLSILANE

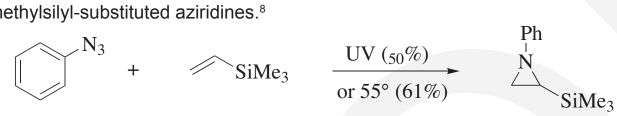
$C_5H_{12}Si$	100.24	55°	(-132°)	0.6903	1.3910

Viscosity, 20°: 0.5 cSt
ΔHcomb: 4,133 kJ/mole
ΔHfus: 7.7 kJ/mole
Copolymerization parameters- e,Q: 0.04, 0.029
Flashpoint: -20°C (-4°F)
TOXICITY: oral rat, LD50: >2,000 mg/kg
Autoignition temperature: 295°C

Forms polymers which can be fabricated into oxygen enrichment membranes
Review of synthetic utility.[1,2]
Polymerization catalyzed by alkyllithium compounds.[2,3,4]
Synthetic reactions of vinylsilanes reviewed.[5,6]
Undergoes Heck coupling to (E)-β-substituted vinyltrimethylsilanes, which can be cross-coupled further.[7]

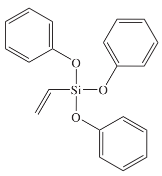


Reacts w/ azides to form trimethylsilyl-substituted aziridines.[8]



1. *Handbook of Reagents for Organic Synthesis, Reagents for Silicon-Mediated Organic Synthesis*, Fuchs, P. L. Ed., John Wiley and Sons, Ltd., 2011, p. 755-761.
2. Oku, J. et al. *Polymer J.* **1991,** *23*, 1377; *Macromolecules* **1992,** *25*, 2780.
3. Gan, Y. et al. *Macromolecules* **1996,** *29*, 8285.
4. Rickle, G. J. *Macromol. Sci.* **1987,** *A24*, 93.
5. Hudrlik, P. In *New Applications of Organometallic Reagents in Organic Synthesis;* Seyferth, D., Ed.; Elsevier: 1976.
6. F&F: Vol. 5, p 375; Vol. 6, p 637.
7. Jeffery, T. *Tetrahedron Lett.* **1999**, *40*, 1673.
8. Bassindale, A. R. et al. *J. Chem. Soc., Perkin Trans. 1* **2000**, 1173.
F&F: Vol. 9, p 498; Vol. 10, p 44; Vol. 11, p 41; Vol. 12, p 566.

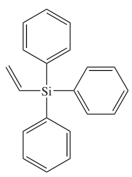
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[754-05-2] TSCA EC 212-042-9 HMIS: 2-4-0-X 10g ¥9,800 100g ¥49,100



SIV9264.0
VINYLTRIPHENOXYSILANE

$C_{20}H_{18}O_3Si$	334.45	210° / 7		1.130^{25}	1.562^{25}

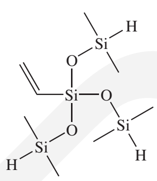
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[18666-65-4] TSCA EC 242-486-9 HMIS: 3-2-1-X 25g ¥24,100



SIV9265.0
VINYLTRIPHENYLSILANE

$C_{20}H_{18}Si$	286.45		(58-61°)		

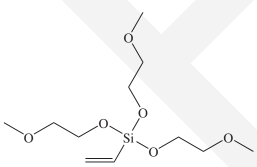
Flashpoint: >110°C (>230°F)
Reacts w/ organolithium reagents to form α-lithiotriphenylsilanes
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[18666-68-7] TSCA EC 242-487-4 HMIS: 1-1-0-X 10g ¥15,600



SIV9269.5
VINYLTRIS(DIMETHYLSILOXY)SILANE

$C_8H_{24}O_3Si_4$	280.61	45° / 10			

HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base
[160172-46-3] TSCA HMIS: 1-3-1-X 50g ¥41,100



SIV9275.0
VINYLTRIS(2-METHOXYETHOXY)SILANE

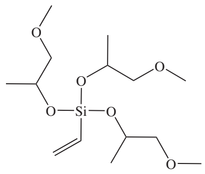
$C_{11}H_{24}O_6Si$	280.39	284-6°		1.0336^{25}	1.4271^{25}

Flashpoint: 115°C (239°F)
TOXICITY: oral rat, LD50: 2,960mg/kg
Autoignition temperature: 210°C
Vapor pressure, 108°: 2 mm

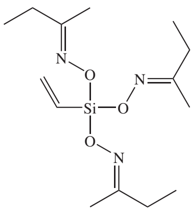
COMMERCIAL

Employed in peroxide graft-moisture crosslinking of polyethylene
Relative hydrolysis rate versus SIV9220.0, vinyltrimethoxysilane; 0.50
Coupling agent for kaolin in EPDM/PE cable formulations.[1]
1. Arkles, B. et al. *Modern Plastics* **1987,** *64*, 138.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[1067-53-4] (既) 2-2067 TSCA EC 213-934-0 HMIS: 3-1-1-X 50g ¥3,400 2kg ¥40,000 18kg ¥205,000

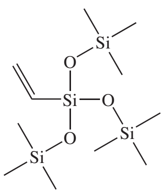
Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIV9277.0
VINYLTRIS(1-METHOXY-2-PROPOXY)SILANE
$C_{14}H_{30}O_6Si$ 322.47 0.981 1.424
Flashpoint: 122°C (252°F)
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[303746-21-6] HMIS: 2-1-1-X 25g ¥10,900 100g ¥27,800

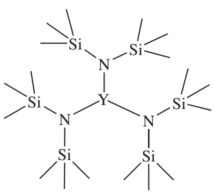


SIV9280.0
VINYLTRIS(METHYLETHYLKETOXIMINO)SILANE, tech-95
$C_{14}H_{27}N_3O_3Si$ 313.47 113° / 0.1 (-22°) 0.982^{25} 1.465
Neutral cross-linker/coupling agent for condensation cure silicones
Byproduct: methylethylketoxime
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[2224-33-1] TSCA EC 218-747-8 HMIS: 3-3-1-X 50g ¥7,700 2kg ¥56,400 16kg ¥242,000
COMMERCIAL

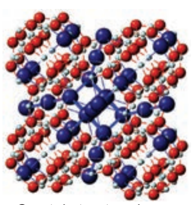


SIV9300.0
VINYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{11}H_{30}O_3Si_4$ 322.70 78° / 15 0.8657 1.3971
Dipole moment: 0.93 debye
Copolymerization parameters- e,Q: -0.690, 0.030
Undergoes hydrosilylation reactions
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[5356-84-3] TSCA EC 226-342-2 HMIS: 2-2-0-X 25g ¥15,400 100g ¥42,200

WOLLASTONITE - see SIC2050.0 CALCIUM METASILICATE

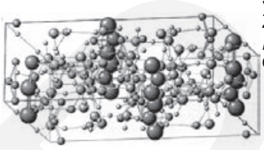


SIY9680.0
YTTRIUM(III) TRIS[BIS(TRIMETHYLSILYLAMIDE)]
YTTRIUM(III) TRIS(HEXAMETHYLDISILAZIDE)
$C_{18}H_{54}N_3Si_6Y$ 570.06 105° / 10^{-4} sub. (180-4°)
Employed in CVD of yttria stabilized coatings
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[41836-28-6] HMIS: 3-2-1-X 5g ¥67,100

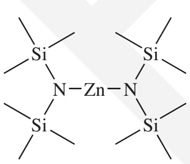

Crystal structure image courtesy of webmineral.com

SIZ9692.0
ZEOLITE-CHABAZITE
HYDRATED SODIUM CHABAZITE
$CaAl_2Si_4O_{12}·6H_2O$ 1039.07 1.73 1.48
Particle Size: <74 µm
Typical bulk density, not compacted: 0.18 g/cm³
Effective pore diameter: 4.3 Å
Surface area: 500-550 m²/g
Slurry pH: 8.5
Colorless to white
Mohs Hardness: 4.0
Triclinic pinacoidal
Bulk density: 0.55-0.60 g/cm³
Electron Density: 2.07 gm/cc
Used in molecular sieves, gas adsorption, detergents, cation exchange, catalysis
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12251-32-0] TSCA-E HMIS: 1-0-0-X 500g ¥10,900 3kg ¥37,900

ZEOLITE - FAUJASITE - see SIM6594.7 MOLECULAR SIEVES, 13X


Crystal structure image courtesy of webmineral.com

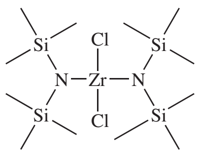
SIZ9696.0
ZEOLITE-MORDENITE
HYDRATED CALCIUM SODIUM POTASSIUM ALUMINUM SILICATE
$Ca_{0.6}Na_{0.15}K_{0.05}Al_2Si_{10}O_{24}·7H_2O$ 874.11 2.12 1.47
Particle Size: <74 µm
Typical bulk density, not compacted: 0.16 g/cm³
Colorless to white prismatic minute crystals
Mohs Hardness: 5.0
Orthorhombic pyramidal
Used in molecular sieves, gas adsorption, detergents, cation exchange, catalysis
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12445-20-4] TSCA-E HMIS: 1-0-0-X 500g ¥54,900



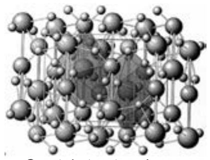
SIZ9700.0
ZINC BIS(HEXAMETHYLDISILAZIDE)
ZINC BIS[BIS(TRIMETHYLSILYL)AMIDE]
$C_{12}H_{36}N_2Si_4Zn$ 386.15 82-7° / 0.5 (12-3°) 0.957 1.4506
Flashpoint: 40°C (104°F)
Converts aryl bromides and chlorides to anilines.[1]
1. Lee, D.-Y.; Hartwig, J. F. *Org. Lett.* **2005,** *7*, 1169.
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[3999-27-7] HMIS: 3-3-1-X 1.0g ¥38,500

SILICON COMPOUNDS

Name	Mw	bp °C/mm	(mp °C)	D_4^{20}	n_D^{20}



SIZ9810.0
ZIRCONIUM BIS(HEXAMETHYLDISILAZIDE)DICHLORIDE, tech-95
$C_{12}H_{36}Cl_2N_2Si_4Zr$ — Mw 482.90 — (50°)
Precursor for ALD of ZrO_2.[1]
1. Nam, W. et al. *Chem. Vap. Deposition* **2004,** *10*, 201.
See also SIZ9920.0
HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents
[70969-28-7] HMIS: 3-2-1-X 10g ¥31,600

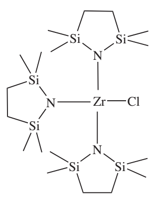


Crystal structure image courtesy of webmineral.com

SIZ9850.0
ZIRCONIUM SILICATE
ZIRCON
O_4SiZr — Mw 183.30 — (2,550°) — D_4^{20} 4.56 — n_D^{20} 1.925
~200 mesh powder
Resistivity: 10^{14} ohm-cm
Mohs Hardness: 7.5
Dielectric constant: 9.4 - 12.7
Forms zirconium boride ceramics in combination with SiB_6.[1]
1. Low, I. *Key Eng. Mater.* **1992,** *53b*, 592.
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[10101-52-7] (既) 1-550 TSCA-E EC 233-252-7 HMIS: 1-0-0-X 500g ¥10,900 2.5kg ¥35,500

$ZrSi_2$

SIZ9860.0
ZIRCONIUM SILICIDE, powder, 99%
Si_2Zr — Mw 147.39 — (1,620°) — D_4^{20} 4.880
Average particle size: 10 µm
HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems
[12039-90-6] TSCA EC 234-911-1 HMIS: 2-0-0-X 25g ¥13,000



SIZ9920.0
ZIRCONIUM TRIS(2,2,5,5-TETRAMETHYL-2,5-DISILAPYRROLIDINE)CHLORIDE, tech-95
$C_{18}H_{48}ClN_3Si_6Zr$ — Mw 601.79 — (>200°)
Light yellow solid; contains tetrakis analog
For ALD of ZrO_2
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
HMIS: 3-2-1-X 10g ¥77,700

Molecular formula	Catalog #	Name
B_6Si	SIS6968.0	SILICON HEXABORIDE
Br_4Si	SIT7050.0	TETRABROMOSILANE
CaO_3Si	SIC2050.0	CALCIUM METASILICATE
$CaSi_2$	SIC2054.0	CALCIUM SILICIDE, tech-95, powder
Cl_4Si	SIT7085.0	TETRACHLOROSILANE, 98%
Cl_4Si	SIT7085.1	TETRACHLOROSILANE, 99.99%
Cl_6OSi_2	SIH5910.0	HEXACHLORODISILOXANE, 95%
Cl_6Si_2	SIH5905.0	HEXACHLORODISILANE
Cl_6Si_2	SIH5905.1	HEXACHLORODISILANE, 99.9%
$Cl_8O_2Si_3$	SIO6605.0	OCTACHLOROTRISILOXANE, 95%
Cl_8Si_3	SIO6601.0	OCTACHLOROTRISILANE, tech-95
$Cl_{12}Si_5$	SIT7294.0	TETRAKIS(TRICHLOROSILYL)SILANE
CCl_6Si	SIT8153.0	TRICHLOROMETHYLTRICHLOROSILANE, 50% in toluene
CH_2Cl_4Si	SIC2298.0	CHLOROMETHYLTRICHLOROSILANE
$CH_2Cl_6Si_2$	SIB1813.0	BIS(TRICHLOROSILYL)METHANE
CH_3Cl_3Si	SIM6520.0	METHYLTRICHLOROSILANE, 98%
CH_3Cl_3Si	SIM6520.1	METHYLTRICHLOROSILANE, 99%
CH_3F_3Si	SIM6558.0	METHYLTRIFLUOROSILANE
CH_4Cl_2Si	SIM6504.0	METHYLDICHLOROSILANE
$CH_4Cl_4Si_2$	SIB1064.0	BIS(DICHLOROSILYL)METHANE, tech-95
CH_5KO_3Si	SIP6898.0	POTASSIUM METHYLSILICONATE, 40% in water
CH_5NaO_3Si	SIS6984.0	SODIUM METHYLSILICONATE, 30% in water
CH_6Si	SIM6515.0	METHYLSILANE
CH_6Si	SIM6515.1	METHYLSILANE, 99.9+%
CH_8Si_2	SID4595.0	1,3-DISILAPROPANE
CSi	SIS6959.0	SILICON CARBIDE, powder. 35-60µ
$C_2Cl_6Si_2$	SIB1805.0	BIS(TRICHLOROSILYL)ACETYLENE
$C_2H_3Br_2Cl_3Si$	SID2756.0	1,2-DIBROMOETHYLTRICHLOROSILANE
$C_2H_3Cl_3Si$	SIV9110.0	VINYLTRICHLOROSILANE
$C_2H_4BrCl_3Si$	SIB1880.0	2-BROMOETHYLTRICHLOROSILANE, 95%
$C_2H_4Cl_4Si$	SIC2269.0	1-CHLOROETHYLTRICHLOROSILANE, tech-95
$C_2H_4Cl_4Si$	SIC2270.0	2-CHLOROETHYLTRICHLOROSILANE, 95%
$C_2H_4Cl_4Si$	SID3362.0	(DICHLOROMETHYL)METHYLDICHLOROSILANE, tech-95
$C_2H_4Cl_6Si_2$	SIB1810.0	1,2-BIS(TRICHLOROSILYL)ETHANE, 95%
$C_2H_5Cl_3Si$	SIC2290.0	CHLOROMETHYLMETHYLDICHLOROSILANE
$C_2H_5Cl_3Si$	SIE4901.0	ETHYLTRICHLOROSILANE
$C_2H_6Cl_2Si$	SID4120.0	DIMETHYLDICHLOROSILANE, 98%
$C_2H_6Cl_2Si$	SID4120.1	DIMETHYLDICHLOROSILANE, 99+%
$C_2H_6Cl_2Si$	SIE4890.0	ETHYLDICHLOROSILANE
$C_2H_6Cl_4Si_2$	SIT7084.0	1,1,3,3-TETRACHLORO-1,3-DISILABUTANE, tech-90
$C_2H_6F_2Si$	SID4122.0	DIMETHYLDIFLUOROSILANE
C_2H_6Si	SIV9096.7	VINYLSILANE
C_2H_7ClSi	SIC2268.5	2-CHLOROETHYLSILANE
C_2H_7ClSi	SID4070.0	DIMETHYLCHLOROSILANE
C_2H_7FSi	SID4145.0	DIMETHYLFLUOROSILANE
C_2H_8Si	SID4230.0	DIMETHYLSILANE
C_2H_8Si	SIE4898.0	ETHYLSILANE
$C_2H_{10}Si_2$	SID4592.0	1,3-DISILABUTANE
$C_2H_{10}Si_2$	SID4593.0	1,4-DISILABUTANE
$C_2H_{12}Si_3$	SIT8709.8	1,3,5-TRISILAPENTANE
$C_3H_4Cl_3F_3Si$	SIT8371.0	(3,3,3-TRIFLUOROPROPYL)TRICHLOROSILANE
$C_3H_4Cl_3NSi$	SIC2442.0	2-CYANOETHYLTRICHLOROSILANE
$C_3H_5Cl_3Si$	SIA0520.0	ALLYLTRICHLOROSILANE
$C_3H_6BrCl_3Si$	SIB1905.0	3-BROMOPROPYLTRICHLOROSILANE
$C_3H_6Cl_2Si$	SIA0445.0	ALLYLDICHLOROSILANE
$C_3H_6Cl_2Si$	SIC2568.0	CYCLOTRIMETHYLENEDICHLOROSILANE
$C_3H_6Cl_2Si$	SIV9084.0	VINYLMETHYLDICHLOROSILANE
$C_3H_6Cl_4Si$	SIC2405.0	3-CHLOROPROPYLTRICHLOROSILANE
$C_3H_6Cl_6Si_2$	SIB1815.0	1,3-BIS(TRICHLOROSILYL)PROPANE
$C_3H_6Na_2O_5Si$	SIC2263.0	CARBOXYETHYLSILANETRIOL, DISODIUM SALT, 25% in water
$C_3H_7Cl_3Si$	SIB1053.0	BIS(CHLOROMETHYL)METHYLCHLOROSILANE, 95%
$C_3H_7Cl_3Si$	SIC2267.0	2-CHLOROETHYLMETHYLDICHLOROSILANE
$C_3H_7Cl_3Si$	SID3361.0	(DICHLOROMETHYL)DIMETHYLCHLOROSILANE, tech-95
$C_3H_7Cl_3Si$	SII6463.3	ISOPROPYLTRICHLOROSILANE
$C_3H_7Cl_3Si$	SIP6915.0	n-PROPYLTRICHLOROSILANE
$C_3H_8BrClSi$	SIB1890.0	BROMOMETHYLDIMETHYLCHLOROSILANE
$C_3H_8Cl_2Si$	SIC2285.0	CHLOROMETHYLDIMETHYLCHLOROSILANE
$C_3H_8Cl_2Si$	SIE4896.0	ETHYLMETHYLDICHLOROSILANE
C_3H_9BrSi	SIT8430.0	TRIMETHYLBROMOSILANE
C_3H_9ClOSi	SID4210.0	DIMETHYLMETHOXYCHLOROSILANE, 90%
$C_3H_9ClO_3SSi$	SIT8584.0	TRIMETHYLSILYLCHLOROSULFONATE, 95%
C_3H_9ClSi	SIC2289.0	CHLOROMETHYLDIMETHYLSILANE
C_3H_9ClSi	SIT8510.0	TRIMETHYLCHLOROSILANE
C_3H_9ClSi	SIT8510.1	TRIMETHYLCHLOROSILANE, 99+%
$C_3H_9Cl_3GeSi$	GET8561	TRIMETHYLGERMYLTRICHLOROSILANE
$C_3H_9Cl_3OSi_2$	SIT8572.6	TRIMETHYLSILOXYTRICHLOROSILANE
C_3H_9FSi	SIT8525.0	TRIMETHYLFLUOROSILANE
C_3H_9ISi	SIT8564.0	TRIMETHYLIODOSILANE
C_3H_9KOSi	SIP6901.0	POTASSIUM TRIMETHYLSILANOLATE, 95%
C_3H_9KOSi	SIP6901.2	POTASSIUM TRIMETHYLSILANOLATE, 2M in tetrahydrofuran
C_3H_9LiOSi	SIL6469.7	LITHIUM TRIMETHYLSILANOLATE
$C_3H_9N_3Si$	SIT8580.0	TRIMETHYLSILYLAZIDE
C_3H_9NaOSi	SIS6988.0	SODIUM TRIMETHYLSILANOLATE
$C_3H_9O_4ReSi$	SIT8598.0	TRIMETHYLSILYL PERRHENATE
$C_3H_{10}OSi$	SIT8570.3	TRIMETHYLSILANOL, tech-95
$C_3H_{10}O_2Si$	SIM6508.0	METHYLDIMETHOXYSILANE
$C_3H_{10}O_3Si$	SIT8392.0	TRIMETHOXYSILANE, 95%
$C_3H_{10}O_6SSi$	SIT8378.3	3-(TRIHYDROXYSILYL)-1-PROPANESULFONIC ACID, 30-35% in water
$C_3H_{10}Si$	SIT8570.0	TRIMETHYLSILANE
$C_3H_{16}Si_4$	SIT8715.9	TRIS(SILYLMETHYL)SILANE
$C_3H_{11}NOSi$	SIT8589.8	O-TRIMETHYLSILYLHYDROXYLAMINE, 95%
$C_3H_{11}NO_3Si$	SIA0608.0	3-AMINOPROPYLSILANETRIOL, 22-25% in water
$C_3H_{12}Si_3$	SIT8709.3	1,3,5-TRISILACYCLOHEXANE
$C_4H_3BrCl_3F_4Si$	SIB1906.5	4-BROMO-3,3,4,4-TETRAFLUOROBUTYLTRICHLOROSILANE
$C_4H_6Cl_2Si$	SID4600.0	DIVINYLDICHLOROSILANE, 90%
$C_4H_6Cl_3NSi$	SIC2454.0	3-CYANOPROPYLTRICHLOROSILANE
$C_4H_6Cl_4O_2Si$	SIT8163.0	3-(TRICHLOROSILYL)PROPYLCHLOROFORMATE
$C_4H_6Cl_4Si$	SIC2281.0	2-(CHLOROMETHYL)ALLYLTRICHLOROSILANE
$C_4H_6Cl_6Si_2$	SIB1813.5	1,1-BIS(TRICHLOROSILYLMETHYL)ETHYLENE
$C_4H_7Cl_2F_3Si$	SIT8369.0	(3,3,3-TRIFLUOROPROPYL)METHYLDICHLOROSILANE
$C_4H_7Cl_2NSi$	SIC2440.0	2-CYANOETHYLMETHYLDICHLOROSILANE
$C_4H_7Cl_3O_2Si$	SIA0020.0	ACETOXYETHYLTRICHLOROSILANE
$C_4H_7Cl_3O_2Si$	SIC2070.0	2-(CARBOMETHOXY)ETHYLTRICHLOROSILANE, tech 95
$C_4H_7Cl_3Si$	SIB1927.2	(E)-2-BUTENYLTRICHLOROSILANE
$C_4H_7Cl_3Si$	SIB1927.4	(Z)-2-BUTENYLTRICHLOROSILANE
$C_4H_8BrCl_3Si$	SIB1879.6	4-BROMOBUTYLTRICHLOROSILANE
$C_4H_8Cl_2Si$	SIA0470.0	ALLYLMETHYLDICHLOROSILANE, 95%
$C_4H_8Cl_2Si$	SIC2564.0	CYCLOTETRAMETHYLENEDICHLOROSILANE
$C_4H_8Cl_2Si$	SIP6904.0	1-PROPENYLMETHYLDICHLOROSILANE, 95%
C_4H_8Si	SIS6951.0	1-SILA-3-CYCLOPENTENE, tech-95
C_4H_9ClSi	SIC2572.0	CYCLOTRIMETHYLENEMETHYLCHLOROSILANE
C_4H_9ClSi	SIV9070.0	VINYLDIMETHYLCHLOROSILANE
$C_4H_9Cl_3Si$	SIB1982.0	n-BUTYLTRICHLOROSILANE
$C_4H_9Cl_3Si$	SIB1985.0	t-BUTYLTRICHLOROSILANE
$C_4H_9Cl_3Si$	SIC2350.0	3-CHLOROPROPYLMETHYLDICHLOROSILANE
$C_4H_9Cl_3Si$	SID3360.5	(DICHLOROMETHYL)(CHLOROMETHYL)DIMETHYLSILANE, tech-95
$C_4H_9Cl_3Si$	SII6453.0	ISOBUTYLTRICHLOROSILANE
C_4H_9FSi	SIV9073.0	VINYLDIMETHYLFLUOROSILANE
$C_4H_9F_3O_3SSi$	SIT8620.0	TRIMETHYLSILYL TRIFLUOROMETHANESULFONATE
$C_4H_9F_3Si$	SIT8362.0	TRIFLUOROMETHYLTRIMETHYLSILANE
C_4H_9KOSi	SIP6902.0	POTASSIUM VINYLDIMETHYLSILANOLATE, tech-90
C_4H_9NOSi	SIT8591.0	TRIMETHYLSILYLISOCYANATE, 75%
C_4H_9NSSi	SIT8592.0	TRIMETHYLSILYLISOTHIOCYANATE
C_4H_9NSi	SIT8585.0	TRIMETHYLSILYLCYANIDE
C_4H_9NSi	SIT8585.1	TRIMETHYLSILYLCYANIDE, 99%
$C_4H_{10}Cl_2O_2Si$	SID3393.0	DIETHOXYDICHLOROSILANE, tech-90
$C_4H_{10}Cl_2Si$	SIB1051.0	BIS(CHLOROMETHYL)DIMETHYLSILANE
$C_4H_{10}Cl_2Si$	SIB1933.0	t-BUTYLDICHLOROSILANE
$C_4H_{10}Cl_2Si$	SID3366.0	(DICHLOROMETHYL)TRIMETHYLSILANE, tech-95
$C_4H_{10}Cl_2Si$	SID3402.0	DIETHYLDICHLOROSILANE
$C_4H_{10}Cl_2Si$	SII6452.3	ISOBUTYLDICHLOROSILANE
$C_4H_{10}Cl_2Si$	SII6463.0	ISOPROPYLMETHYLDICHLOROSILANE
$C_4H_{10}Cl_2Si$	SIP6912.0	n-PROPYLMETHYLDICHLOROSILANE
$C_4H_{10}Cl_4Si_2$	SIB1614.0	1,2-BIS(METHYLDICHLOROSILYL)ETHANE
$C_4H_{10}Cl_6Si_3$	SIH5915.0	2,2,4,4,6,6-HEXACHLORO-2,4,6-TRISILAHEPTANE
$C_4H_{10}F_4Si_2$	SIB1630.0	1,2-BIS(METHYLDIFLUOROSILYL)ETHANE
$C_4H_{10}N_2Si$	SIT8588.0	TRIMETHYLSILYLDIAZOMETHANE, 1.0M in methylene chloride
$C_4H_{10}N_2Si$	SIT8588.3	TRIMETHYLSILYLDIAZOMETHANE, 2M in diethyl ether
$C_4H_{10}Si$	SIV9073.5	VINYLDIMETHYLSILANE
$C_4H_{11}BrSi$	SIB1892.0	BROMOMETHYLTRIMETHYLSILANE
$C_4H_{11}ClMgSi$	SIT8594.0	TRIMETHYLSILYLMETHYLMAGNESIUM CHLORIDE, 1.0M in diethyl ether
$C_4H_{11}ClMgSi$	SIT8594.1	TRIMETHYLSILYLMETHYLMAGNESIUM CHLORIDE, 3M in methyltetrahydrofuran
$C_4H_{11}ClO_2Si$	SIC2293.2	CHLOROMETHYLMETHYLDIMETHOXYSILANE
$C_4H_{11}ClO_3Si$	SIC2298.6	CHLOROMETHYLTRIMETHOXYSILANE
$C_4H_{11}ClSi$	SIC2305.0	CHLOROMETHYLTRIMETHYLSILANE
$C_4H_{11}ClSi$	SIE4892.0	ETHYLDIMETHYLCHLOROSILANE
$C_4H_{11}ISi$	SII6450.0	IODOMETHYLTRIMETHYLSILANE
$C_4H_{11}LiSi$	SIT8593.5	TRIMETHYLSILYLMETHYLLITHIUM, 1M in hexane

SILICON COMPOUNDS

Molecular Formula Index

Molecular formula	Catalog #	Name
$C_4H_{11}N_3Si$	SIA0775.0	(AZIDOMETHYL)TRIMETHYLSILANE, 95%
$C_4H_{12}Br_2Si_3$	SID2768.0	1,2-DIBROMOTETRAMETHYLDISILANE, tech-95
$C_4H_{12}ClNSi$	SID3546.5	(N,N-DIMETHYLAMINO)DIMETHYLCHLOROSILANE, 95%
$C_4H_{12}Cl_2OSi_2$	SID3372.0	1,3-DICHLOROTETRAMETHYLDISILOXANE
$C_4H_{12}Cl_2Si_2$	SID3370.0	1,2-DICHLOROTETRAMETHYLDISILANE, 95%
$C_4H_{12}NaO_6PSi$	SIT8378.5	3-(TRIHYDROXYSILYL)PROPYL METHYLPHOSPHONATE, MONOSODIUM SALT, 42% in water
$C_4H_{12}OSi$	SID4125.0	DIMETHYLETHOXYSILANE
$C_4H_{12}OSi$	SIH6177.0	HYDROXYMETHYLTRIMETHYLSILANE
$C_4H_{12}OSi$	SIT8566.0	TRIMETHYLMETHOXYSILANE
$C_4H_{12}O_2Si$	SID4123.0	DIMETHYLDIMETHOXYSILANE, 96%
$C_4H_{12}O_2Si$	SID4123.1	DIMETHYLDIMETHOXYSILANE, 99+%
$C_4H_{12}O_3SSi$	SIT8593.0	TRIMETHYLSILYL METHANESULFONATE
$C_4H_{12}O_3Si$	SIM6560.0	METHYLTRIMETHOXYSILANE
$C_4H_{12}O_3Si$	SIM6560.1	METHYLTRIMETHOXYSILANE, 99%
$C_4H_{12}O_4Si$	SIT7510.0	TETRAMETHOXYSILANE, 98%
$C_4H_{12}O_4Si$	SIT7510.2	TETRAMETHOXYSILANE, 99+%
$C_4H_{12}SSi$	SIM6518.5	(METHYLTHIO)TRIMETHYLSILANE
$C_4H_{12}Si$	SIB1974.5	n-BUTYLSILANE
$C_4H_{12}Si$	SID3415.0	DIETHYLSILANE
$C_4H_{12}Si$	SIE4894.0	ETHYLDIMETHYLSILANE
$C_4H_{12}Si$	SIT7555.0	TETRAMETHYLSILANE, 99+%
$C_4H_{12}Si$	SIT7555.1	TETRAMETHYLSILANE, 99.9+%
$C_4H_{13}NSi$	SIA0596.0	AMINOMETHYLTRIMETHYLSILANE
$C_4H_{13}NSi$	SID3546.6	(N,N-DIMETHYLAMINO)DIMETHYLSILANE, 95%
$C_4H_{14}OSi_2$	SIT7546.0	1,1,3,3-TETRAMETHYLDISILOXANE, 98%
$C_4H_{14}Si_2$	SID4235.0	1,4-DIMETHYLDISILETHANE
$C_4H_{14}Si_2$	SIT7541.0	1,1,2,2-TETRAMETHYLDISILANE
$C_4H_{15}NSi_2$	SIT7542.0	1,1,3,3-TETRAMETHYLDISILAZANE
$C_4H_{16}O_4Si_4$	SIT7530.0	1,3,5,7-TETRAMETHYLCYCLOTETRASILOXANE
$C_4H_{16}O_4Si_4$	SIT7530.1	1,3,5,7-TETRAMETHYLCYCLOTETRASILOXANE, 99+%
$C_4H_{18}Si_4$	SIT7580.0	2,2,3,3-TETRAMETHYLTETRASILANE, 95%
$C_4N_4O_4Si$	SIT7125.0	TETRAISOCYANATOSILANE
$C_5H_8Cl_3NSi$	SIC2438.0	(3-CYANOBUTYL)TRICHLOROSILANE
$C_5H_9Cl_2NOSi$	SII6454.4	3-ISOCYANATOPROPYLMETHYLDICHLOROSILANE
$C_5H_9Cl_2NSi$	SIC2453.0	3-CYANOPROPYLMETHYLDICHLOROSILANE
$C_5H_9Cl_3O_2Si$	SIT8616.0	TRIMETHYLSILYL TRICHLOROACETATE
$C_5H_9Cl_3Si$	SIC2555.0	CYCLOPENTYLTRICHLOROSILANE
$C_5H_9F_3O_2Si$	SIT8618.0	TRIMETHYLSILYL TRIFLUOROACETATE
$C_5H_9F_3O_4SSi$	SIT8588.4	TRIMETHYLSILYL 2,2-DIFLUORO-2-(FLUOROSULFONYL)ACETATE
$C_5H_9F_3Si$	SIV9205.0	VINYL(TRIFLUOROMETHYL)DIMETHYLSILANE
C_5H_9ISi	SII6452.2	1-IODO-2-(TRIMETHYLSILYL)ACETYLENE
C_5H_9LiSi	SIL6470.0	LITHIUM (TRIMETHYLSILYL)ACETYLIDE, 0.5M in tetrahydrofuran
$C_5H_{10}BrCl_3Si$	SIB1894.0	5-BROMOPENTYLTRICHLOROSILANE
$C_5H_{10}ClF_3Si$	SIT8364.0	(3,3,3-TRIFLUOROPROPYL)DIMETHYLCHLOROSILANE
$C_5H_{10}Cl_2O_2Si$	SIA0015.0	ACETOXYETHYLMETHYLDICHLOROSILANE
$C_5H_{10}Cl_2O_2Si$	SIC2068.0	2-(CARBOMETHOXY)ETHYLMETHYLDICHLOROSILANE, tech-95
$C_5H_{10}Cl_2Si$	SIB1926.0	3-BUTENYLMETHYLDICHLOROSILANE
$C_5H_{10}Cl_2Si$	SIC2524.0	CYCLOPENTAMETHYLENEDICHLOROSILANE
$C_5H_{10}Si$	SIE4904.0	ETHYNYLTRIMETHYLSILANE
$C_5H_{11}BrO_2Si$	SIT8582.0	TRIMETHYLSILYL BROMOACETATE
$C_5H_{11}BrSi$	SIB1910.0	1-BROMOVINYLTRIMETHYLSILANE
$C_5H_{11}BrSi$	SIB1910.1	2-BROMOVINYLTRIMETHYLSILANE
$C_5H_{11}BrSi$	SIV9062.0	VINYL(BROMOMETHYL)DIMETHYLSILANE
$C_5H_{11}ClO_2Si$	SIV9064.0	VINYL(CHLOROMETHYL)DIMETHOXYSILANE
$C_5H_{11}ClSi$	SIA0460.0	ALLYLDIMETHYLCHLOROSILANE, 95%
$C_5H_{11}ClSi$	SIC2432.0	1-CHLOROVINYLTRIMETHYLSILANE
$C_5H_{11}ClSi$	SIV9065.0	VINYL(CHLOROMETHYL)DIMETHYLSILANE
$C_5H_{11}Cl_3Si$	SIC2279.0	3-CHLOROISOBUTYLMETHYLDICHLOROSILANE
$C_5H_{11}Cl_3Si$	SIP6720.0	PENTYLTRICHLOROSILANE
$C_5H_{11}F_3O_3SSi$	SIT8595.0	TRIMETHYLSILYLMETHYLTRIFLUOROMETHANESULFONATE, 96%
$C_5H_{11}NSi$	SIT8579.0	TRIMETHYLSILYLACETONITRILE
$C_5H_{11}N_3Si$	SIT8613.0	1-TRIMETHYLSILYL-1,2,4-TRIAZOLE
$C_5H_{11}NaOSi$	SIS6977.0	SODIUM ALLYLDIMETHYLSILANOLATE, 2M in tetrahydrofuran
$C_5H_{12}Br_2Si$	SID2758.0	1,2-DIBROMOETHYLTRIMETHYLSILANE, 95%
$C_5H_{12}Cl_2Si$	SIB1972.0	n-BUTYLMETHYLDICHLOROSILANE
$C_5H_{12}Cl_2Si$	SIB1972.2	t-BUTYLMETHYLDICHLOROSILANE
$C_5H_{12}Cl_2Si$	SIC2336.0	3-CHLOROPROPYLDIMETHYLCHLOROSILANE
$C_5H_{12}OSi$	SIA0130.0	ACETYLTRIMETHYLSILANE
$C_5H_{12}OSi$	SIV9089.0	VINYLOXYTRIMETHYLSILANE
$C_5H_{12}O_2SSi$	SID3545.0	2,2-DIMETHOXY-1-THIA-2-SILACYCLOPENTANE
$C_5H_{12}O_2Si$	SIA0110.0	ACETOXYTRIMETHYLSILANE
$C_5H_{12}O_2Si$	SIA0447.0	ALLYLDIMETHOXYSILANE
$C_5H_{12}O_2Si$	SIT8577.0	2-(TRIMETHYLSILYL)ACETIC ACID
$C_5H_{12}O_2Si$	SIV9086.0	VINYLMETHYLDIMETHOXYSILANE
$C_5H_{12}O_3Si$	SIV9220.0	VINYLTRIMETHOXYSILANE
$C_5H_{12}Si$	SIA0464.0	ALLYLDIMETHYLSILANE, 90%
$C_5H_{12}Si$	SIC2554.0	CYCLOPENTYLSILANE
$C_5H_{12}Si$	SIC2570.0	CYCLOTRIMETHYLENEDIMETHYLSILANE
$C_5H_{12}Si$	SIV9250.0	VINYLTRIMETHYLSILANE
$C_5H_{13}ClOSi$	SIC2286.0	CHLOROMETHYLDIMETHYLETHOXYSILANE
$C_5H_{13}ClO_2Si$	SIC2268.0	2-CHLOROETHYLMETHYLDIMETHOXYSILANE
$C_5H_{13}ClSi$	SIC2275.0	1-CHLOROETHYLTRIMETHYLSILANE, 96%
$C_5H_{13}ClSi$	SIC2340.0	3-CHLOROPROPYLDIMETHYLSILANE
$C_5H_{13}ClSi$	SII6462.0	ISOPROPYLDIMETHYLCHLOROSILANE
$C_5H_{13}ClSi$	SIP6910.0	n-PROPYLDIMETHYLCHLOROSILANE
$C_5H_{13}NOSi$	SIT8575.0	N-(TRIMETHYLSILYL)ACETAMIDE
$C_5H_{13}NO_2Si$	SIM6574.0	METHYL N-TRIMETHYLSILYLCARBAMATE
$C_5H_{14}FNSi$	SIA0603.4	3-AMINOPROPYLDIMETHYLFLUOROSILANE, 95%
$C_5H_{14}OSi$	SIM6492.0	METHOXYMETHYLTRIMETHYLSILANE
$C_5H_{14}OSi$	SIT8515.0	TRIMETHYLETHOXYSILANE
$C_5H_{14}OSi$	SIT8589.2	2-(TRIMETHYLSILYL)ETHANOL
$C_5H_{14}O_2Si$	SIM6506.0	METHYLDIETHOXYSILANE
$C_5H_{14}O_3Si$	SIE4901.4	ETHYLTRIMETHOXYSILANE
$C_5H_{14}Si$	SID3410.0	DIETHYLMETHYLSILANE
$C_5H_{14}Si$	SIE4901.5	ETHYLTRIMETHYLSILANE
$C_5H_{14}Si$	SII6463.1	ISOPROPYLDIMETHYLSILANE
$C_5H_{15}ClSi_2$	SIP6717.5	PENTAMETHYLCHLORODISILANE
$C_5H_{15}NOSi$	SID3546.8	(DIMETHYLAMINO)METHYLETHOXYSILANE, tech-95
$C_5H_{15}NSi$	SID3605.0	(N,N-DIMETHYLAMINO)TRIMETHYLSILANE
$C_5H_{15}O_3PSi$	SID4245.0	O,O'-DIMETHYL(TRIMETHYLSILYL)PHOSPHITE, tech-95
$C_5H_{16}N_2O_3Si$	SIA0590.0	N-(2-AMINOETHYL)-3-AMINOPROPYLSILANETRIOL, 25% in water, mainly oligomers
$C_5H_{16}N_2Si$	SIB1075.0	BIS(DIMETHYLAMINO)METHYLSILANE
$C_5H_{16}OSi_2$	SIP6719.0	PENTAMETHYLDISILOXANE
$C_5H_{20}O_5Si_5$	SIP6718.0	1,3,5,7,9-PENTAMETHYLCYCLOPENTASILOXANE, 90%
$C_6H_3Cl_5Si$	SID3367.6	DICHLOROPHENYLTRICHLOROSILANE, 95%
$C_6H_4BrCl_3Si$	SIB1903.0	BROMOPHENYLTRICHLOROSILANE
$C_6H_4Cl_3F_9Si$	SIN6597.6	NONAFLUOROHEXYLTRICHLOROSILANE
$C_6H_4Cl_4Si$	SIC2330.0	CHLOROPHENYLTRICHLOROSILANE, 95%
$C_6H_5Cl_3Si$	SIP6810.0	PHENYLTRICHLOROSILANE
$C_6H_5F_3Si$	SIP6821.5	PHENYLTRIFLUOROSILANE, 95%
$C_6H_6Cl_2Si$	SIP6725.0	PHENYLDICHLOROSILANE
$C_6H_6Cl_3F_7OSi$	SIH5842.0	(3-HEPTAFLUOROISOPROPOXY)PROPYLTRICHLOROSILANE
C_6H_7ClSi	SIP6724.98	PHENYLCHLOROSILANE
C_6H_8Si	SIP6750.0	PHENYLSILANE
C_6H_9ClSi	SIT8729.0	TRIVINYLCHLOROSILANE, 95%
$C_6H_9Cl_3O_2Si$	SIA0199.0	(3-ACRYLOXYPROPYL)TRICHLOROSILANE
$C_6H_9Cl_3Si$	SIC2464.0	3-CYCLOHEXENYLTRICHLOROSILANE
$C_6H_9NaOSSi$	SIS6987.0	SODIUM (2-THIENYL)DIMETHYLSILANOLATE, 2M in tetrahydrofuran
$C_6H_9NaO_2Si$	SIS6980.6	SODIUM (2-FURYL)DIMETHYLSILANOLATE
$C_6H_{10}Cl_2Si$	SID2742.0	DIALLYLDICHLOROSILANE
$C_6H_{10}OSi$	SIT8606.3	3-TRIMETHYLSILYLPROPYNAL
$C_6H_{10}O_2Si$	SIT8606.6	3-TRIMETHYLSILYLPROPYNOIC ACID
$C_6H_{10}Si$	SIT8735.5	TRIVINYLSILANE, tech-95
$C_6H_{11}BrSi$	SIB1907.0	3-BROMO-1-(TRIMETHYLSILYL)-1-PROPYNE, 95%
$C_6H_{11}Cl_2NSi$	SIC2437.0	(3-CYANOBUTYL)METHYLDICHLOROSILANE
$C_6H_{11}Cl_3Si$	SIA0441.0	ALLYL(3-CHLOROPROPYL)DICHLOROSILANE
$C_6H_{11}Cl_3Si$	SIC2480.0	CYCLOHEXYLTRICHLOROSILANE
$C_6H_{11}Cl_3Si$	SIH6164.0	5-HEXENYLTRICHLOROSILANE, 95%
$C_6H_{11}NSSi$	SIT8612.0	2-TRIMETHYLSILYLTHIAZOLE
$C_6H_{12}ClNOSi$	SII6454.0	3-ISOCYANATOPROPYLDIMETHYLCHLOROSILANE
$C_6H_{12}ClNSi$	SIC2452.0	3-CYANOPROPYLDIMETHYLCHLOROSILANE
$C_6H_{12}Cl_2OSi_2$	SID4604.0	1,3-DIVINYL-1,3-DIMETHYL-1,3-DICHLORODISILOXANE
$C_6H_{12}Cl_2O_2Si$	SIA0090.0	3-ACETOXYPROPYLMETHYLDICHLOROSILANE
$C_6H_{12}Cl_4Si$	SIB1055.3	BIS(3-CHLOROPROPYL)DICHLOROSILANE
$C_6H_{12}Cl_6Si_2$	SIB1812.0	1,6-BIS(TRICHLOROSILYL)HEXANE
$C_6H_{12}F_3NOSi$	SIM6576.0	N-METHYL-N-TRIMETHYLSILYLTRIFLUOROACETAMIDE, 96%
$C_6H_{12}N_2Si$	SIT8590.0	N-(TRIMETHYLSILYL)IMIDAZOLE
$C_6H_{12}OSi$	SIP6903.0	PROPARGYLOXYTRIMETHYLSILANE
$C_6H_{12}OSi$	SIT8604.0	3-TRIMETHYLSILYLPROPARGYL ALCOHOL
$C_6H_{12}O_2Si$	SIA0320.0	ACRYLOXYTRIMETHYLSILANE
$C_6H_{12}O_4Si$	SID4076.0	DIMETHYLDIACETOXYSILANE
$C_6H_{12}Si$	SID4606.0	DIVINYLDIMETHYLSILANE
$C_6H_{12}Si$	SIT8606.5	1-TRIMETHYLSILYLPROPYNE
$C_6H_{13}ClO_2Si$	SIA0010.0	ACETOXYETHYLDIMETHYLCHLOROSILANE
$C_6H_{13}ClSi$	SIA0440.0	ALLYL(CHLOROMETHYL)DIMETHYLSILANE, 95%
$C_6H_{13}Cl_3Si$	SID4069.0	(3,3-DIMETHYLBUTYL)TRICHLOROSILANE
$C_6H_{13}Cl_3Si$	SIH6167.0	HEXYLTRICHLOROSILANE
$C_6H_{13}Cl_3Si$	SIT7906.6	THEXYLTRICHLOROSILANE

Molecular formula	Catalog #	Name
$C_6H_{13}F_3O_2Si$	SIT8370.0	(3,3,3-TRIFLUOROPROPYL)METHYLDIMETHOXYSILANE
$C_6H_{13}F_3O_3Si$	SIT8372.0	(3,3,3-TRIFLUOROPROPYL)TRIMETHOXYSILANE, 98%
$C_6H_{13}F_3Si$	SIH6168.0	HEXYLTRIFLUOROSILANE
$C_6H_{13}NO_2Si$	SIC2441.0	2-CYANOETHYLMETHYLDIMETHOXYSILANE
$C_6H_{13}NO_3Si$	SIC2446.0	2-CYANOETHYLTRIMETHOXYSILANE
$C_6H_{13}NSi$	SIC2446.5	2-CYANOETHYLTRIMETHYLSILANE
$C_6H_{14}BrClSi$	SIB1879.2	4-BROMOBUTYLDIMETHYLCHLOROSILANE
$C_6H_{14}Cl_2Si$	SIC2265.0	4-CHLOROBUTYLDIMETHYLCHLOROSILANE
$C_6H_{14}Cl_2Si$	SIC2277.0	3-CHLOROISOBUTYLDIMETHYLCHLOROSILANE
$C_6H_{14}Cl_2Si$	SID3537.0	DIISOPROPYLDICHLOROSILANE
$C_6H_{14}Cl_2Si$	SIH6165.0	HEXYLDICHLOROSILANE
$C_6H_{14}Cl_2Si$	SIP6719.9	PENTYLMETHYLDICHLOROSILANE
$C_6H_{14}Cl_4Si_2$	SIB1612.0	1,4-BIS(METHYLDICHLOROSILYL)BUTANE, 95%
$C_6H_{14}OSi$	SIA0480.0	ALLYLOXYTRIMETHYLSILANE
$C_6H_{14}OSi$	SID4234.0	1,1-DIMETHYL-1-SILA-2-OXACYCLOHEXANE, 96%
$C_6H_{14}OSi$	SII6460.0	ISOPROPENOXYTRIMETHYLSILANE, 95%
$C_6H_{14}OSi$	SIM6496.3	(1-METHOXYVINYL)TRIMETHYLSILANE, 95%
$C_6H_{14}OSi$	SIV9072.0	VINYLDIMETHYLETHOXYSILANE
$C_6H_{14}O_2Si$	SIA0060.0	ACETOXYMETHYLTRIMETHYLSILANE
$C_6H_{14}O_2Si$	SIA0485.0	ALLYLMETHYLDIMETHOXYSILANE, tech-95
$C_6H_{14}O_2Si$	SIM6571.5	METHYLTRIMETHYLSILYLACETATE
$C_6H_{14}O_2Si$	SIT8606.0	3-TRIMETHYLSILYLPROPIONIC ACID
$C_6H_{14}O_3Si$	SIA0540.0	ALLYLTRIMETHOXYSILANE
$C_6H_{14}O_5Si$	SIA0055.0	ACETOXYMETHYLTRIMETHOXYSILANE, 95%
$C_6H_{14}Si$	SIA0555.0	ALLYLTRIMETHYLSILANE
$C_6H_{14}Si$	SIC2566.0	CYCLOTETRAMETHYLENEDIMETHYLSILANE
$C_6H_{14}Si$	SIP6905.0	2-PROPENYLTRIMETHYLSILANE, 95%
$C_6H_{15}BrO_3Si$	SIB1906.0	3-BROMOPROPYLTRIMETHOXYSILANE
$C_6H_{15}BrSi$	SIT8210.0	TRIETHYLBROMOSILANE
$C_6H_{15}ClOSi$	SIC2286.5	CHLOROMETHYLDIMETHYLISOPROPOXYSILANE
$C_6H_{15}ClOSi$	SIC2338.0	3-CHLOROPROPYLDIMETHYLMETHOXYSILANE, 95%
$C_6H_{15}ClOSi$	SIT8588.5	2-(TRIMETHYLSILYL)ETHOXYMETHYL CHLORIDE, 95%
$C_6H_{15}ClO_2Si$	SIC2292.0	CHLOROMETHYLMETHYLDIETHOXYSILANE
$C_6H_{15}ClO_2Si$	SIC2355.0	3-CHLOROPROPYLMETHYLDIMETHOXYSILANE
$C_6H_{15}ClO_3Si$	SIC2410.0	3-CHLOROPROPYLTRIMETHOXYSILANE
$C_6H_{15}ClO_3Si$	SIT8178.0	TRIETHOXYCHLOROSILANE, tech-95
$C_6H_{15}ClSi$	SIB1934.0	n-BUTYLDIMETHYLCHLOROSILANE
$C_6H_{15}ClSi$	SIB1935.0	t-BUTYLDIMETHYLCHLOROSILANE
$C_6H_{15}ClSi$	SIB1935.2	t-BUTYLDIMETHYLCHLOROSILANE, 1.0M in methylene chloride
$C_6H_{15}ClSi$	SIB1935.4	t-BUTYLDIMETHYLCHLOROSILANE, 3M in tetrahydrofuran
$C_6H_{15}ClSi$	SIB1935.5	t-BUTYLDIMETHYLCHLOROSILANE, 2.85M in toluene, 48-52% solution
$C_6H_{15}ClSi$	SIC2411.0	3-CHLOROPROPYLTRIMETHYLSILANE
$C_6H_{15}ClSi$	SID3535.0	DIISOPROPYLCHLOROSILANE
$C_6H_{15}ClSi$	SII6452.5	ISOBUTYLDIMETHYLCHLOROSILANE
$C_6H_{15}ClSi$	SIT8250.0	TRIETHYLCHLOROSILANE
$C_6H_{15}FO_3Si$	SIT8180.0	TRIETHOXYFLUOROSILANE, 95%
$C_6H_{15}IO_3Si$	SII6452.0	3-IODOPROPYLTRIMETHOXYSILANE
$C_6H_{15}ISi$	SIT8290.0	TRIETHYLIODOSILANE
$C_6H_{15}KOSi$	SIP6899.0	POTASSIUM TRIETHYLSILANOLATE, 95%
$C_6H_{15}NaO_3SSi$	SIT8599.0	TRIMETHYLSILYLPROPANESULFONIC ACID SODIUM SALT, monohydrate
$C_6H_{15}NOSi$	SIT8567.0	2,2,4-TRIMETHYL-1-OXA-4-AZA-2-SILACYCLOHEXANE
$C_6H_{15}NSi$	SIA0402.0	ALLYLAMINOTRIMETHYLSILANE, 96%
$C_6H_{16}Cl_2OSi_2$	SIB1055.0	1,3-BIS(CHLOROMETHYL)TETRAMETHYLDISILOXANE
$C_6H_{16}Cl_2Si_2$	SIB1042.0	1,2-BIS(CHLORODIMETHYLSILYL)ETHANE
$C_6H_{16}OSi$	SIB1939.0	t-BUTYLDIMETHYLSILANOL
$C_6H_{16}OSi$	SIP6911.0	n-PROPYLDIMETHYLMETHOXYSILANE
$C_6H_{16}OSi$	SIT8332.0	TRIETHYLSILANOL
$C_6H_{16}OSi$	SIT8568.0	TRIMETHYL-n-PROPOXYSILANE
$C_6H_{16}OSi$	SIT8602.0	3-(TRIMETHYLSILYL)-1-PROPANOL
$C_6H_{16}OSi_2$	SIT7540.0	2,2,5,5-TETRAMETHYL-2,5-DISILA-1-OXACYCLOPENTANE
$C_6H_{16}OSi_2$	SIV9097.5	VINYL-1,1,3,3-TETRAMETHYLDISILOXANE
$C_6H_{16}O_2SSi$	SIM6473.0	(MERCAPTOMETHYL)METHYLDIETHOXYSILANE, 95%
$C_6H_{16}O_2SSi$	SIM6474.0	3-MERCAPTOPROPYLMETHYLDIMETHOXYSILANE, 96%
$C_6H_{16}O_2Si$	SID4121.0	DIMETHYLDIETHOXYSILANE, 98%
$C_6H_{16}O_2Si$	SIP6914.0	n-PROPYLMETHYLDIMETHOXYSILANE
$C_6H_{16}O_3Si$	SIP6918.0	n-PROPYLTRIMETHOXYSILANE
$C_6H_{16}O_3Si$	SIT8185.0	TRIETHOXYSILANE
$C_6H_{16}O_3SSi$	SIM6476.0	3-MERCAPTOPROPYLTRIMETHOXYSILANE
$C_6H_{16}O_3SSi$	SIM6476.1	3-MERCAPTOPROPYLTRIMETHOXYSILANE, 99+%
$C_6H_{16}SSi$	SIM6479.0	3-MERCAPTOPROPYLTRIMETHYLSILANE
$C_6H_{16}Si$	SIB1937.5	n-BUTYLDIMETHYLSILANE
$C_6H_{16}Si$	SIB1938.0	t-BUTYLDIMETHYLSILANE
$C_6H_{16}Si$	SID3539.4	DIISOPROPYLSILANE
$C_6H_{16}Si$	SIH6166.2	HEXYLSILANE
$C_6H_{16}Si$	SIT8330.0	TRIETHYLSILANE, 98%
$C_6H_{16}Si_2$	SIT7538.0	1,1,3,3-TETRAMETHYL-1,3-DISILACYCLOBUTANE
$C_6H_{17}ClOSi_2$	SIC2294.0	CHLOROMETHYLPENTAMETHYLDISILOXANE
$C_6H_{17}NOSi$	SIB1963.0	O-(t-BUTYLDIMETHYLSILYL)HYDROXYLAMINE, 95%
$C_6H_{17}NO_3Si$	SIA0611.0	3-AMINOPROPYLTRIMETHOXYSILANE
$C_6H_{17}NSi$	SIA0612.0	3-AMINOPROPYLTRIMETHYLSILANE
$C_6H_{17}NSi$	SID3395.3	DIETHYLAMINODIMETHYLSILANE, 95%
$C_6H_{17}NSi_2$	SIT7536.0	2,2,5,5-TETRAMETHYL-2,5-DISILA-1-AZACYCLOPENTANE, 95%
$C_6H_{18}BCl_2NSi_2$	SID3354.0	N-(DICHLOROBORYL)HEXAMETHYLDISILAZANE
$C_6H_{18}Br_2Si_3$	SID2764.0	1,3-DIBROMOHEXAMETHYLTRISILANE, tech-95
$C_6H_{18}Cl_2O_2Si_3$	SIB1837.0	BIS(TRIMETHYLSILOXY)DICHLOROSILANE
$C_6H_{18}Cl_2O_2Si_3$	SID3360.0	1,5-DICHLOROHEXAMETHYLTRISILOXANE, tech-95
$C_6H_{18}ClN_3Si$	SIT8711.0	TRIS(DIMETHYLAMINO)CHLOROSILANE, 95%
$C_6H_{18}KNSi_2$	SIP6890.0	POTASSIUM HEXAMETHYLDISILAZIDE, 11% in toluene, 0.5M
$C_6H_{18}KNSi_2$	SIP6890.1	POTASSIUM HEXAMETHYLDISILAZIDE, 20% in THF
$C_6H_{18}LiNSi_2$	SIL6467.0	LITHIUM HEXAMETHYLDISILAZIDE
$C_6H_{18}LiNSi_2$	SIL6467.2	LITHIUM HEXAMETHYLDISILAZIDE, 1M in hexane
$C_6H_{18}LiNSi_2$	SIL6467.4	LITHIUM HEXAMETHYLDISILAZIDE, 1.25M in tetrahydrofuran
$C_6H_{18}NNaSi_2$	SIS6980.0	SODIUM BIS(TRIMETHYLSILYL)AMIDE, 95%
$C_6H_{18}NNaSi_2$	SIS6980.2	SODIUM BIS(TRIMETHYLSILYL)AMIDE, 2M in tetrahydrofuran
$C_6H_{18}N_2SSi_2$	SIB1872.0	BIS(TRIMETHYLSILYL)SULFUR DIIMIDE, 95%
$C_6H_{18}N_2Si$	SIB1072.0	BIS(DIMETHYLAMINO)DIMETHYLSILANE
$C_6H_{18}OSi_2$	SIH6115.0	HEXAMETHYLDISILOXANE, 98%
$C_6H_{18}OSi_2$	SIH6115.1	HEXAMETHYLDISILOXANE, 99.9%
$C_6H_{18}O_2Si_2$	SIB1868.0	BIS(TRIMETHYLSILYL)PEROXIDE
$C_6H_{18}O_2Si_2$	SID3544.6	1,2-DIMETHOXYTETRAMETHYLDISILANE
$C_6H_{18}O_3Si_3$	SIH6105.0	HEXAMETHYLCYCLOTRISILOXANE, 95%
$C_6H_{18}O_3Si_3$	SIH6105.1	HEXAMETHYLCYCLOTRISILOXANE, 98%
$C_6H_{18}O_5Si_2$	SID4236.0	1,3-DIMETHYLTETRAMETHOXYDISILOXANE, 95%
$C_6H_{18}O_6Si_2$	SIH6101.0	HEXAMETHOXYDISILANE, tech-95
$C_6H_{18}SSi_2$	SIH6116.0	HEXAMETHYLDISILTHIANE
$C_6H_{18}SeSi_2$	SIB1871.0	BIS(TRIMETHYLSILYL)SELENIDE
$C_6H_{18}Si_2$	SIH6109.0	HEXAMETHYLDISILANE
$C_6H_{18}Si_2$	SIT7537.0	1,1,4,4-TETRAMETHYL-1,4-DISILABUTANE
$C_6H_{18}Si_2Te$	SIB1873.0	BIS(TRIMETHYLSILYL)TELLURIDE
$C_6H_{19}NOSi_2$	SIB1859.0	N,O-BIS(TRIMETHYLSILYL)HYDROXYLAMINE
$C_6H_{19}NSi_2$	SIH6110.0	1,1,1,3,3,3-HEXAMETHYLDISILAZANE
$C_6H_{19}NSi_2$	SIH6110.1	1,1,1,3,3,3-HEXAMETHYLDISILAZANE, 99%
$C_6H_{19}N_3Si$	SIT8714.0	TRIS(DIMETHYLAMINO)SILANE
$C_6H_{19}N_3Si$	SIT8714.1	TRIS(DIMETHYLAMINO)SILANE
$C_6H_{19}PSi$	SIB1868.6	BIS(TRIMETHYLSILYL)PHOSPHINE
$C_6H_{20}O_2Si_3$	SIH6116.6	1,1,1,5,5,5-HEXAMETHYLTRISILOXANE
$C_6H_{20}O_2Si_3$	SIH6117.0	1,1,3,3,5,5-HEXAMETHYLTRISILOXANE
$C_6H_{21}NSi_3$	SIT8715.5	TRIS(DIMETHYLSILYL)AMINE, 95%
$C_6H_{21}N_3Si_3$	SIH6102.0	1,1,3,3,5,5-HEXAMETHYLCYCLOTRISILAZANE
$C_6H_{21}N_3Si_3$	SIH6103.0	1,2,3,4,5,6 HEXAMETHYLCYCLOTRISILAZANE, tech-95
$C_7H_6Cl_4Si$	SIC2296.0	(p-CHLOROMETHYL)PHENYLTRICHLOROSILANE, 95%
$C_7H_7Cl_2F_9Si$	SIN6597.5	NONAFLUOROHEXYLMETHYLDICHLOROSILANE
$C_7H_7Cl_3Si$	SIB0970.0	BENZYLTRICHLOROSILANE
$C_7H_7Cl_3Si$	SIC2328.0	(CHLOROPHENYL)METHYLDICHLOROSILANE, 95%
$C_7H_7Cl_3Si$	SIT8040.0	p-TOLYLTRICHLOROSILANE
$C_7H_8Cl_2Si$	SIP6738.0	PHENYLMETHYLDICHLOROSILANE
$C_7H_8Cl_3NSi$	SIT8157.0	2-[2-(TRICHLOROSILYL)ETHYL]PYRIDINE
$C_7H_8Cl_3NSi$	SIT8158.0	4-[2-(TRICHLOROSILYL)ETHYL]PYRIDINE, 15-20% in toluene
C_7H_9ClSi	SIP6737.0	PHENYLMETHYLCHLOROSILANE
$C_7H_9Cl_2F_7OSi$	SIH5841.9	(3-HEPTAFLUOROISOPROPOXY)PROPYLMETHYLDICHLOROSILANE
$C_7H_9Cl_3Si$	SIB0991.0	(5-BICYCLO[2.2.1]HEPT-2-ENYL)TRICHLOROSILANE
$C_7H_{10}Si$	SIP6742.0	PHENYLMETHYLSILANE
$C_7H_{10}Si$	SIT8038.0	p-TOLYLSILANE
$C_7H_{11}Cl_3O_2Si$	SIM6487.2	METHACRYLOXYPROPYLTRICHLOROSILANE, tech-95
$C_7H_{11}Cl_3Si$	SIB0997.0	(5-BICYCLO[2.2.1]HEPTYL)TRICHLOROSILANE
$C_7H_{12}BrF_4O_3Si$	SIB1906.7	4-BROMO-3,3,4,4-TETRAFLUOROBUTYLTRIMETHOXYSILANE
$C_7H_{12}Cl_2O_2Si$	SIA0196.0	(3-ACRYLOXYPROPYL)METHYLDICHLOROSILANE
$C_7H_{12}OSi$	SIT8583.2	4-TRIMETHYLSILYLBUT-3-YN-2-ONE
$C_7H_{12}OSi$	SIT8732.0	TRIVINYLMETHOXYSILANE, 95%
$C_7H_{12}O_2Si$	SIM6575.0	METHYL 3-TRIMETHYLSILYLPROPYNOATE
$C_7H_{12}O_2Si$	SIT8571.3	2-(TRIMETHYLSILOXY)FURAN
$C_7H_{12}O_4Si$	SIV9083.0	VINYLMETHYLDIACETOXYSILANE
$C_7H_{12}O_6Si$	SIM6519.0	METHYLTRIACETOXYSILANE, 95%
$C_7H_{12}SSi$	SIT7907.0	2-THIENYLTRIMETHYLSILANE
$C_7H_{12}Si$	SIT8734.0	TRIVINYLMETHYLSILANE
$C_7H_{13}Cl_3Si$	SIC2470.0	(CYCLOHEXYLMETHYL)TRICHLOROSILANE
$C_7H_{13}F_3Si$	SIV9208.0	VINYL(3,3,3-TRIFLUOROPROPYL)DIMETHYLSILANE
$C_7H_{14}ClNO_3Si$	SIC2297.0	CHLOROMETHYLSILATRANE

Molecular formula	Catalog #	Name
$C_7H_{14}ClNSi$	SIC2436.0	(3-CYANOBUTYL)DIMETHYLCHLOROSILANE
$C_7H_{14}Cl_2Si$	SIC2468.0	CYCLOHEXYLMETHYLDICHLOROSILANE
$C_7H_{14}OSi$	SIT8571.0	1-(TRIMETHYLSILOXY)-1,3-BUTADIENE
$C_7H_{14}OSi$	SIT8571.2	2-(TRIMETHYLSILOXY)-1,3-BUTADIENE
$C_7H_{14}OSi$	SIT8571.25	3-(TRIMETHYLSILOXY)-1-BUTYNE
$C_7H_{14}OSi$	SIT8583.0	1-TRIMETHYLSILYLBUT-1-YNE-3-OL
$C_7H_{14}O_2Si$	SIA0186.0	ACRYLOXYMETHYLTRIMETHYLSILANE
$C_7H_{14}O_2Si$	SIM6491.0	METHACRYLOXYTRIMETHYLSILANE
$C_7H_{14}O_2Si$	SIT8584.5	TRIMETHYLSILYL CROTONATE
$C_7H_{14}O_5Si$	SIA0182.0	ACRYLOXYMETHYLTRIMETHOXYSILANE
$C_7H_{14}Si$	SIT8582.5	3-(TRIMETHYLSILYL)-1,2-BUTADIENE, 95%
$C_7H_{14}Si$	SIV9087.0	1-VINYL-1-METHYLSILACYCLOPENTANE
$C_7H_{15}ClO_3Si$	SIC2282.0	2-(CHLOROMETHYL)ALLYLTRIMETHOXYSILANE
$C_7H_{15}ClSi$	SIC2320.0	2-CHLOROMETHYL-3-TRIMETHYLSILYL1-PROPENE
$C_7H_{15}Cl_3Si$	SIH5846.0	n-HEPTYLTRICHLOROSILANE
$C_7H_{15}Cl_9Si_4$	SIT8716.0	TRIS(TRICHLOROSILYLETHYL)METHYLSILANE, tech-95
$C_7H_{15}F_3O_3SSi$	SIB1967.0	t-BUTYLDIMETHYLSILYLTRIFLUOROMETHANESULFONATE
$C_7H_{15}F_3O_3SSi$	SIT8335.0	TRIETHYLSILYLTRIFLUOROMETHANESULFONATE
$C_7H_{15}F_3Si$	SIT8356.0	TRIFLUOROMETHYLTRIETHYLSILANE
$C_7H_{15}NOSi$	SIM6480.6	METHACRYLAMIDOTRIMETHYLSILANE, tech-95
$C_7H_{15}NO_2Si$	SIC2453.5	3-CYANOPROPYLMETHYLDIMETHOXYSILANE
$C_7H_{15}NO_3Si$	SIC2456.0	3-CYANOPROPYLTRIMETHOXYSILANE
$C_7H_{15}NO_3Si$	SII6454.5	3-ISOCYANATOPROPYLMETHYLDIMETHOXYSILANE, tech-95
$C_7H_{15}NO_3Si$	SIM6518.0	METHYLSILATRANE
$C_7H_{15}NO_4Si$	SII6456.0	3-ISOCYANOTOPROPYLTRIMETHOXYSILANE, 95%
$C_7H_{15}NSi$	SIB1965.0	t-BUTYLDIMETHYLSILYLNITRILE
$C_7H_{16}Cl_2Si$	SIB1932.8	t-BUTYL(DICHLOROMETHYL)DIMETHYLSILANE
$C_7H_{16}Cl_2Si$	SIH6165.6	HEXYLMETHYLDICHLOROSILANE
$C_7H_{16}OSi$	SIM6497.0	(2-METHYLALLYLOXY)TRIMETHYLSILANE, 95%
$C_7H_{16}OSi$	SIM6571.0	2-METHYL-1-(TRIMETHYLSILOXY)-1-PROPENE
$C_7H_{16}O_2SSi$	SIC2264.0	2-(CARBOXYMETHYLTHIO)ETHYLTRIMETHYLSILANE, 95%
$C_7H_{16}O_2Si$	SIE4901.6	ETHYL (2-TRIMETHYLSILYL)ACETATE
$C_7H_{16}O_2Si$	SIV9085.0	VINYLMETHYLDIETHOXYSILANE
$C_7H_{16}O_5Si$	SIA0030.0	ACETOXYETHYLTRIMETHOXYSILANE, 95%
$C_7H_{16}O_5Si$	SIC2072.0	2-(CARBOMETHOXY)ETHYLTRIMETHOXYSILANE
$C_7H_{16}S_2Si$	SIT8589.0	2-TRIMETHYLSILYL-1,3-DITHIANE
$C_7H_{16}Si$	SIB1930.0	3-BUTENYLTRIMETHYLSILANE
$C_7H_{16}Si$	SIC2525.0	CYCLOPENTAMETHYLENEDIMETHYLSILANE
$C_7H_{16}Si$	SIM6513.0	(2-METHYL-2-PROPENYL)TRIMETHYLSILANE
$C_7H_{16}Si$	SIV9068.0	VINYLDIETHYLMETHYLSILANE
$C_7H_{17}BrOSi$	SIB1879.1	4-BROMOBUTOXYTRIMETHYLSILANE
$C_7H_{17}BrO_3Si$	SIB1879.7	4-BROMOBUTYLTRIMETHOXYSILANE
$C_7H_{17}ClOSi$	SIC2278.0	3-CHLOROISOBUTYLDIMETHYLMETHOXYSILANE
$C_7H_{17}ClOSi$	SIC2337.0	3-CHLOROPROPYLDIMETHYLETHOXYSILANE
$C_7H_{17}ClOSi_2$	SIV9066.0	1-VINYL-3-(CHLOROMETHYL)-1,1,3,3-TETRAMETHYLDISILOXANE
$C_7H_{17}ClO_3Si$	SIC2280.4	3-CHLOROISOBUTYLTRIMETHOXYSILANE
$C_7H_{17}ClO_3Si$	SIC2298.4	CHLOROMETHYLTRIETHOXYSILANE
$C_7H_{17}NOSi$	SIE4897.0	(ETHYLMETHYLKETOXIMINO)TRIMETHYLSILANE, 95%
$C_7H_{17}NOSi$	SIT8596.0	N-(TRIMETHYLSILYL)MORPHOLINE
$C_7H_{17}NSi$	SIM6501.4	N-METHYL-AZA-2,2,4-TRIMETHYLSILACYCLOPENTANE
$C_7H_{17}NSi$	SIT8609.0	1-TRIMETHYLSILYLPYRROLIDINE, 95%
$C_7H_{18}Cl_2Si_2$	SIB1048.2	1,3-BIS(CHLORODIMETHYLSILYL)PROPANE
$C_7H_{18}N_2O_2Si$	SID3543.0	2,2-DIMETHOXY-1,6-DIAZA-2-SILACYCLOOCTANE
$C_7H_{18}N_2O_2Si$	SID3543.1	2,2-DIMETHOXY-1,6-DIAZA-2-SILACYCLOOCTANE, 10% in cyclohexane
$C_7H_{18}N_2O_4Si$	SIU9058.0	UREIDOPROPYLTRIMETHOXYSILANE
$C_7H_{18}N_2Si$	SIB1080.0	BIS(DIMETHYLAMINO)VINYLMETHYLSILANE
$C_7H_{18}N_2Si_2$	SIB1856.0	BIS(TRIMETHYLSILYL)CARBODIIMIDE
$C_7H_{18}OSi$	SIB1932.0	t-BUTOXYTRIMETHYLSILANE
$C_7H_{18}OSi$	SIB1937.3	n-BUTYLDIMETHYLMETHOXYSILANE
$C_7H_{18}OSi_2$	SIA0490.0	1-ALLYL-1,1,3,3-TETRAMETHYLDISILOXANE
$C_7H_{18}OSi_2$	SIV9090.0	VINYLPENTAMETHYLDISILOXANE
$C_7H_{18}O_2Si$	SII6452.8	ISOBUTYLMETHYLDIMETHOXYSILANE
$C_7H_{18}O_2Si$	SIM6492.8	(1-METHOXY-2-PROPOXY)TRIMETHYLSILANE
$C_7H_{18}O_3Si$	SIB1988.0	n-BUTYLTRIMETHOXYSILANE
$C_7H_{18}O_3Si$	SIB1989.0	t-BUTYLTRIMETHOXYSILANE
$C_7H_{18}O_3Si$	SII6453.7	ISOBUTYLTRIMETHOXYSILANE
$C_7H_{18}O_3Si$	SIM6555.0	METHYLTRIETHOXYSILANE
$C_7H_{18}O_3Si_2$	SIP6717.0	1,1,1,3,3-PENTAMETHYL-3-ACETOXYDISILOXANE
$C_7H_{18}O_4Si$	SIH6175.0	HYDROXYMETHYLTRIETHOXYSILANE, 50% in ethanol
$C_7H_{18}O_4Si$	SIM6493.0	3-METHOXYPROPYLTRIMETHOXYSILANE
$C_7H_{19}ClN_2O_3SSi$	SIT8405.0	S-(TRIMETHOXYSILYLPROPYL)ISOTHIOURONIUM CHLORIDE, 50% in water
$C_7H_{19}ClSi_2$	SIB1864.0	BIS(TRIMETHYLSILYL)METHYL CHLORIDE
$C_7H_{19}NOSi$	SIA0587.1	1-AMINO-2-(DIMETHYLETHOXYSILYL)PROPANE, 85%
$C_7H_{19}NOSi$	SIA0603.0	3-AMINOPROPYLDIMETHYLETHOXYSILANE
$C_7H_{19}NO_2Si$	SIM6498.0	N-METHYLAMINOPROPYLMETHYLDIMETHOXYSILANE
$C_7H_{19}NO_3Si$	SIM6500.0	N-METHYLAMINOPROPYLTRIMETHOXYSILANE
$C_7H_{19}NSi$	SID3398.0	(DIETHYLAMINO)TRIMETHYLSILANE
$C_7H_{19}NSi$	SIP6910.3	n-PROPYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_7H_{20}GeSi$	GET8595.5	TRIMETHYLSILYLMETHYLTRIMETHYLGERMANE
$C_7H_{20}N_2OSi_2$	SIB1878.0	N,N'-BIS(TRIMETHYLSILYL)UREA
$C_7H_{20}O_4Si_2$	SIB1635.0	BIS(METHYLDIMETHOXYSILYL)METHANE
$C_7H_{20}Si_2$	SIB1863.0	BIS(TRIMETHYLSILYL)METHANE
$C_7H_{21}NSi_2$	SID3546.9	N,N-DIMETHYLAMINOPENTAMETHYLDISILANE
$C_7H_{21}NSi_2$	SIH5843.0	HEPTAMETHYLDISILAZANE
$C_7H_{21}N_3Si$	SIT8712.0	TRIS(DIMETHYLAMINO)METHYLSILANE
$C_7H_{22}O_2Si_3$	SIB1844.0	BIS(TRIMETHYLSILOXY)METHYLSILANE
$C_7H_{22}O_2Si_3$	SIH5844.0	1,1,1,3,3,5,5-HEPTAMETHYLTRISILOXANE, 90%
$C_7H_{22}O_4Si_4$	SIH5842.5	HEPTAMETHYLCYCLOTETRASILOXANE, tech-95
$C_7H_{24}O_3Si_4$	SIM6582.0	METHYLTRIS(DIMETHYLSILOXY)SILANE
$C_8F_{12}O_8Si$	SIT7295.0	TETRAKIS(TRIFLUOROACETOXY)SILANE, tech-95
$C_8H_4Cl_3F_{13}Si$	SIT8174.0	(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)TRICHLOROSILANE
$C_8H_6ClF_5Si$	SIP6716.1	PENTAFLUOROPHENYLDIMETHYLCHLOROSILANE
$C_8H_7F_{13}Si$	SIT8173.0	(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)SILANE
$C_8H_8Cl_2Si$	SIV9092.0	VINYLPHENYLDICHLOROSILANE
$C_8H_8Cl_4O_2SSi$	SIC2415.0	2-(4-CHLOROSULFONYLPHENYL)ETHYLTRICHLOROSILANE, 50% in methylene chloride
$C_8H_8Cl_4O_2SSi$	SIC2415.4	2-(4-CHLOROSULFONYLPHENYL)ETHYLTRICHLOROSILANE, 50% in toluene
$C_8H_9Cl_3Si$	SIP6722.0	PHENETHYLTRICHLOROSILANE
$C_8H_{10}ClF_9Si$	SIN6597.3	NONAFLUOROHEXYLDIMETHYLCHLOROSILANE
$C_8H_{10}Cl_2Si$	SIP6730.0	PHENYLETHYLDICHLOROSILANE
$C_8H_{10}Cl_2Si$	SIT8035.0	p-TOLYLMETHYLDICHLOROSILANE
$C_8H_{10}F_6O_2Si$	SIT8571.5	2-TRIMETHYLSILOXY-1,1,1,5,5,5-HEXAFLUOROPENT-2-ENE-4-ONE
$C_8H_{11}ClOSi$	SIC2335.0	(3-CHLOROPROPOXY)ISOPROPYLDIMETHYLSILANE
$C_8H_{11}ClSi$	SIP6728.0	PHENYLDIMETHYLCHLOROSILANE
$C_8H_{11}KOSi$	SIP689805	POTASSIUM PHENYLDIMETHYLSILANOLATE, 95%
$C_8H_{11}NaOSi$	SIS6986.1	SODIUM PHENYLDIMETHYLSILANOLATE, 2M in tetrahydrofuran
$C_8H_{12}Cl_2N_2Si$	SIB1057.0	BIS(CYANOPROPYL)DICHLOROSILANE
$C_8H_{12}Cl_2Si$	SIB0990.0	(5-BICYCLO[2.2.1]HEPT-2-ENYL)METHYLDICHLOROSILANE, 95%
$C_8H_{12}N_4Si$	SIB1185.0	BIS(1-IMIDAZOLYL)DIMETHYLSILANE, tech-95
$C_8H_{12}OSi$	SIP6729.2	PHENYLDIMETHYLSILANOL
$C_8H_{12}O_6SSi$	SIT8378.1	TRIHYDROXYSILYLETHYL PHENYLSULPHONIC ACID, 25% in water
$C_8H_{12}O_6Si$	SIV9098.0	VINYLTRIACETOXYSILANE
$C_8H_{12}O_8Si$	SIT6998.0	TETRAACETOXYSILANE, 95%
$C_8H_{12}Si$	SIP6729.0	PHENYLDIMETHYLSILANE
$C_8H_{12}Si$	SIT7897.0	TETRAVINYLSILANE
$C_8H_{13}Cl_3Si$	SIC2459.0	[2-(3-CYCLOHEXENYL)ETHYL]TRICHLOROSILANE
$C_8H_{13}Cl_3Si$	SIC2485.0	(4-CYCLOOCTENYL)TRICHLOROSILANE, 95%
$C_8H_{13}NSi$	SIP6942.0	2-PYRIDYLTRIMETHYLSILANE
$C_8H_{14}Cl_2O_2Si$	SIM6486.7	METHACRYLOXYPROPYLMETHYLDICHLOROSILANE, 95%
$C_8H_{14}F_6O_6S_2Si$	SID3534.0	DIISOPROPYLBIS(TRIFLUOROMETHANESULFONYL)SILANE
$C_8H_{14}OSi$	SIT8730.0	TRIVINYLETHOXYSILANE, 95%
$C_8H_{14}OSi_2$	SID3425.0	1,3-DIETHYNYLTETRAMETHYLDISILOXANE
$C_8H_{14}O_2Si$	SIE4901.8	ETHYL 3-(TRIMETHYLSILYL)PROPYNOATE
$C_8H_{14}O_6Si$	SIE4899.0	ETHYLTRIACETOXYSILANE
$C_8H_{14}Si$	SIC2522.0	CYCLOPENTADIENYLTRIMETHYLSILANE
$C_8H_{15}Cl_3Si$	SIC2490.0	CYCLOOCTYLTRICHLOROSILANE, 95%
$C_8H_{15}Cl_3Si$	SIO6708.0	7-OCTENYLTRICHLOROSILANE, tech-95
$C_8H_{15}NO_3Si$	SIV9097.0	VINYLSILATRANE
$C_8H_{16}Cl_6Si_2$	SIB1814.0	1,8-BIS(TRICHLOROSILYL)OCTANE
$C_8H_{16}Cl_{12}Si_5$	SIT7292.0	TETRAKIS(2-TRICHLOROSILYLETHYL)SILANE, 95%
$C_8H_{16}OSi$	SIC2552.0	(CYCLOPENTENYLOXY)TRIMETHYLSILANE
$C_8H_{16}O_2Si$	SID3395.0	1,1-DIETHOXY-1-SILACYCLOPENT-3-ENE, tech-95
$C_8H_{16}O_2Si$	SIM6485.6	METHACRYLOXYMETHYLTRIMETHYLSILANE
$C_8H_{16}O_2Si$	SIM6494.0	1-METHOXY-3-(TRIMETHYLSILOXY)BUTADIENE, 90%
$C_8H_{16}O_2Si$	SIT8572.0	2-TRIMETHYLSILOXYPENT-2-ENE-4-ONE
$C_8H_{16}O_3Si$	SIA0160.0	(2-ACRYLOXYETHOXY)TRIMETHYLSILANE
$C_8H_{16}O_3Si$	SIM6570.0	METHYL-3-(TRIMETHYLSILOXY)CROTONATE
$C_8H_{16}O_4Si$	SIM6481.46	(METHACRYLOXYMETHYL)METHYLDIMETHOXYSILANE
$C_8H_{16}O_5Si$	SIM6483.0	METHACRYLOXYMETHYLTRIMETHOXYSILANE
$C_8H_{16}Si$	SID2745.0	DIALLYLDIMETHYLSILANE, 95%
$C_8H_{16}Si$	SIE4901.83	ETHYNYL-t-BUTYLDIMETHYLSILANE
$C_8H_{16}Si$	SIE4902.0	ETHYNYLTRIETHYLSILANE
$C_8H_{17}ClSi$	SIC2465.0	CYCLOHEXYLDIMETHYLCHLOROSILANE
$C_8H_{17}ClSi$	SIH6163.0	5-HEXENYLDIMETHYLCHLOROSILANE, 95%
$C_8H_{17}Cl_3Si$	SII6457.0	ISOOCTYLTRICHLOROSILANE
$C_8H_{17}Cl_3Si$	SIO6713.0	n-OCTYLTRICHLOROSILANE
$C_8H_{17}NO_2Si$	SIA0415.0	N-ALLYL-AZA-2,2-DIMETHOXYSILACYCLOPENTANE
$C_8H_{17}NO_2Si$	SIC2437.5	(3-CYANOBUTYL)METHYLDIMETHOXYSILANE
$C_8H_{17}NO_5Si$	SIH6171.0	HYDROXYETHOXYSILATRANE

Molecular formula	Catalog #	Name
$C_8H_{18}Cl_2Si$	SID3203.0	DI-n-BUTYLDICHLOROSILANE
$C_8H_{18}Cl_2Si$	SID3205.0	DI-t-BUTYLDICHLOROSILANE
$C_8H_{18}Cl_2Si$	SIH5845.0	n-HEPTYLMETHYLDICHLOROSILANE
$C_8H_{18}F_2Si$	SID3207.0	DI-t-BUTYLDIFLUOROSILANE
$C_8H_{18}F_3NOSi_2$	SIB1876.0	N,O-BIS(TRIMETHYLSILYL)TRIFLUOROACETAMIDE
$C_8H_{18}N_2O_2Si$	SIB1680.0	BIS(MORPHOLINO)SILANE
$C_8H_{18}N_2Si$	SIC2452.2	3-CYANOPROPYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_8H_{18}OPtSi_2\cdot CO$	SIP6829.2	PLATINUM CARBONYL CYCLOVINYLMETHYLSILOXANE COMPLEX
$C_8H_{18}OSi_2$	SID4613.0	1,3-DIVINYLTETRAMETHYLDISILOXANE
$C_8H_{18}O_2Si$	SIB1939.3	t-BUTYLDIMETHYLSILOXYACETALDEHYDE, 90%
$C_8H_{18}O_2Si$	SIM6496.0	1-METHOXY-1-(TRIMETHYLSILOXY)-2-METHYL-1-PROPENE
$C_8H_{18}O_2Si$	SIT8195.0	TRIETHYLACETOXYSILANE
$C_8H_{18}O_3Si$	SIC2557.0	CYCLOPENTYLTRIMETHOXYSILANE
$C_8H_{18}O_3Si$	SIV9112.0	VINYLTRIETHOXYSILANE
$C_8H_{18}O_4Si$	SIA0092.0	3-ACETOXYPROPYLMETHYLDIMETHOXYSILANE
$C_8H_{18}O_4Si$	SID4220.4	DIMETHYLSILA-11-CROWN-4
$C_8H_{18}O_5Si$	SIA0100.0	3-ACETOXYPROPYLTRIMETHOXYSILANE
$C_8H_{18}Si$	SIV9063.0	VINYL-t-BUTYLDIMETHYLSILANE, 95%
$C_8H_{18}Si$	SIV9116.0	VINYLTRIETHYLSILANE
$C_8H_{18}Si_2$	SIB1850.0	BIS(TRIMETHYLSILYL)ACETYLENE
$C_8H_{18}Si_2$	SID4611.6	1,2-DIVINYLTETRAMETHYLDISILANE, 95%
$C_8H_{19}BrOSi$	SIB1939.59	2-(t-BUTYLDIMETHYLSILOXY)ETHYLBROMIDE
$C_8H_{19}BrO_3Si$	SIB1894.2	5-BROMOPENTYLTRIMETHOXYSILANE
$C_8H_{19}ClO_2Si$	SIC2293.0	CHLOROMETHYLMETHYLDIISOPROPOXYSILANE
$C_8H_{19}ClO_2Si$	SIC2352.0	3-CHLOROPROPYLMETHYLDIETHOXYSILANE
$C_8H_{19}ClO_3Si$	SIC2271.0	2-CHLOROETHYLTRIETHOXYSILANE, 95%
$C_8H_{19}ClSi$	SID3120.0	DI-t-BUTYLCHLOROSILANE
$C_8H_{19}ClSi$	SID3526.0	DIISOBUTYLCHLOROSILANE
$C_8H_{19}ClSi$	SID4065.0	(3,3-DIMETHYLBUTYL)DIMETHYLCHLOROSILANE
$C_8H_{19}ClSi$	SIT7906.0	THEXYLDIMETHYLCHLOROSILANE
$C_8H_{19}NO_2Si$	SIE4891.0	1-ETHYL-2,2-DIMETHOXY-4-METHYL-1-AZA-2-SILACYCLOPENTANE
$C_8H_{19}NO_4Si$	SIA0006.0	(3-ACETAMIDOPROPYL)TRIMETHOXYSILANE
$C_8H_{19}NO_5Si$	SIT8407.0	N-TRIMETHOXYSILYLPROPYLMETHYLCARBAMATE
$C_8H_{19}NSI$	SIP6828.6	(N-PIPERIDINO)TRIMETHYLSILANE
$C_8H_{19}NSi_2$	SID4612.0	1,3-DIVINYL-1,1,3,3-TETRAMETHYLDISILAZANE
$C_8H_{20}N_2Si$	SIA0592.0	N-(2-AMINOETHYL)-2,2,4-TRIMETHYL-1-AZA-2-SILACYCLOPENTANE
$C_8H_{20}OSi$	SID3539.0	DIISOPROPYLETHOXYSILANE
$C_8H_{20}OSi$	SIT8285.0	TRIETHYLETHOXYSILANE
$C_8H_{20}O_2Si$	SIB1939.58	2-(t-BUTYLDIMETHYLSILOXY)ETHANOL
$C_8H_{20}O_2Si$	SID3404.0	DIETHYLDIETHOXYSILANE
$C_8H_{20}O_2Si$	SID3538.0	DIISOPROPYLDIMETHOXYSILANE
$C_8H_{20}O_3Si$	SIE4901.2	ETHYLTRIETHOXYSILANE
$C_8H_{20}O_3Si_2$	SIT8622.0	TRIMETHYLSILYL(TRIMETHYLSILOXY)ACETATE
$C_8H_{20}O_4Si$	SIT7110.0	TETRAETHOXYSILANE, 98%
$C_8H_{20}O_4Si$	SIT7110.2	TETRAETHOXYSILANE, 99.9+%
$C_8H_{20}O_8Si$	SIT7283.5	TETRAKIS(2-HYDROXYETHOXY)SILANE, tech 90
$C_8H_{20}Si$	SID3342.0	DI-t-BUTYLSILANE
$C_8H_{20}Si$	SIO6712.5	n-OCTYLSILANE
$C_8H_{20}Si$	SIT7115.0	TETRAETHYLSILANE
$C_8H_{20}Si_2$	SIB1857.9	1,2-BIS(TRIMETHYLSILYL)ETHYLENE, 90%
$C_8H_{21}ClOSi_2$	SIC2362.0	(3-CHLOROPROPYL)PENTAMETHYLDISILOXANE
$C_8H_{21}NOSi_2$	SIB1846.0	N,O-BIS(TRIMETHYLSILYL)ACETAMIDE
$C_8H_{21}NO_2Si$	SIA0605.0	3-AMINOPROPYLMETHYLDIETHOXYSILANE, 95%
$C_8H_{21}NO_2Si$	SID3546.94	(N,N-DIMETHYL-3-AMINOPROPYL)METHYLDIMETHOXYSILANE
$C_8H_{21}NO_3Si$	SID3395.6	(N,N-DIETHYLAMINOMETHYL)TRIMETHOXYSILANE
$C_8H_{21}NO_3Si$	SID3547.0	(N,N-DIMETHYL-3-AMINOPROPYL)TRIMETHOXYSILANE
$C_8H_{21}NSi$	SIB1937.0	n-BUTYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_8H_{21}NSi$	SID3603.0	(N,N-DIMETHYLAMINO)TRIETHYLSILANE
$C_8H_{22}Cl_2Si_3$	SIB1865.0	BIS(TRIMETHYLSILYLMETHYL)DICHLOROSILANE
$C_8H_{22}N_2O_2Si$	SIA0589.0	N-(2-AMINOETHYL)-3-AMINOPROPYLMETHYLDIMETHOXYSILANE, tech-95
$C_8H_{22}N_2O_3Si$	SIA0591.0	N-(2-AMINOETHYL)-3-AMINOPROPYLTRIMETHOXYSILANE, tech-95
$C_8H_{22}N_2O_3Si$	SIA0591.1	N-(2-AMINOETHYL)-3-AMINOPROPYLTRIMETHOXYSILANE, 98%
$C_8H_{22}N_2Si$	SIB1069.0	BIS(DIETHYLAMINO)SILANE
$C_8H_{22}N_2Si$	SIB1070.0	BIS(DIMETHYLAMINO)DIETHYLSILANE
$C_8H_{22}N_2Si$	SID2795.0	DI(t-BUTYLAMINO)SILANE
$C_8H_{22}OSi_2$	SIB1977.0	n-BUTYL-1,1,3,3-TETRAMETHYLDISILOXANE
$C_8H_{22}OSi_2$	SID3220.0	1,3-DI-t-BUTYLDISILOXANE
$C_8H_{22}OSi_2$	SID3418.0	1,3-DIETHYLTETRAMETHYLDISILOXANE
$C_8H_{22}OSi_2$	SIT8280.0	1,1,1-TRIETHYL-3,3-DIMETHYLDISILOXANE
$C_8H_{22}O_2Si_2$	SIB1840.0	1,2-BIS(TRIMETHYLSILOXY)ETHANE
$C_8H_{22}O_2Si_2$	SID3395.2	1,2-DIETHOXYTETRAMETHYLDISILANE
$C_8H_{22}O_3Si_2$	SIT7534.0	1,1,3,3-TETRAMETHYL-1,3-DIETHOXYDISILOXANE
$C_8H_{22}O_4Si_2$	SIB1632.0	1,2-BIS(METHYLDIMETHOXYSILYL)ETHANE
$C_8H_{22}O_6Si_2$	SIB1830.0	1,2-BIS(TRIMETHOXYSILYL)ETHANE

Molecular formula	Catalog #	Name
$C_8H_{22}SSi_2$	SIB1867.0	BIS(TRIMETHYLSILYLMETHYL)SULFIDE
$C_8H_{22}Si_2$	SID4593.5	1,10-DISILADECANE
$C_8H_{23}ClO_2Si_3$	SIC2289.5	3-(CHLOROMETHYL)HEPTAMETHYLTRISILOXANE
$C_8H_{23}NOSi_2$	SIA0607.0	3-AMINOPROPYLPENTAMETHYLDISILOXANE
$C_8H_{23}NSi_2$	SIB1863.3	BIS(TRIMETHYLSILYLMETHYL)AMINE
$C_8H_{23}N_3Si$	SIT8711.6	TRIS(DIMETHYLAMINO)ETHYLSILANE
$C_8H_{24}Cl_2O_3Si_4$	SID3367.0	1,7-DICHLOROOCTAMETHYLTETRASILOXANE, 95%
$C_8H_{24}NPSi_2$	SIB1852.8	BIS(TRIMETHYLSILYL)AMINODIMETHYLPHOSPHINE
$C_8H_{24}N_2Si_2$	SIB1077.0	1,2-BIS(DIMETHYLAMINO)TETRAMETHYLDISILANE
$C_8H_{24}N_4Si$	SIT7276.0	TETRAKIS(DIMETHYLAMINO)SILANE
$C_8H_{24}O_2Si_3$	SIO6703.0	OCTAMETHYLTRISILOXANE
$C_8H_{24}O_3Si_3$	SIB1843.0	BIS(TRIMETHYLSILOXY)METHYLMETHOXYSILANE
$C_8H_{24}O_3Si_4$	SIV9269.5	VINYLTRIS(DIMETHYLSILOXY)SILANE
$C_8H_{24}O_4Si_4$	SIO6700.0	OCTAMETHYLCYCLOTETRASILOXANE, 98%
$C_8H_{24}O_4Si_4$	SIT7112.0	1,3,5,7-TETRAETHYLCYCLOTETRASILOXANE, 95%
$C_8H_{26}N_2O_4Si$	SIT7516.0	TETRAMETHYLAMMONIUM SILICATE, 16-20% in water
$C_8H_{26}O_3Si_4$	SIB1838.0	1,3-BIS(TRIMETHYLSILOXY)-1,3-DIMETHYLDISILOXANE, 95%
$C_8H_{26}O_3Si_4$	SIO6702.0	1,1,3,3,5,5,7,7-OCTAMETHYLTETRASILOXANE, 80% in octamethylcyclotetrasiloxane
$C_8H_{26}O_4Si_4$	SIT8715.4	TRIS(DIMETHYLSILOXY)ETHOXYSILANE, tech-95
$C_8H_{28}N_4Si_4$	SIO6698.0	1,1,3,3,5,5,7,7-OCTAMETHYLCYCLOTETRASILAZANE
$C_8H_{28}N_4Si_4$	SIO6699.0	1,2,3,4,5,6,7,8-OCTAMETHYLCYCLOTETRASILAZANE, 95%
$C_8H_{28}O_4Si_5$	SIT7278.0	TETRAKIS(DIMETHYLSILOXY)SILANE
$C_9H_6Cl_3F_5Si$	SIP6716.4	PENTAFLUOROPHENYLPROPYLTRICHLOROSILANE
$C_9H_7Cl_2F_{13}Si$	SIT8172.0	(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)METHYLDICHLOROSILANE
$C_9H_9F_5O_3Si$	SIP6716.73	PENTAFLUOROPHENYLTRIMETHOXYSILANE
$C_9H_9F_5Si$	SIP6716.8	PENTAFLUOROPHENYLTRIMETHYLSILANE
$C_9H_{10}Cl_2Si$	SIA0486.0	ALLYLPHENYLDICHLOROSILANE, 95%
$C_9H_{10}Cl_4Si$	SIC2295.3	((CHLOROMETHYL)PHENYLETHYL)TRICHLOROSILANE
$C_9H_{11}ClSi$	SIV9094.0	VINYLPHENYLMETHYLCHLOROSILANE
$C_9H_{11}Cl_3OSi$	SIP6723.3	3-PHENOXYPROPYLTRICHLOROSILANE
$C_9H_{11}Cl_3Si$	SIP6744.6	(3-PHENYLPROPYL)TRICHLOROSILANE
$C_9H_{12}Br_2Si$	SID2772.0	3,5-DIBROMO-1-TRIMETHYLSILYLBENZENE
$C_9H_{12}Cl_2Si$	SIP6721.5	PHENETHYLMETHYLDICHLOROSILANE
$C_9H_{12}Si$	SIV9096.0	VINYLPHENYLMETHYLSILANE
$C_9H_{13}BrO_3Si$	SIB1904.0	BROMOPHENYLTRIMETHOXYSILANE
$C_9H_{13}BrO_3Si$	SIB1904.3	p-BROMOPHENYLTRIMETHOXYSILANE
$C_9H_{13}ClSi$	SIB0962.0	BENZYLDIMETHYLCHLOROSILANE
$C_9H_{13}ClSi$	SIC2287.0	(CHLOROMETHYL)DIMETHYLPHENYLSILANE
$C_9H_{13}ClSi$	SIC2334.0	p-CHLOROPHENYLTRIMETHYLSILANE
$C_9H_{13}ClSi$	SIT8030.0	p-TOLYLDIMETHYLCHLOROSILANE
$C_9H_{13}Cl_3Si$	SIB0986.0	[(5-BICYCLO[2.2.1]HEPT-2-ENYL)ETHYL]TRICHLOROSILANE, tech-95, endo/exo isomers
$C_9H_{13}FSi$	SIF4930.0	4-FLUOROPHENYLTRIMETHYLSILANE
$C_9H_{13}F_9O_3Si$	SIN6597.7	NONAFLUOROHEXYLTRIMETHOXYSILANE
$C_9H_{13}NaOSi$	SIS6983.0	SODIUM (4-METHYLPHENYL)DIMETHYLSILANOLATE, 2M in tetrahydrofuran
$C_9H_{13}N_3Si$	SIT8581.0	1-TRIMETHYLSILYLBENZOTRIAZOLE
$C_9H_{14}OSi$	SIP6723.5	PHENOXYTRIMETHYLSILANE
$C_9H_{14}O_2Si$	SIP6740.0	PHENYLMETHYLDIMETHOXYSILANE
$C_9H_{14}O_3SSi$	SIT8580.7	TRIMETHYLSILYL BENZENESULFONATE
$C_9H_{14}O_3Si$	SIP6822.0	PHENYLTRIMETHOXYSILANE
$C_9H_{14}O_3Si$	SIP6822.1	PHENYLTRIMETHOXYSILANE, 99+%
$C_9H_{14}SSi$	SIP6770.0	PHENYLTHIOTRIMETHYLSILANE
$C_9H_{14}SeSi$	SIP6747.0	PHENYLSELENOTRIMETHYLSILANE, 95%
$C_9H_{14}Si$	SIB0964.0	BENZYLDIMETHYLSILANE
$C_9H_{14}Si$	SIP6823.0	PHENYLTRIMETHYLSILANE
$C_9H_{15}F_7O_4Si$	SIH5842.2	3-(HEPTAFLUOROISOPROPOXY)PROPYLTRIMETHOXYSILANE
$C_9H_{15}NO_3Si$	SIA0599.0	m-AMINOPHENYLTRIMETHOXYSILANE, 90%
$C_9H_{15}NO_3Si$	SIA0599.1	p-AMINOPHENYLTRIMETHOXYSILANE, 90%
$C_9H_{15}NSi$	SIA0710.0	ANILINOTRIMETHYLSILANE
$C_9H_{16}Cl_2Si$	SIC2458.0	[2-(3-CYCLOHEXENYL)ETHYL]METHYLDICHLOROSILANE
$C_9H_{17}ClO_2Si$	SIM6486.2	3-METHACRYLOXYPROPYLDIMETHYLCHLOROSILANE
$C_9H_{17}ClSi$	SIB0994.0	(5-BICYCLO[2.2.1]HEPTYL)DIMETHYLCHLOROSILANE
$C_9H_{18}F_3NOSi$	SIB1966.0	N-(t-BUTYLDIMETHYLSILYL)-N-METHYLTRIFLUOROACETAMIDE
$C_9H_{18}N_2Si$	SIB1964.0	1-(t-BUTYLDIMETHYLSILYL)IMIDAZOLE
$C_9H_{18}OSi$	SIC2462.0	(CYCLOHEXENYLOXY)TRIMETHYLSILANE
$C_9H_{18}OSi$	SIP6902.4	PROPARGYLOXY-t-BUTYLDIMETHYLSILANE
$C_9H_{18}O_2Si_2$	SIT8623.0	TRIMETHYLSILYL(TRIMETHYLSILYL)PROPYNOATE
$C_9H_{18}O_3Si$	SIA0190.0	(3-ACRYLOXYPROPYL)DIMETHYLMETHOXYSILANE, 95%
$C_9H_{18}O_3Si$	SIC2464.1	3-CYCLOHEXENYLTRIMETHOXYSILANE
$C_9H_{18}O_3Si$	SIM6481.0	METHACRYLOXYETHOXYTRIMETHYLSILANE
$C_9H_{18}O_3Si$	SIM6481.3	(METHACRYLOXYMETHYL)DIMETHYLETHOXYSILANE
$C_9H_{18}O_3Si_3$	SIT8737.0	1,3,5-TRIVINYL-1,3,5-TRIMETHYLCYCLOTRISILOXANE
$C_9H_{18}O_4Si$	SIA0198.0	(3-ACRYLOXYPROPYL)METHYLDIMETHOXYSILANE, 95%
$C_9H_{18}O_5Si$	SIA0200.0	(3-ACRYLOXYPROPYL)TRIMETHOXYSILANE, 96%
$C_9H_{18}Si$	SIT8589.7	1-TRIMETHYLSILYL-1-HEXYNE

SILICON COMPOUNDS

Molecular formula	Catalog #	Name
$C_9H_{19}NO_3Si$	SIC2445.0	2-CYANOETHYLTRIETHOXYSILANE
$C_9H_{19}NO_3Si$	SII6454.45	3-ISOCYANATOPROPYLMETHYLDIETHOXYSILANE, 95%
$C_9H_{19}NO_4Si$	SIA0146.0	3-ACRYLAMIDOPROPYLTRIMETHOXYSILANE, tech-95
$C_9H_{20}Cl_2Si$	SIO6712.0	n-OCTYLMETHYLDICHLOROSILANE
$C_9H_{20}OSi$	SIA0476.0	ALLYLOXY-t-BUTYLDIMETHYLSILANE
$C_9H_{20}O_2Si$	SIC2469.0	CYCLOHEXYLMETHYLDIMETHOXYSILANE
$C_9H_{20}O_3Si$	SIG5805.0	(S)-GLYCIDOXY-t-BUTYLDIMETHYLSILANE
$C_9H_{20}O_3Si$	SIA0525.0	ALLYLTRIETHOXYSILANE
$C_9H_{20}O_3Si$	SIC2482.0	CYCLOHEXYLTRIMETHOXYSILANE
$C_9H_{20}O_3Si_2$	SIM6486.14	METHACRYLOXYPENTAMETHYLDISILOXANE
$C_9H_{20}O_4Si$	SIG5836.0	(3-GLYCIDOXYPROPYL)METHYLDIMETHOXYSILANE
$C_9H_{20}O_4Si_2$	SIB1862.0	BIS(TRIMETHYLSILYL) MALONATE
$C_9H_{20}O_5Si$	SIA0050.0	ACETOXYMETHYLTRIETHOXYSILANE
$C_9H_{20}O_5Si$	SIG5840.0	(3- GLYCIDOXYPROPYL)TRIMETHOXYSILANE
$C_9H_{20}O_5Si$	SIG5840.1	(3- GLYCIDOXYPROPYL)TRIMETHOXYSILANE, 99+%
$C_9H_{21}BrOSi$	SIB1904.5	3-BROMOPROPOXY-t-BUTYLDIMETHYLSILANE
$C_9H_{21}ClOSi$	SIB1939.52	1-(t-BUTYLDIMETHYLSILYLOXY)-3-CHLOROPROPANE
$C_9H_{21}ClO_3Si$	SIC2407.0	3-CHLOROPROPYLTRIETHOXYSILANE
$C_9H_{21}ClSi$	SID3255.0	DI-t-BUTYLMETHYLCHLOROSILANE
$C_9H_{21}ClSi$	SIT8384.0	TRIISOPROPYLCHLOROSILANE
$C_9H_{21}ClSi$	SIT8707.0	TRI-n-PROPYLCHLOROSILANE
$C_9H_{21}LiOSi$	SIB1940.6	3-(t-BUTYLDIMETHYLSILOXY)-1-PROPYLLITHIUM, 1M in cyclohexane - 20-23 wgt%
$C_9H_{21}NO_2Si$	SIB1932.4	N-n-BUTYL-AZA-2,2-DIMETHOXYSILACYCLOPENTANE
$C_9H_{21}NO_3Si$	SIA0400.0	3-(N-ALLYLAMINO)PROPYLTRIMETHOXYSILANE, 95%
$C_9H_{21}N_3O_3Si$	SIA0777.0	3-AZIDOPROPYLTRIETHOXYSILANE
$C_9H_{21}N_3Si_3$	SIT8736.0	1,3,5-TRIVINYL-1,3,5-TRIMETHYLCYCLOTRISILAZANE, 95%
$C_9H_{21}O_5PSi$	SID3420.0	DIETHYL(TRIMETHYLSILOXYCARBONYLMETHYL)PHOSPHONATE, 95%
$C_9H_{22}O_2Si$	SIB1939.7	3-(t-BUTYLDIMETHYLSILOXY)PROPAN-1-OL
$C_9H_{22}O_2Si$	SIB1971.0	t-BUTYLISOPROPYLDIMETHOXYSILANE
$C_9H_{22}O_2Si$	SII6452.6	ISOBUTYLISOPROPYLDIMETHOXYSILANE
$C_9H_{22}O_3SSi$	SIM6475.0	3-MERCAPTOPROPYLTRIETHOXYSILANE, 95%
$C_9H_{22}O_3Si$	SIH6168.5	HEXYLTRIMETHOXYSILANE
$C_9H_{22}O_3Si$	SIP6917.0	n-PROPYLTRIETHOXYSILANE
$C_9H_{22}O_3Si$	SIT8379.0	TRIISOPROPOXYSILANE, 95%
$C_9H_{22}O_3Si_2$	SIB1861.0	O,O-BIS(TRIMETHYLSILYL) LACTATE
$C_9H_{22}Si$	SID3258.0	DI-t-BUTYLMETHYLSILANE
$C_9H_{22}Si$	SIT8385.0	TRIISOPROPYLSILANE
$C_9H_{22}Si$	SIT8709.0	TRI-n-PROPYLSILANE
$C_9H_{23}NO_2Si$	SIA0587.05	4-AMINO-3,3-DIMETHYLBUTYLMETHYLDIMETHOXYSILANE
$C_9H_{23}NO_3Si$	SIA0587.07	4-AMINO-3,3-DIMETHYLBUTYLTRIMETHOXYSILANE
$C_9H_{23}NO_3Si$	SIA0610.0	3-AMINOPROPYLTRIETHOXYSILANE
$C_9H_{23}NO_3Si$	SIA0610.1	3-AMINOPROPYLTRIETHOXYSILANE 99+%
$C_9H_{23}NO_3Si$	SIE4886.0	(3-(N-ETHYLAMINO)ISOBUTYL)TRIMETHOXYSILANE
$C_9H_{23}NO_4Si$	SIH6172.0	N-(HYDROXYETHYL)-N-METHYLAMINOPROPYLTRIMETHOXYSILANE, 75% in methanol
$C_9H_{23}NSi$	SID3533.0	(DIISOPROPYLAMINO)TRIMETHYLSILANE
$C_9H_{23}NSi_2$	SIB1852.7	N,N-BIS(TRIMETHYLSILYL)ALLYLAMINE
$C_9H_{24}ClNO_3Si$	SIT8415.0	N-TRIMETHOXYSILYLPROPYL-N,N,N-TRIMETHYLAMMONIUM CHLORIDE, 50% in methanol
$C_9H_{24}ClN_3Si$	SIT8715.55	TRIS(ETHYLMETHYLAMINO)CHLOROSILANE
$C_9H_{24}N_2OSi$	SIA0587.2	N-(2-AMINOETHYL)-3-AMINOISOBUTYLDIMETHYLMETHOXYSILANE, 95%
$C_9H_{24}N_2O_2Si$	SIA0587.5	N-(2-AMINOETHYL)-3-AMINOISOBUTYLMETHYLDIMETHOXYSILANE, 95%
$C_9H_{24}OSi_2$	SIT8339.0	1,1,1-TRIETHYL-3,3,3-TRIMETHYLDISILOXANE
$C_9H_{24}O_2Si_2$	SIB1094.0	BIS(ETHOXYDIMETHYLSILYL)METHANE
$C_9H_{24}O_2Si_3$	SIV9082.0	VINYLMETHYLBIS(TRIMETHYLSILOXY)SILANE
$C_9H_{24}O_4Si_2$	SIT8572.7	TRIMETHYLSILOXYTRIETHOXYSILANE
$C_9H_{24}O_6Si_4$	SIA0038.0	ACETOXYHEPTAMETHYLCYCLOTETRASILOXANE
$C_9H_{25}F_3O_3Si_4$	SIT8372.4	TRIFLUOROPROPYLTRIS(DIMETHYLSILOXY)SILANE
$C_9H_{26}O_2Si_3$	SIE4895.0	3-ETHYLHEPTAMETHYLTRISILOXANE
$C_9H_{27}BO_3Si_3$	SIT8718.0	TRIS(TRIMETHYLSILOXY)BORON
$C_9H_{27}ClO_3Si_4$	SIT8719.0	TRIS(TRIMETHYLSILOXY)CHLOROSILANE
$C_9H_{27}ClSi_4$	SIC2420.0	CHLOROTRIS(TRIMETHYLSILYL)SILANE, 95%
$C_9H_{27}F_2N_3SSi$	SIT8715.0	TRIS(DIMETHYLAMINO)SULFUR(TRIMETHYLSILYL)DIFLUORIDE, tech-95
$C_9H_{27}NSi_3$	SIN6595.0	NONAMETHYLTRISILAZANE
$C_9H_{27}O_3PSi_3$	SIT8723.6	TRIS(TRIMETHYLSILYL)PHOSPHITE, 95%
$C_9H_{27}O_3SbSi_3$	SIT8717.7	TRIS(TRIMETHYLSILOXY)ANTIMONY
$C_9H_{27}O_4PSi_3$	SIT8723.0	TRIS(TRIMETHYLSILYL)PHOSPHATE
$C_9H_{27}PSi_3$	SIT8723.4	TRIS(TRIMETHYLSILYL)PHOSPHINE, 10% in hexane
$C_9H_{28}GeSi_3$	GET8721.5	TRIS(TRIMETHYLSILYL)GERMANE
$C_9H_{28}O_3Si_4$	SIT8721.0	TRIS(TRIMETHYLSILOXY)SILANE
$C_9H_{28}Si_4$	SIT8724.0	TRIS(TRIMETHYLSILYL)SILANE
$C_{10}H_4Cl_3F_{17}Si$	SIH5841.0	(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TRICHLOROSILANE
$C_{10}H_7Cl_3F_{12}Si$	SID4623.4	DODECAFLUORODEC-9-ENE-1-YLTRICHLOROSILANE
$C_{10}H_8Cl_6F_{12}Si_2$	SIB1809.5	1,6-BIS(TRICHLOROSILYLETHYL)DODECAFLUOROHEXANE
$C_{10}H_9Cl_2F_5Si$	SIP6716.3	PENTAFLUOROPHENYLPROPYLMETHYLDICHLOROSILANE
$C_{10}H_{10}ClF_{13}Si$	SIT8170.0	(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)DIMETHYLCHLOROSILANE

Molecular formula	Catalog #	Name
$C_{10}H_{10}F_6Si$	SIB1828.2	3,5-BIS(TRIFLUOROMETHYL)PHENYLDIMETHYLSILANE, 95%
$C_{10}H_{11}Cl_2NSi$	SIC2453.7	3-CYANOPROPYLPHENYLDICHLOROSILANE
$C_{10}H_{11}Cl_3O_2Si$	SIA0070.0	4-ACETOXYPHENETHYLTRICHLOROSILANE
$C_{10}H_{11}Cl_7O_2SSi_2$	SIB1811.7	BIS(TRICHLOROSILYLETHYL)PHENYLSULFONYL CHLORIDE, mixed isomers, 40% in toluene
$C_{10}H_{12}Cl_6Si_2$	SIB1811.0	BIS(TRICHLOROSILYLETHYL)BENZENE, tech-95
$C_{10}H_{12}Si$	SIP6732.0	PHENYLETHYNYLDIMETHYLSILANE
$C_{10}H_{13}ClOSi$	SIM6492.3	1-(4-METHOXYPHENYL)-1-CHLOROSILACYCLOBUTANE
$C_{10}H_{13}Cl_3OSi$	SIM6492.5	3-(p-METHOXYPHENYL)PROPYLTRICHLOROSILANE
$C_{10}H_{13}Cl_3Si$	SIC2295.1	((CHLOROMETHYL)PHENYLETHYL)METHYLDICHLOROSILANE
$C_{10}H_{13}Cl_3Si$	SIP6724.9	4-PHENYLBUTYLTRICHLOROSILANE
$C_{10}H_{13}Cl_3Si$	SIP6813.0	1-PHENYL-1-TRICHLOROSILYLBUTANE
$C_{10}H_{13}CuF_6O_2Si$	AKC252.8	COPPER(I)/(II) HEXAFLUORO-2,4-PENTANEDIONATE - VINYLTRIMETHYLSILANE COMPLEX
$C_{10}H_{13}F_3O_3SSi$	SIT8598.5	2-(TRIMETHYLSILYL)PHENYLTRIFLUOROMETHANESULFONATE
$C_{10}H_{13}F_3O_3Si$	SIT8343.0	m-(TRIFLUOROMETHYL)PHENYLTRIMETHOXYSILANE
$C_{10}H_{14}Cl_2OSi$	SIP6723.25	3-PHENOXYPROPYLMETHYLDICHLOROSILANE
$C_{10}H_{14}Cl_2Si$	SIB1974.0	t-BUTYLPHENYLDICHLOROSILANE
$C_{10}H_{14}Cl_2Si$	SIM6511.0	p-(METHYLPHENETHYL)METHYLDICHLOROSILANE, 95%
$C_{10}H_{14}Cl_2Si$	SIM6512.5	(2-METHYL-2-PHENYLETHYL)METHYLDICHLOROSILANE
$C_{10}H_{14}Cl_2Si$	SIP6744.0	(3-PHENYLPROPYL)METHYLDICHLOROSILANE
$C_{10}H_{14}OSi$	SIV9095.0	VINYLPHENYLMETHYLMETHOXYSILANE
$C_{10}H_{14}O_2Si$	SIP6726.0	PHENYLDIMETHYLACETOXYSILANE
$C_{10}H_{14}O_2Si$	SIT8570.7	2-TRIMETHYLSILOXYBENZALDEHYDE
$C_{10}H_{14}O_2Si$	SIT8570.8	4-TRIMETHYLSILOXYBENZALDEHYDE
$C_{10}H_{14}Si$	SIV9093.0	VINYLPHENYLDIMETHYLSILANE
$C_{10}H_{15}BrSi$	SIB1878.6	(4-BROMBENZYL)TRIMETHYLSILANE
$C_{10}H_{15}ClO_3Si$	SIC2296.2	(p-CHLOROMETHYL)PHENYLTRIMETHOXYSILANE, 95%
$C_{10}H_{15}ClSi$	SIP6721.0	PHENETHYLDIMETHYLCHLOROSILANE
$C_{10}H_{15}NSi$	SIP6923.0	(2-PYRIDYL)ALLYLDIMETHYLSILANE, 90%
$C_{10}H_{15}N_3O_3Si$	SIA0774.0	p-AZIDOMETHYLPHENYLTRIMETHOXYSILANE, 90%
$C_{10}H_{16}Cl_2Si$	SIB0984.0	[(5-BICYCLO[2.2.1]HEPT-2-ENYL)ETHYL]METHYLDICHLOROSILANE, tech-95, endo/exo isomers
$C_{10}H_{16}F_9NSi$	SIN6597.4	NONAFLUOROHEXYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_{10}H_{16}OSi$	SIB0968.0	BENZYLOXYTRIMETHYLSILANE
$C_{10}H_{16}OSi$	SIP6728.4	PHENYLDIMETHYLETHOXYSILANE
$C_{10}H_{16}O_2Si$	SIP6725.2	PHENYLDIETHOXYSILANE, 95%
$C_{10}H_{16}O_2Si$	SIP8035.6	p-TOLYLMETHYLDIMETHOXYSILANE
$C_{10}H_{16}O_2Si$	SIT8605.0	3-TRIMETHYLSILYLPROPARGYLMETHACRYLATE, 95%
$C_{10}H_{16}O_3Si$	SIT8042.0	p-TOLYLTRIMETHOXYSILANE
$C_{10}H_{16}O_4Si$	SIM6492.55	p-METHOXYPHENYLTRIMETHOXYSILANE
$C_{10}H_{16}SSi$	SIP6775.0	(PHENYLTHIOMETHYL)TRIMETHYLSILANE
$C_{10}H_{16}SeSi$	SIP6745.0	(PHENYLSELENOMETHYL)TRIMETHYLSILANE, 95%
$C_{10}H_{16}Si$	SIB0973.0	BENZYLTRIMETHYLSILANE
$C_{10}H_{16}Si$	SIT8043.0	p-TOLYLTRIMETHYLSILANE
$C_{10}H_{17}BrN_2Si$	SIB1879.5	5-BROMO-2-(t-BUTYLDIMETHYLSILYL)PYRIMIDINE
$C_{10}H_{17}ClN_2Si$	SIP6724.6	PHENYLBIS(DIMETHYLAMINO)CHLOROSILANE, 95%
$C_{10}H_{17}NO_2Si$	SIP6723.67	(PHENYLAMINOMETHYL)METHYLDIMETHOXYSILANE, 95%
$C_{10}H_{17}NO_3Si$	SIP6930.0	2-(2-PYRIDYLETHYL)TRIMETHOXYSILANE
$C_{10}H_{18}Cl_2Si$	SID3390.0	DICYCLOPENTYLDICHLOROSILANE
$C_{10}H_{18}F_6O_6S_2Si$	SID3345.0	DI-t-BUTYLSILYLBIS(TRIFLUOROMETHANESULFONATE)
$C_{10}H_{18}OSi_2$	SIT7896.0	1,1,3,3-TETRAVINYLDIMETHYLDISILOXANE, 95%
$C_{10}H_{18}O_2Si_2$	SIB1135.0	1,4-BIS(HYDROXYDIMETHYLSILYL)BENZENE, tech-95
$C_{10}H_{18}O_3S_2Si$	SIT8411.0	2-(3-TRIMETHOXYSILYLPROPYLTHIO)THIOPHENE
$C_{10}H_{18}O_4Si_2$	SIB1852.0	BIS(TRIMETHYLSILYL)ACETYLENEDICARBOXYLATE
$C_{10}H_{18}SSi$	SIT7906.9	2-THIENYL-t-BUTYLDIMETHYLSILANE
$C_{10}H_{18}Si$	SIT8060.0	TRIALLYLMETHYLSILANE
$C_{10}H_{18}Si_2$	SIB1084.0	1,2-BIS(DIMETHYLSILYL)BENZENE
$C_{10}H_{18}Si_2$	SIB1086.0	1,4-BIS(DIMETHYLSILYL)BENZENE
$C_{10}H_{18}Si_2$	SIB1854.0	BIS(TRIMETHYLSILYL)BUTADIYNE
$C_{10}H_{19}ClSi$	SIC2457.0	[2-(3-CYCLOHEXENYL)ETHYL]DIMETHYLCHLORO-SILANE
$C_{10}H_{19}FN_2O_2Si_2$	SIB1858.6	BIS(TRIMETHYLSILYL)-5-FLUOROURACIL
$C_{10}H_{19}NO_3Si$	SIT8410.0	N-(3-TRIMETHOXYSILYLPROPYL)PYRROLE
$C_{10}H_{20}ClNSi$	SIC2450.0	3-CYANOPROPYLDIISOPROPYLCHLOROSILANE
$C_{10}H_{20}Cl_2Si$	SIV9088.0	VINYLOCTYLDICHLOROSILANE
$C_{10}H_{20}Cl_6Si_2$	SIB1808.0	1,2-BIS(TRICHLOROSILYL)DECANE
$C_{10}H_{20}Cl_6Si_2$	SIB1809.0	1,10-BIS(TRICHLOROSILYL)DECANE, tech-95
$C_{10}H_{20}F_6OSi_2$	SIB1828.5	1,3-BIS(TRIFLUOROPROPYL)TETRAMETHYLDISILOXANE
$C_{10}H_{20}OSi$	SIB1939.35	1-(t-BUTYLDIMETHYLSILOXY)-1,3-BUTADIENE, 95%
$C_{10}H_{20}OSi$	SIB1939.5	4-(t-BUTYLDIMETHYLSILOXY)BUTYNE
$C_{10}H_{20}O_3Si$	SIM6486.5	METHACRYLOXYPROPYLDIMETHYLMETHOXYSILANE, 95%
$C_{10}H_{20}O_4Si$	SIM6481.43	(METHACRYLOXYMETHYL)METHYLDIETHOXYSILANE
$C_{10}H_{20}O_4Si$	SIM6486.9	METHACRYLOXYPROPYLMETHYLDIMETHOXYSILANE, 95%
$C_{10}H_{20}O_5Si$	SIM6487.4	METHACRYLOXYPROPYLTRIMETHOXYSILANE
$C_{10}H_{20}O_5Si$	SIM6487.4LI	METHACRYLOXYPROPYLTRIMETHOXYSILANE, low inhibitor grade
$C_{10}H_{20}Si$	SIH5848.0	1-HEPTYNYLTRIMETHYLSILANE

Molecular formula	Catalog #	Name
$C_{10}H_{21}BrO_5Si$	SIT8397.0	(3-TRIMETHOXYSILYL)PROPYL 2-BROMO-2-METHYLPROPIONATE
$C_{10}H_{21}ClSi$	SIO6707.0	7-OCTENYLDIMETHYLCHLOROSILANE, tech-95
$C_{10}H_{21}Cl_3O_4Si$	SIM6493.2	METHOXYTRIETHYLENEOXYPROPYLTRICHLOROSILANE
$C_{10}H_{21}Cl_3Si$	SID2663.0	n-DECYLTRICHLOROSILANE
$C_{10}H_{21}F_3O_3SSi$	SIT8387.0	TRIISOPROPYLSILYLTRIFLUOROMETHANESULFONATE
$C_{10}H_{21}F_6NSi_2$	SIB1828.4	1,3-BIS(TRIFLUOROPROPYL)-1,1,3,3-TETRAMETHYLDISILAZANE, 95%
$C_{10}H_{21}NO_3SSi$	SIT7908.0	3-THIOCYANATOPROPYLTRIETHOXYSILANE, 96%
$C_{10}H_{21}NO_3Si$	SIC2455.0	3-CYANOPROPYLTRIETHOXYSILANE
$C_{10}H_{21}NO_4Si$	SII6455.0	3-ISOCYANATOPROPYLTRIETHOXYSILANE, 95%
$C_{10}H_{21}N_3OSi_2$	SIB1857.0	BIS(TRIMETHYLSILYL)CYTOSINE
$C_{10}H_{22}N_2O_5Si$	SIA0120.2	N-(ACETYLGLYCYL)-3-AMINOPROPYLTRIMETHOXYSILANE, 5% in methanol
$C_{10}H_{22}OSi_2$	SID2754.0	1,3-DIALLYLTETRAMETHYLDISILOXANE, 95%
$C_{10}H_{22}O_2Si_2$	SIB1836.0	1,2-BIS(TRIMETHYLSILOXY)CYCLOBUTENE, 95%
$C_{10}H_{22}O_3Si$	SIB1928.0	3-BUTENYLTRIETHOXYSILANE, 95%
$C_{10}H_{22}O_3Si$	SIG5825.0	(3-GLYCIDOXYPROPYL)DIMETHYLETHOXYSILANE
$C_{10}H_{22}O_4Si$	SIT8185.3	TRIETHOXYSILYLBUTYRALDEHYDE, tech-90
$C_{10}H_{22}O_5Si$	SIA0025.0	ACETOXYETHYLTRIETHOXYSILANE
$C_{10}H_{22}O_5Si$	SID4220.5	DIMETHYLSILA-14-CROWN-5
$C_{10}H_{22}Si$	SIO6707.5	7-OCTENYLDIMETHYLSILANE, tech-95
$C_{10}H_{22}Si_2$	SID4614.0	1,4-DIVINYL-1,1,4,4-TETRAMETHYL-1,4-DISILABUTANE
$C_{10}H_{23}BrO_3Si$	SIB1886.0	7-BROMOHEPTYLTRIMETHOXYSILANE
$C_{10}H_{23}ClO_2Si$	SIC2353.0	3-CHLOROPROPYLMETHYLDIISOPROPOXYSILANE
$C_{10}H_{23}ClO_3Si$	SIC2298.5	CHLOROMETHYLTRIISOPROPOXYSILANE
$C_{10}H_{23}ClSi$	SII6456.6	ISOOCTYLDIMETHYLCHLOROSILANE
$C_{10}H_{23}ClSi$	SIO6711.0	n-OCTYLDIMETHYLCHLOROSILANE
$C_{10}H_{23}IOSi$	SII6400.0	(4-IODOBUTOXY)-t-BUTYLDIMETHYLSILANE
$C_{10}H_{23}IO_2Si$	SII6451.2	(3-IODOPROPYL)METHYLDIISOPROPOXYSILANE
$C_{10}H_{24}Cl_2OSi_2$	SIB1056.0	1,3-BIS(3-CHLOROPROPYL)TETRAMETHYLDISILOXANE
$C_{10}H_{24}Cl_2O_2Si_2$	SIB1048.3	BIS[(3-CHLORODIMETHYLSILYL)PROPYL] ETHER
$C_{10}H_{24}Cl_2Si_2$	SIB1046.0	1,6-BIS(CHLORODIMETHYLSILYL)HEXANE, 95%
$C_{10}H_{24}N_2O_2Si$	SIP6828.4	[3-(1-PIPERAZINYL)PROPYL]METHYLDIMETHOXYSILANE
$C_{10}H_{24}N_2O_4Si$	SIU9055.0	UREIDOPROPYLTRIETHOXYSILANE, 50% in methanol
$C_{10}H_{24}N_3O_4Si$	SIS6944.0	3-(4-SEMICARBAZIDYL)PROPYLTRIETHOXYSILANE, tech-95
$C_{10}H_{24}O_2Si$	SID3214.0	DI-n-BUTYLDIMETHOXYSILANE
$C_{10}H_{24}O_2Si$	SID3530.0	DIISOBUTYLDIMETHOXYSILANE
$C_{10}H_{24}O_2Si$	SID4080.0	DIMETHYLDI-n-BUTOXYSILANE
$C_{10}H_{24}O_2Si_3$	SID4610.0	1,5-DIVINYLHEXAMETHYLTRISILOXANE, 95%
$C_{10}H_{24}O_3Si$	SIB1986.0	n-BUTYLTRIETHOXYSILANE
$C_{10}H_{24}O_3Si$	SII6453.5	ISOBUTYLTRIETHOXYSILANE, 98%
$C_{10}H_{24}O_3Si$	SIM6579.0	METHYLTRI-n-PROPOXYSILANE
$C_{10}H_{24}O_3Si_2$	SIG5838.5	(3-GLYCIDOXYPROPYL)-1,1,3,3-TETRAMETHYLDISILOXANE
$C_{10}H_{24}O_4Si$	SID2792.0	DI-t-BUTOXYDIMETHOXYSILANE, tech-95
$C_{10}H_{24}O_6Si$	SIM6585.0	METHYLTRIS(METHOXYETHOXY)SILANE
$C_{10}H_{24}O_6Si_2$	SIB1832.5	1,1-BIS(TRIMETHOXYSILYLMETHYL)ETHYLENE, tech-95
$C_{10}H_{24}S_2Si_2$	SIB1857.7	2,2-BIS(TRIMETHYLSILYL)-1,3-DITHIANE
$C_{10}H_{24}Si$	SIO6711.4	n-OCTYLDIMETHYLSILANE
$C_{10}H_{25}F_3O_2Si_3$	SIT8365.0	3-(3,3,3-TRIFLUOROPROPYL)HEPTAMETHYLTRISILOXANE
$C_{10}H_{25}NO_3Si$	SIA0587.0	4-AMINOBUTYLTRIETHOXYSILANE, 95%
$C_{10}H_{25}NO_3Si$	SIB1932.2	n-BUTYLAMINOPROPYLTRIMETHOXYSILANE
$C_{10}H_{25}NO_3Si$	SIB1932.3	t-BUTYLAMINOPROPYLTRIMETHOXYSILANE
$C_{10}H_{25}NO_3Si$	SID3396.0	(N,N-DIETHYL-3-AMINOPROPYL)TRIMETHOXYSILANE
$C_{10}H_{25}N_3O_2Si$	SIA0035.0	ACETOXYETHYLTRIS(DIMETHYLAMINO)SILANE
$C_{10}H_{26}N_2O_2Si$	SIA0588.8	N-(2-AMINOETHYL)-3-AMINOPROPYLMETHYLDIETHOXYSILANE
$C_{10}H_{26}N_2Si$	SIB1068.0	BIS(DIETHYLAMINO)DIMETHYLSILANE
$C_{10}H_{26}N_2Si$	SID4040.0	DIMETHYLBIS(s-BUTYLAMINO)SILANE, 95%
$C_{10}H_{26}N_2Si_2$	SIA0604.0	N-(3-AMINOPROPYLDIMETHYLSILYL)AZA-2,2-DIMETHYL-2-SILACYCLOPENTANE
$C_{10}H_{26}O_3Si_2$	SIB1145.0	1,3-BIS(HYDROXYPROPYL)TETRAMETHYLDISILOXANE, 95%
$C_{10}H_{26}O_5Si_2$	SIT7095.0	1,1,3,3-TETRAETHOXY-1,3-DIMETHYLDISILOXANE, 95%
$C_{10}H_{27}NO_3Si_2$	SIM6572.0	N-METHYL-N-TRIMETHYLSILYL-3-AMINOPROPYLTRIMETHOXYSILANE, 95%
$C_{10}H_{27}NSi_2$	SID4591.0	1,3-DI-n-PROPYL-1,1,3,3-TETRAMETHYLDISILAZANE
$C_{10}H_{27}N_3O_3Si$	SIT8398.0	(3-TRIMETHOXYSILYLPROPYL)DIETHYLENETRIAMINE, 95%
$C_{10}H_{28}Cl_2O_3Si_4$	SIB1053.5	3,5-BIS(CHLOROMETHYL)OCTAMETHYLTETRASILOXANE, 95%
$C_{10}H_{28}N_2OSi_2$	SIB1024.0	1,3-BIS(3-AMINOPROPYL)TETRAMETHYLDISILOXANE
$C_{10}H_{28}N_2Si_2$	SIB1073.0	1,2-BIS(DIMETHYLAMINODIMETHYLSILYL)ETHANE, 95%
$C_{10}H_{28}O_2Si_3$	SIB1866.0	BIS(TRIMETHYLSILYLMETHYL)DIMETHOXYSILANE
$C_{10}H_{28}O_4Si_3$	SID3394.0	1,5-DIETHOXYHEXAMETHYLTRISILOXANE
$C_{10}H_{28}Si_3$	SIT8722.0	TRIS(TRIMETHYLSILYL)METHANE
$C_{10}H_{29}ClO_3Si_4$	SIC2325.0	CHLOROMETHYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{10}H_{29}NO_2Si_3$	SIA0604.5	3-AMINOPROPYLMETHYLBIS(TRIMETHYLSILOXY)SILANE
$C_{10}H_{30}N_4OSi_2$	SIB1021.5	1,3-BIS(2-AMINOETHYLAMINOMETHYL)TETRAMETHYLDISILOXANE, tech-95
$C_{10}H_{30}O_2Si_4$	SIB1770.0	1,2-BIS(TETRAMETHYLDISILOXANYL)ETHANE, 95%
$C_{10}H_{30}O_3Si_4$	SID2655.0	DECAMETHYLTETRASILOXANE
$C_{10}H_{30}O_3Si_4$	SIM6592.0	METHYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{10}H_{30}O_5Si_5$	SID2650.0	DECAMETHYLCYCLOPENTASILOXANE
$C_{10}H_{32}O_4Si_5$	SID2653.0	1,1,3,3,5,5,7,7,9,9-DECAMETHYLPENTASILOXANE, 95%
$C_{11}H_7Cl_2F_{17}Si$	SIH5840.6	(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)METHYLDICHLOROSILANE
$C_{11}H_9Cl_3Si$	SIN6596.0	(1-NAPHTHYLMETHYL)TRICHLOROSILANE
$C_{11}H_{12}ClF_5Si$	SIP6716.2	PENTAFLUOROPHENYLPROPYLDIMETHYLCHLOROSILANE
$C_{11}H_{13}BrSi$	SIB1899.0	(4-BROMOPHENYLETHYNYL)TRIMETHYLSILANE
$C_{11}H_{13}F_{13}O_3Si$	SIT8176.0	(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)TRIMETHOXYSILANE
$C_{11}H_{14}Si$	SIP6736.0	PHENYLETHYNYLTRIMETHYLSILANE
$C_{11}H_{15}NOSi$	SIT8572.3	1-(TRIMETHYLSILOXY)PHENYLACETONITRILE
$C_{11}H_{16}Cl_2OSi$	SIM6492.4	3-(p-METHOXYPHENYL)PROPYLMETHYLDICHLOROSILANE
$C_{11}H_{16}Cl_2Si$	SIC2295.0	((CHLOROMETHYL)PHENYLETHYL)DIMETHYLCHLOROSILANE
$C_{11}H_{16}Cl_2Si$	SIP6724.8	4-PHENYLBUTYLMETHYLDICHLOROSILANE
$C_{11}H_{16}Cl_2Si$	SIP6738.5	1-PHENYL-1-(METHYLDICHLOROSILYL)BUTANE
$C_{11}H_{16}OSi$	SIP6824.0	1-PHENYL-1-TRIMETHYLSILOXYETHYLENE
$C_{11}H_{16}OSi$	SIV9079.0	VINYL(p-METHOXYPHENYL)DIMETHYLSILANE
$C_{11}H_{16}O_2Si$	SIP6723.6	PHENYLACETOXYTRIMETHYLSILANE
$C_{11}H_{17}ClOSi$	SIP6723.2	3-PHENOXYPROPYLDIMETHYLCHLOROSILANE
$C_{11}H_{17}ClO_5SSi$	SIC2417.0	2-(4-CHLOROSULFONYLPHENYL)ETHYLTRIMETHOXYSILANE, 50% in methylene chloride
$C_{11}H_{17}ClO_5SSi$	SIC2417.4	2-(4-CHLOROSULFONYLPHENYL)ETHYLTRIMETHOXYSILANE, 50% in toluene
$C_{11}H_{17}ClSi$	SIP6743.0	(3-PHENYLPROPYL)DIMETHYLCHLOROSILANE
$C_{11}H_{17}N_3O_5SSi$	SIA0790.0	4-(AZIDOSULFONYL)PHENETHYLTRIMETHOXYSILANE, 22-25% in methanol/toluene
$C_{11}H_{18}O_2Si$	SIP6739.0	PHENYLMETHYLDIETHOXYSILANE
$C_{11}H_{18}O_3Si$	SIP6722.6	PHENETHYLTRIMETHOXYSILANE, tech-95
$C_{11}H_{18}O_3Si$	SIP6731.8	PHENYLETHYLTRIMETHOXYSILANE
$C_{11}H_{18}O_3Si$	SIV9209.0	VINYLTRIISOPROPENOXYSILANE
$C_{11}H_{19}ClSi$	SIB0982.0	[(5-BICYCLO[2.2.1]HEPT-2-ENYL)ETHYL]DIMETHYLCHLOROSILANE, tech-95, endo/exo isomers
$C_{11}H_{19}NO_3Si$	SIP6932.0	2-PYRIDYLTRIETHOXYSILANE
$C_{11}H_{19}NO_3Si$	SIP6934.0	3-PYRIDYLTRIETHOXYSILANE
$C_{11}H_{19}NSi$	SIB0960.0	N-BENZYLAMINOMETHYLTRIMETHYLSILANE
$C_{11}H_{20}N_2Si$	SIP6736.8	PHENYLMETHYLBIS(DIMETHYLAMINO)SILANE
$C_{11}H_{20}OSi$	SIB0981.0	(5-BICYCLO[2.2.1]HEPT-2-ENYL)DIMETHYLETHOXYSILANE
$C_{11}H_{20}Si$	SIE4901.87	ETHYNYLCYCLOPENTYLDIETHYLSILANE
$C_{11}H_{21}Cl_3Si$	SIU9047.0	10-UNDECENYLTRICHLOROSILANE
$C_{11}H_{21}N_5Si_2$	SIB1852.3	N-6,9-BIS(TRIMETHYLSILYL)ADENINE
$C_{11}H_{22}BrCl_3Si$	SIB1908.0	11-BROMOUNDECYLTRICHLOROSILANE, 95%
$C_{11}H_{22}Cl_4Si$	SIC2427.0	11-CHLOROUNDECYLTRICHLOROSILANE
$C_{11}H_{22}N_2O_2Si$	SIV9080.0	VINYLMETHYLBIS(METHYLETHYLKETOXIMINO)SILANE, 95%
$C_{11}H_{22}N_2O_2Si_2$	SIB1873.4	O,O'-BIS(TRIMETHYLSILYL)THYMINE
$C_{11}H_{22}O_2Si$	SIB1939.57	6-(t-BUTYLDIMETHYLSILOXY)-3,4-DIHYDRO-2H-PYRAN
$C_{11}H_{22}O_2Si$	SIB1940.0	2-(t-BUTYLDIMETHYLSILOXY)PENT-2-EN-4-ONE
$C_{11}H_{22}O_2Si_3$	SIP6742.5	3-PHENYL-1,1,3,5,5-PENTAMETHYLTRISILOXANE
$C_{11}H_{22}O_3Si$	SIC2460.0	[2-(3-CYCLOHEXENYL)ETHYL]TRIMETHOXYSILANE
$C_{11}H_{22}O_3Si$	SIM6486.4	METHACRYLOXYPROPYLDIMETHYLETHOXYSILANE, 95%
$C_{11}H_{22}O_4Si$	SIE4670.0	2-(3,4-EPOXYCYCLOHEXYL)ETHYLTRIMETHOXYSILANE
$C_{11}H_{22}O_4Si_2$	SIA0197.0	(3-ACRYLOXYPROPYL)METHYLDIETHOXYSILANE, 95%
$C_{11}H_{22}O_4Si_2$	SIB1860.0	BIS(TRIMETHYLSILYL) ITACONATE
$C_{11}H_{22}O_5Si$	SIM6482.0	METHACRYLOXYMETHYLTRIETHOXYSILANE
$C_{11}H_{23}Cl_3Si$	SIU9050.0	UNDECYLTRICHLOROSILANE
$C_{11}H_{23}NO_3Si$	SIC2439.0	(3-CYANOBUTYL)TRIETHOXYSILANE
$C_{11}H_{24}Cl_2Si$	SID2662.0	n-DECYLMETHYLDICHLOROSILANE
$C_{11}H_{24}O_2Si_3$	SIT8735.0	1,3,5-TRIVINYL-1,1,3,5,5-PENTAMETHYLTRISILOXANE, 95%
$C_{11}H_{24}O_3Si$	SIC2492.0	CYCLOOCTYLTRIMETHOXYSILANE
$C_{11}H_{24}O_3Si$	SIO6709.0	7-OCTENYLTRIMETHOXYSILANE, tech-95
$C_{11}H_{24}O_3Si$	SIV9210.0	VINYLTRIISOPROPOXYSILANE
$C_{11}H_{24}O_4Si$	SIG5832.0	(3-GLYCIDOXYPROPYL)METHYLDIETHOXYSILANE
$C_{11}H_{24}O_6Si$	SIV9275.0	VINYLTRIS(2-METHOXYETHOXY)SILANE
$C_{11}H_{24}Si$	SIU9048.0	10-UNDECENYLSILANE
$C_{11}H_{25}BrSi$	SIB1907.8	11-BROMOUNDECYLSILANE
$C_{11}H_{25}NOSi_2$	SIB1863.2	N,N-BIS(TRIMETHYLSILYLMETHYL)ACRYLAMIDE
$C_{11}H_{25}NSi$	SIA0461.0	ALLYLDIMETHYL(DIISOPROPYLAMINO)SILANE
$C_{11}H_{26}OSi$	SIO6711.1	n-OCTYLDIMETHYLMETHOXYSILANE
$C_{11}H_{26}O_2Si$	SIO6712.4	n-OCTYLMETHYLDIMETHOXYSILANE
$C_{11}H_{26}O_3Si$	SII6458.0	ISOOCTYLTRIMETHOXYSILANE
$C_{11}H_{26}O_3Si$	SIO6715.5	n-OCTYLTRIMETHOXYSILANE
$C_{11}H_{26}O_3Si$	SIP6720.2	PENTYLTRIETHOXYSILANE
$C_{11}H_{26}O_3Si_2$	SIG5838.0	(3-GLYCIDOXYPROPYL)PENTAMETHYLDISILOXANE
$C_{11}H_{27}NOSi$	SIA0602.0	3-AMINOPROPYLDIISOPROPYLETHOXYSILANE
$C_{11}H_{27}NO_2Si$	SIE4885.8	(3-(N-ETHYLAMINO)ISOBUTYL)METHYLDIETHOXYSILANE
$C_{11}H_{27}NO_3Si$	SID3395.4	(N,N-DIETHYLAMINOMETHYL)TRIETHOXYSILANE
$C_{11}H_{27}NO_3Si_3$	SII6454.3	3-(3-ISOCYANATOPROPYL)HEPTAMETHYLTRISILOXANE, 95%
$C_{11}H_{27}NO_6SSi$	SID4241.0	3-{[DIMETHYL(3-TRIMETHOXYSILYL)PROPYL]AMMONIO}PROPANE-1-SULFONATE, tech 95
$C_{11}H_{27}NSi$	SIT8384.5	TRIISOPROPYLDIMETHYLAMINOSILANE
$C_{11}H_{27}O_5PSi$	SID3411.0	(2-DIETHYLPHOSPHATOETHYL)METHYLDIETHOXYSILANE, tech-95
$C_{11}H_{28}N_2O_3Si$	SIA0590.5	N-(2-AMINOETHYL)-3-AMINOPROPYLTRIETHOXYSILANE, 95%

Molecular formula	Catalog #	Name
$C_{11}H_{28}O_3Si_3$	SIT8720.0	TRIS(TRIMETHYLSILOXY)ETHYLENE, 96%
$C_{11}H_{30}O_3Si_4$	SIV9300.0	VINYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{12}H_4Cl_3F_{21}Si$	SIH5840.25	HENEICOSAFLUORODODECYLTRICHLOROSILANE
$C_{12}H_7Cl_3F_{16}Si$	SIH5918.0	HEXADECAFLUORODODEC-11-EN-1-YLTRICHLOROSILANE
$C_{12}H_8Cl_2F_{18}Si$	SIB1705.0	BIS(NONAFLUOROHEXYL)DICHLOROSILANE
$C_{12}H_8Cl_6F_{16}Si_2$	SIB1811.5	1,8-BIS(TRICHLOROSILYLETHYL)HEXADECAFLUOROOCTANE
$C_{12}H_{10}ClF_{17}Si$	SIH5840.4	(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)DIMETHYLCHLOROSILANE
$C_{12}H_{10}Cl_2Si$	SID4510.0	DIPHENYLDICHLOROSILANE, 95%
$C_{12}H_{10}Cl_2Si$	SID4510.1	DIPHENYLDICHLOROSILANE, 99%
$C_{12}H_{10}F_2Si$	SID4530.0	DIPHENYLDIFLUOROSILANE
$C_{12}H_{11}ClSi$	SID4495.0	DIPHENYLCHLOROSILANE, tech-95
$C_{12}H_{12}O_2Si$	SID4560.0	DIPHENYLSILANEDIOL
$C_{12}H_{12}Si$	SID4559.0	DIPHENYLSILANE
$C_{12}H_{14}Cl_2SiZr$	SID4045.0	DIMETHYL[BIS(CYCLOPENTADIENYL)SILYL] ZIRCONIUM DICHLORIDE
$C_{12}H_{14}O_6Si$	SIP6790.0	PHENYLTRIACETOXYSILANE, tech-95
$C_{12}H_{15}F_5O_3Si$	SIP6716.6	PENTAFLUOROPHENYLPROPYLTRIMETHOXYSILANE
$C_{12}H_{15}F_5O_3Si$	SIP6716.7	PENTAFLUOROPHENYLTRIETHOXYSILANE
$C_{12}H_{16}OSi$	SIP6824.6	1-PHENYL-3-TRIMETHYLSILYL-2-PROPYN-1-OL
$C_{12}H_{16}Si$	SID3388.0	DI(CYCLOPENTADIENYL)DIMETHYLSILANE
$C_{12}H_{16}Si$	SIT8588.7	2-[(TRIMETHYLSILYL)ETHYNYL]TOLUENE
$C_{12}H_{17}Cl_3Si$	SIB1973.0	p-(t-BUTYL)PHENETHYLTRICHLOROSILANE
$C_{12}H_{17}Cl_3Si$	SIP6736.4	6-PHENYLHEXYLTRICHLOROSILANE
$C_{12}H_{17}NO_2Si$	SIC2453.8	3-CYANOPROPYLPHENYLDIMETHOXYSILANE, 95%
$C_{12}H_{18}OSi$	SIA0469.0	ALLYL(4-METHOXYPHENYL)DIMETHYLSILANE
$C_{12}H_{18}OSi$	SIV9061.0	(m,p-VINYLBENZYLOXY)TRIMETHYLSILANE
$C_{12}H_{18}OSi_2$	SIH6162.0	HEXAVINYLDISILOXANE, 95%
$C_{12}H_{18}O_2Si$	SIV9092.2	VINYLPHENYLDIETHOXYSILANE
$C_{12}H_{19}BrOSi$	SIB1895.0	p-BROMOPHENOXY(t-BUTYL)DIMETHYLSILANE
$C_{12}H_{19}Cl_3Si$	SIA0325.0	ADAMANTYLETHYLTRICHLOROSILANE
$C_{12}H_{19}ClO_2Si$	SIC2295.2	((CHLOROMETHYL)PHENYLETHYL)METHYLDIMETHOXYSILANE
$C_{12}H_{19}ClO_3Si$	SIC2295.5	((CHLOROMETHYL)PHENYLETHYL)TRIMETHOXYSILANE
$C_{12}H_{19}ClO_3Si$	SIC2332.0	CHLOROPHENYLTRIETHOXYSILANE
$C_{12}H_{19}ClO_3Si$	SIC2332.3	p-CHLOROPHENYLTRIETHOXYSILANE
$C_{12}H_{19}ClSi$	SIE4897.2	m,p-ETHYLPHENETHYLDIMETHYLCHLOROSILANE, tech-95
$C_{12}H_{19}ClSi$	SIP6724.7	4-PHENYLBUTYLDIMETHYLCHLOROSILANE
$C_{12}H_{19}F_9O_3Si$	SIN6597.65	NONAFLUOROHEXYLTRIETHOXYSILANE
$C_{12}H_{19}N_3O_3Si$	SIA0770.0	(AZIDOMETHYL)PHENETHYLTRIMETHOXYSILANE, tech-90
$C_{12}H_{20}O_2Si$	SIB1939.6	4-(t-BUTYLDIMETHYLSILOXY)PHENOL
$C_{12}H_{20}O_2Si$	SIM6511.2	(p-METHYLPHENETHYL)METHYLDIMETHOXYSILANE, 95%
$C_{12}H_{20}O_2Si$	SIP6744.2	3-PHENYLPROPYLMETHYLDIMETHOXYSILANE
$C_{12}H_{20}O_3Si$	SIP6821.0	PHENYLTRIETHOXYSILANE
$C_{12}H_{20}O_4Si$	SIT7010.0	TETRAALLYLOXYSILANE
$C_{12}H_{20}Si$	SIT7020.0	TETRAALLYLSILANE
$C_{12}H_{21}F_3O_3Si_3$	SIT8366.0	(3,3,3-TRIFLUOROPROPYL)METHYLCYCLOTRISILOXANE
$C_{12}H_{21}NO_3Si$	SIP6724.0	N-PHENYLAMINOPROPYLTRIMETHOXYSILANE
$C_{12}H_{21}NO_4Si$	SIA0598.0	3-(m-AMINOPHENOXY)PROPYLTRIMETHOXYSILANE
$C_{12}H_{21}NSi$	SIP6721.2	PHENETHYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_{12}H_{22}BrNSi_2$	SIB1879.0	4-BROMO-N,N-BIS(TRIMETHYLSILYL)ANILINE
$C_{12}H_{22}ClNSi_2$	SIC2264.8	3-CHLORO-N,N-BIS(TRIMETHYLSILYL)ANILINE
$C_{12}H_{22}Cl_2Si$	SID3382.0	DICYCLOHEXYLDICHLOROSILANE
$C_{12}H_{22}Cl_3NSi$	SIC2456.3	11-CYANOUNDECYLTRICHLOROSILANE
$C_{12}H_{22}F_9N_3Si$	SIN6597.8	NONAFLUOROHEXYLTRIS(DIMETHYLAMINO)SILANE
$C_{12}H_{22}O_2Si$	SIB0990.3	(5-BICYCLO[2.2.1]HEPT-2-ENYL)METHYLDIETHOXYSILANE
$C_{12}H_{22}O_2Si_2$	SIB1835.8	1,4-BIS(TRIMETHYLSILOXY)BENZENE
$C_{12}H_{22}O_3Si$	SIB0988.0	[(5-BICYCLO[2.2.1]HEPT-2-ENYL)ETHYL]TRIMETHOXYSILANE, tech-95, endo/exo isomers
$C_{12}H_{22}Si$	SIE4901.85	ETHYNYLCYCLOHEXYLDIETHYLSILANE
$C_{12}H_{22}Si$	SIT7525.0	2,3,4,5-TETRAMETHYLCYCLOPENTADIENYLTRIMETHYLSILANE
$C_{12}H_{22}Si_2$	SIB1853.0	1,4-BIS(TRIMETHYLSILYL)BENZENE
$C_{12}H_{23}Cl_3O_2Si$	SIC2067.6	10-(CARBOMETHOXY)DECYLTRICHLOROSILANE
$C_{12}H_{23}ClSi$	SIC2056.2	(-)-CAMPHANYLDIMETHYLCHLOROSILANE
$C_{12}H_{23}ClSi$	SID4074.0	(DIMETHYLCHLOROSILYL)METHYL-7,7-DIMETHYLNORPINANE
$C_{12}H_{23}NSi_2$	SIB1866.6	4-[BIS(TRIMETHYLSILYL)METHYL]PYRIDINE
$C_{12}H_{23}N_3Si$	SIT8713.0	TRIS(DIMETHYLAMINO)PHENYLSILANE
$C_{12}H_{24}N_2OSi_2$	SIB1058.0	1,3-BIS(CYANOPROPYL)TETRAMETHYLDISILOXANE, 95%
$C_{12}H_{24}N_2O_3Si_2$	SIB1250.0	BIS(3-ISOCYANATOPROPYL)TETRAMETHYLDISILOXANE, 96%
$C_{12}H_{24}O_2Si$	SIA0315.0	ACRYLOXYTRIISOPROPYLSILANE
$C_{12}H_{24}O_2Si$	SIB1939.55	2-(t-BUTYLDIMETHYLSILOXY)CYCLOHEXANONE
$C_{12}H_{24}O_2Si$	SID3391.0	DICYCLOPENTYLDIMETHOXYSILANE
$C_{12}H_{24}O_4Si$	SIM6486.8	METHACRYLOXYPROPYLMETHYLDIETHOXYSILANE, 95%
$C_{12}H_{24}O_4Si_4$	SIT7900.0	1,3,5,7-TETRAVINYL-1,3,5,7-TETRAMETHYLCYCLOTETRASILOXANE
$C_{12}H_{24}O_6Si$	SID2790.0	DI-t-BUTOXYDIACETOXYSILANE, tech-96
$C_{12}H_{24}O_6Si$	SID2790.1	DI-t-BUTOXYDIACETOXYSILANE, 98%
$C_{12}H_{25}Cl_3Si$	SID4630.0	DODECYLTRICHLOROSILANE
$C_{12}H_{26}Cl_2Si$	SID3510.0	DI-n-HEXYLDICHLOROSILANE
$C_{12}H_{26}N_2O_3Si$	SIT8187.5	N-(3-TRIETHOXYSILYLPROPYL)-4,5-DIHYDROIMIDAZOLE
$C_{12}H_{26}N_2Si$	SIC2451.0	3-CYANOPROPYLDIISOPROPYL(DIMETHYLAMINO)SILANE
$C_{12}H_{26}O_3Si$	SIH6164.2	5-HEXENYLTRIETHOXYSILANE, 95%
$C_{12}H_{26}O_3Si_2$	SIM6487.0	METHACRYLOXYPROPYLPENTAMETHYLDISILOXANE, 95%
$C_{12}H_{26}O_3Si_4$	SIP6826.0	PHENYLTRIS(DIMETHYLSILOXY)SILANE
$C_{12}H_{26}O_4Si$	SIE4675.0	5,6-EPOXYHEXYLTRIETHOXYSILANE
$C_{12}H_{26}O_4Si_2$	SIB1852.6	BIS(TRIMETHYLSILYL) ADIPATE
$C_{12}H_{26}O_5Si$	SIG5839.0	(3-GLYCIDOXYPROPYL)TRIETHOXYSILANE
$C_{12}H_{26}O_5Si_2$	SIB1027.0	1,3-BIS(3-CARBOXYPROPYL)TETRAMETHYLDISILOXANE
$C_{12}H_{26}O_5Si_2$	SID4611.0	1,3-DIVINYLTETRAETHOXYDISILOXANE, 95%
$C_{12}H_{26}O_6Si$	SID4220.6	DIMETHYLSILA-17-CROWN-6, 90%
$C_{12}H_{26}O_6Si$	SID4221.0	DIMETHYLSILACROWNS, mixed
$C_{12}H_{26}Si$	SIA0535.0	ALLYLTRIISOPROPYLSILANE
$C_{12}H_{26}Si$	SIM6472.7	(-)-MENTHYLDIMETHYLSILANE
$C_{12}H_{27}BO_3Si_3$	AKB159.5	BORON VINYLDIMETHYLSILOXIDE
$C_{12}H_{27}ClO_3Si$	SIT8085.0	TRI-t-BUTOXYCHLOROSILANE, 95%
$C_{12}H_{27}ClSi$	SID2660.0	n-DECYLDIMETHYLCHLOROSILANE
$C_{12}H_{27}ClSi$	SIT8091.0	TRI-n-BUTYLCHLOROSILANE
$C_{12}H_{27}ClSi$	SIT8378.6	TRIISOBUTYLCHLOROSILANE
$C_{12}H_{27}NO_3Si$	SIC2464.4	N-CYCLOHEXYLAMINOPROPYLTRIMETHOXYSILANE
$C_{12}H_{27}NO_5Si$	SIT8188.0	TRIETHOXYSILYLPROPYL ETHYLCARBAMATE
$C_{12}H_{27}N_3O_5SSi$	SIA0780.0	6-AZIDOSULFONYLHEXYLTRIETHOXYSILANE, tech-95
$C_{12}H_{28}Cl_2OSi_2$	SIB1048.8	1,3-BIS(3-CHLOROISOBUTYL)TETRAMETHYLDISILOXANE
$C_{12}H_{28}Cl_2OSi_2$	SIT7273.0	1,1,3,3-TETRAISOPROPYL-1,3-DICHLORODISILOXANE
$C_{12}H_{28}Cl_2Si_2$	SIB1048.0	1,8-BIS(CHLORODIMETHYLSILYL)OCTANE, 95%
$C_{12}H_{28}N_4Si_4$	SIT7899.0	1,3,5,7-TETRAVINYL-1,3,5,7-TETRAMETHYLCYCLOTETRASILAZANE, 95%
$C_{12}H_{28}O_2Si$	SID3528.0	DIISOBUTYLDIETHOXYSILANE
$C_{12}H_{28}O_3Si$	SID4069.4	(3,3-DIMETHYLBUTYL)TRIETHOXYSILANE
$C_{12}H_{28}O_3Si$	SIH6167.5	HEXYLTRIETHOXYSILANE
$C_{12}H_{28}O_4Si$	SIT7271.0	TETRAISOPROPOXYSILANE
$C_{12}H_{28}O_4Si$	SIT7777.0	TETRA-n-PROPOXYSILANE
$C_{12}H_{28}O_4Si$	SIT8088.0	TRI-t-BUTOXYSILANOL
$C_{12}H_{28}O_4Si_2$	SIB1618.0	1,2-BIS(METHYLDIETHOXYSILYL)ETHYLENE
$C_{12}H_{28}O_4Si_3$	SIM6481.2	(METHACRYLOXYMETHYL)BIS(TRIMETHYLSILOXY)METHYLSILANE, 95%
$C_{12}H_{28}O_8Si$	SIT7286.0	TETRAKIS(METHOXYETHOXY)SILANE, tech-95
$C_{12}H_{28}Si$	SID3224.0	DI-t-BUTYLISOBUTYLSILANE
$C_{12}H_{28}Si$	SID4629.6	DODECYLSILANE
$C_{12}H_{28}Si$	SIT8091.6	TRI-n-BUTYLSILANE
$C_{12}H_{28}Si$	SIT8092.0	TRI-t-BUTYLSILANE, 95%
$C_{12}H_{28}Si$	SIT8378.7	TRIISOBUTYLSILANE
$C_{12}H_{29}NO_5Si\cdot HCl$	SIB1500.0	BIS(METHOXYETHYL)-3-TRIMETHOXYSILYLPROPYLAMMONIUM CHLORIDE, 60% in methanol
$C_{12}H_{29}NSi$	SIO6711.3	n-OCTYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_{12}H_{29}O_6PSi$	SID3412.0	(2-DIETHYLPHOSPHATOETHYL)TRIETHOXYSILANE, tech-95
$C_{12}H_{29}PSi$	SID3351.5	DI-tert-BUTYL(TRIMETHYLSILYLMETHYL)PHOSPHINE
$C_{12}H_{30}N_2O_3Si$	SIA0594.0	N-(6-AMINOHEXYL)AMINOPROPYLTRIMETHOXYSILANE, 95%
$C_{12}H_{30}OSi_2$	SID3349.4	1,3-DI-n-BUTYLTETRAMETHYLDISILOXANE
$C_{12}H_{30}OSi_2$	SIH6070.0	HEXAETHYLDISILOXANE
$C_{12}H_{30}OSi_2$	SIT7274.0	1,1,3,3-TETRAISOPROPYLDISILOXANE
$C_{12}H_{30}O_3Si_2$	SIB1130.0	1,3-BIS(4-HYDROXYBUTYL)TETRAMETHYLDISILOXANE, 95%
$C_{12}H_{30}O_3Si_2$	SIB1144.0	1,3-BIS(3-HYDROXYISOBUTYL)TETRAMETHYLDISILOXANE
$C_{12}H_{30}O_3Si_3$	SIT8617.0	1,3,5-TRIMETHYL-1,3,5-TRIETHOXY-1,3,5-TRISILACYCLOHEXANE
$C_{12}H_{30}O_4Si_2$	SIB1615.0	1,2-BIS(METHYLDIETHOXYSILYL)ETHANE
$C_{12}H_{30}O_4Si_3$	SIA0088.0	3-(3-ACETOXYPROPYL)HEPTAMETHYLTRISILOXANE
$C_{12}H_{30}O_6Si_2$	SIB1832.0	1,6-BIS(TRIMETHOXYSILYL)HEXANE
$C_{12}H_{30}O_6Si_2$	SIH5935.0	HEXAETHOXYDISILANE, tech-95
$C_{12}H_{31}NO_6Si_2$	SIB1833.0	BIS(3-TRIMETHOXYSILYLPROPYL)AMINE, 96%
$C_{12}H_{31}NSi_2$	SIB1869.5	BIS(3-TRIMETHYLSILYLPROPYL)AMINE
$C_{12}H_{31}NSi_2$	SID3349.0	1,3-DI-n-BUTYL-1,1,3,3-TETRAMETHYLDISILAZANE
$C_{12}H_{31}N_3Si$	SIT8090.0	TRI-(t-BUTYLAMINO)SILANE, 95%
$C_{12}H_{32}O_3Si_4$	SIA0585.0	ALLYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{12}H_{33}ClO_3Si_4$	SIC2413.0	3-CHLOROPROPYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{12}H_{33}PSi_3$	SIT8722.7	TRIS(TRIMETHYLSILYLMETHYL)PHOSPHINE
$C_{12}H_{34}O_2Si_4$	SIB1735.0	1,2-BIS(PENTAMETHYLDISILOXANYL)ETHANE
$C_{12}H_{34}O_3Si_4$	SIP6921.0	PROPYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{12}H_{35}NO_3Si_4$	SIA0620.0	3-AMINOPROPYLTRIS(TRIMETHYLSILOXY)SILANE, 95%
$C_{12}H_{36}Cl_2N_2Si_4Zr$	SIZ9810.0	ZIRCONIUM BIS(HEXAMETHYLDISILAZIDE)DICHLORIDE
$C_{12}H_{36}GeN_2Si_4$	GEB1025	GERMANIUM(II) BIS(HEXAMETHYLDISILYL)AMIDE
$C_{12}H_{36}GeO_4Si_4$	GET7296	TETRAKIS(TRIMETHYLSILOXY)GERMANE
$C_{12}H_{36}N_2SSi_4$	SIT7907.5	THIOBIS(HEXAMETHYLDISILAZANE)
$C_{12}H_{36}N_2Si_4Sn$	SNB1025	TIN(II) BIS(HEXAMETHYLDISILAZIDE)
$C_{12}H_{36}N_2Si_4Zn$	SIZ9700.0	ZINC BIS(HEXAMETHYLDISILAZIDE)
$C_{12}H_{36}O_4Si_4Ti$	SIT7305.0	TETRAKIS(TRIMETHYLSILOXY)TITANIUM
$C_{12}H_{36}O_4Si_4Zr$	SIT7306.0	TETRAKIS(TRIMETHYLSILOXY)ZIRCONIUM

Molecular formula	Catalog #	Name
$C_{12}H_{36}O_4Si_5$	SID4626.0	DODECAMETHYLPENTASILOXANE
$C_{12}H_{36}O_4Si_5$	SIT7298.0	TETRAKIS(TRIMETHYLSILOXY)SILANE
$C_{12}H_{36}O_6Si_6$	SID4625.0	DODECAMETHYLCYCLOHEXASILOXANE
$C_{12}H_{36}Si_5$	SIT7308.0	TETRAKIS(TRIMETHYLSILYL)SILANE
$C_{13}H_{11}Cl_3Si$	SID4555.5	(DIPHENYLMETHYL)TRICHLOROSILANE
$C_{13}H_{13}ClSi$	SID4552.0	DIPHENYLMETHYLCHLOROSILANE
$C_{13}H_{13}F_{17}O_3Si$	SIH5841.5	(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TRIMETHOXYSILANE
$C_{13}H_{14}Si$	SID4555.0	DIPHENYLMETHYLSILANE
$C_{13}H_{15}F_7O_3Si$	SIT8345.0	p-TRIFLUOROMETHYLTETRAFLUOROPHENYLTRIETHOXYSILANE
$C_{13}H_{16}F_{12}O_3Si$	SID4623.6	DODECAFLUORODEC-9-ENE-1-YLTRIMETHOXYSILANE
$C_{13}H_{16}O_3Si$	SIM6565.0	4-METHYL-7-TRIMETHYLSILOXYCOUMARIN
$C_{13}H_{16}O_3Si$	SIN6597.0	1-NAPHTHYLTRIMETHOXYSILANE
$C_{13}H_{18}ClNOSi$	SIA0433.0	(S,S)-2-ALLYL-2-CHLORO-3,4-DIMETHYL-5-PHENYL-[1,3,2]-OXAZASILOLIDINE
$C_{13}H_{18}Cl_4O_2Si$	SIC2283.0	3-[2-(4-CHLOROMETHYLBENZYLOXY)ETHOXY]PROPYLTRICHLOROSILANE
$C_{13}H_{18}O_2Si$	SIM6481.5	(METHACRYLOXYMETHYL)PHENYLDIMETHYLSILANE
$C_{13}H_{19}NO_3SSi$	SIT7907.7	(THIOCYANATOMETHYL)PHENETHYLTRIMETHOXYSILANE, tech-95
$C_{13}H_{20}O_3Si$	SIS6990.0	STYRYLETHYLTRIMETHOXYSILANE, tech-90
$C_{13}H_{20}O_5Si$	SIB0959.0	BENZOYLOXYPROPYLTRIMETHOXYSILANE
$C_{13}H_{20}O_5Si$	SIM6509.0	3,4-METHYLENEDIOXYPHENYLTRIETHOXYSILANE
$C_{13}H_{20}O_8Si$	SIM6481.17	3-METHACRYLOXYPROPYLTRIACETOXYSILANE, tech-90
$C_{13}H_{22}Cl_3NSi$	SIC2439.5	12-CYANODODEC-10-ENYLTRICHLOROSILANE, tech-95
$C_{13}H_{22}O_2Si$	SIN6597.1	NEOPHYLMETHYLDIMETHOXYSILANE
$C_{13}H_{22}O_3Si$	SIB0971.0	BENZYLTRIETHOXYSILANE
$C_{13}H_{22}O_3Si$	SIE4897.5	m,p-ETHYLPHENETHYLTRIMETHOXYSILANE, tech-95
$C_{13}H_{22}O_3Si$	SIP6724.92	4-PHENYLBUTYLTRIMETHOXYSILANE
$C_{13}H_{22}O_3Si$	SIT8041.0	p-TOLYLTRIETHOXYSILANE
$C_{13}H_{22}O_4Si$	SIM6492.53	p-METHOXYPHENYLTRIETHOXYSILANE
$C_{13}H_{23}NOSi$	SIB0966.0	N-BENZYL-N-METHOXYMETHYL-N-(TRIMETHYLSILYLMETHYL)AMINE, 96%
$C_{13}H_{23}NO_3SSi$	SIP6926.2	3-(2-PYRIDYLETHYL)THIOPROPYLTRIMETHOXYSILANE
$C_{13}H_{23}NO_3SSi$	SIP6926.4	3-(4-PYRIDYLETHYL)THIOPROPYLTRIMETHOXYSILANE
$C_{13}H_{23}NO_3Si$	SIP6723.7	N-PHENYLAMINOMETHYLTRIETHOXYSILANE
$C_{13}H_{23}NO_3Si$	SIP6928.0	2-(4-PYRIDYLETHYL)TRIETHOXYSILANE
$C_{13}H_{23}NO_5Si$	SIM6487.1	METHACRYLOXYPROPYLSILATRANE, 95%
$C_{13}H_{24}O_3Si$	SIB0992.0	(5-BICYCLO[2.2.1]HEPT-2-ENYL)TRIETHOXYSILANE
$C_{13}H_{24}O_6Si$	SIT8192.6	(3-TRIETHOXYSILYL)PROPYLSUCCINIC ANHYDRIDE, 95%
$C_{13}H_{25}Cl_3O_2Si$	SIA0114.0	11-ACETOXYUNDECYLTRICHLOROSILANE
$C_{13}H_{25}NO_5Si$	SIP6902.6	O-(PROPARGYL)-N-(TRIETHOXYSILYLPROPYL) CARBAMATE, 90%
$C_{13}H_{25}NO_6Si$	SIT8189.8	TRIETHOXYSILYLPROPYLMALEAMIC ACID, tech-90
$C_{13}H_{25}NSi$	SIT8384.8	1-(TRIISOPROPYLSILYL)PYRROLE
$C_{13}H_{26}Cl_2Si_2$	SIC2265.5	(CHLORODIMETHYLSILYL)-5-[2-(CHLORODIMETHYLSILYL)ETHYL]BICYCLOHEPTANE
$C_{13}H_{26}N_2O_5Si$	SIT8394.0	N-[5-(TRIMETHOXYSILYL)-2-AZA-1-OXOPENTYL]CAPROLACTAM, 95%
$C_{13}H_{26}O_2Si_3$	SIP6736.2	3-PHENYLHEPTAMETHYLTRISILOXANE, 95%
$C_{13}H_{26}O_3Si$	SIE4666.0	2-(3,4-EPOXYCYCLOHEXYL)ETHYLMETHYLDIETHOXYSILANE
$C_{13}H_{26}O_5Si$	SIM6487.3	METHACRYLOXYPROPYLTRIETHOXYSILANE
$C_{13}H_{27}ClSi$	SIU9045.0	10-UNDECENYLDIMETHYLCHLOROSILANE
$C_{13}H_{27}F_3O_3SSi$	SID3226.0	DI-t-BUTYLISOBUTYLSILYL TRIFLUOROMETHANESULFONATE
$C_{13}H_{27}NO_4Si$	SIM6480.73	(3-METHACRYLAMIDOPROPYL)TRIETHOXYSILANE, tech-95
$C_{13}H_{27}NO_5Si$	SIT8186.7	N-[3-(TRIETHOXYSILYL)PROPYL]-2-CARBOMETHOXYAZIRIDINE, 95%
$C_{13}H_{27}N_3O_3Si$	SIM6590.0	METHYLTRIS(METHYLETHYLKETOXIMINO)SILANE, tech-95
$C_{13}H_{28}BrClSi$	SIB1907.6	11-BROMOUNDECYLDIMETHYLCHLOROSILANE, 95%
$C_{13}H_{28}Cl_2Si$	SID4628.0	DODECYLMETHYLDICHLOROSILANE
$C_{13}H_{28}OSi$	SIH5844.5	(E)-HEPTENYLDIISOPROPYLSILANOL
$C_{13}H_{28}O_3Si_2$	SID4610.3	2-(DIVINYLMETHYLSILYL)ETHYLTRIETHOXYSILANE
$C_{13}H_{29}NO_3Si$	SIC2464.2	(N-CYCLOHEXYLAMINOMETHYL)TRIETHOXYSILANE, 95%
$C_{13}H_{29}NO_5Si$	SIT8189.5	N-(3-TRIETHOXYSILYLPROPYL)-4-HYDROXYBUTYRAMIDE
$C_{13}H_{30}O_2Si$	SIO6712.2	n-OCTYLMETHYLDIETHOXYSILANE
$C_{13}H_{30}O_3Si$	SID2670.0	n-DECYLTRIMETHOXYSILANE
$C_{13}H_{30}O_3Si_4$	SIT8725.0	TRIS(VINYLDIMETHYLSILOXY)METHYLSILANE, 95%
$C_{13}H_{30}O_4Si_3$	SIA0194.0	(3-ACRYLOXYPROPYL)METHYLBIS(TRIMETHYLSILOXY)SILANE, tech-90
$C_{13}H_{30}O_5Si_3$	SIM6486.1	METHACRYLOXYPROPYLBIS(TRIMETHYLSILOXY)SILANOL - blend
$C_{13}H_{30}O_7Si$	SIM6493.4	METHOXYTRIETHYLENEOXYPROPYLTRIMETHOXYSILANE
$C_{13}H_{31}NO_5Si$	SIB1140.0	N,N-BIS(2-HYDROXYETHYL)-3-AMINOPROPYLTRIETHOXYSILANE, 62% in ethanol
$C_{13}H_{32}N_2O_3Si$	SIA0592.6	N-(6-AMINOHEXYL)AMINOMETHYLTRIETHOXYSILANE, 95%
$C_{13}H_{32}N_2O_6SSi_2$	SIB1835.2	N,N′-BIS(3-TRIMETHOXYSILYLPROPYL)THIOUREA, tech-90
$C_{13}H_{32}N_2O_7Si_2$	SIB1835.5	N,N′-BIS(3-TRIMETHOXYSILYLPROPYL)UREA, 95%
$C_{13}H_{32}O_4Si_3$	SIG5820.0	(3-GLYCIDOXYPROPYL)BIS(TRIMETHYLSILOXY)METHYLSILANE
$C_{13}H_{32}O_5Si$	SIT8185.8	1-(TRIETHOXYSILYL)-2-(DIETHOXYMETHYLSILYL)ETHANE
$C_{13}H_{32}O_6Si_2$	SIB1821.0	BIS(TRIETHOXYSILYL)METHANE
$C_{13}H_{33}NO_4Si_2$	SIB1645.0	BIS(METHYLDIMETHOXYSILYLPROPYL)-N-METHYLAMINE, 95%
$C_{13}H_{33}NO_6Si_2$	SIB1835.0	BIS(3-TRIMETHOXYSILYLPROPYL)-N-METHYLAMINE
$C_{13}H_{34}O_2Si_3$	SIH6074.0	1,1,1,5,5,5-HEXAETHYL-3-METHYLTRISILOXANE
$C_{13}H_{37}ClO_3Si_5$	SIT8719.5	[TRIS(TRIMETHYLSILOXY)SILYLETHYL]DIMETHYLCHLOROSILANE
$C_{13}H_{37}NO_3Si_4$	SIM6500.5	N-METHYLAMINOPROPYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{14}H_6Cl_4O_4$	SID3352.0	2,4-DICHLOROBENZOYL PEROXIDE, 50% in polydimethylsiloxane
$C_{14}H_6O_2F_{10}Si$	SIB1710.0	BIS(PENTAFLUOROPHENYL)DIMETHOXYSILANE
$C_{14}H_{13}ClSi$	SIV9074.0	VINYLDIPHENYLCHLOROSILANE
$C_{14}H_{14}Cl_2O_2Si$	SID2755.0	DIBENZYLOXYDICHLOROSILANE, tech-95
$C_{14}H_{14}Cl_2Si$	SID4598.0	DI(p-TOLYL)DICHLOROSILANE, tech-95
$C_{14}H_{15}ClOSi$	SIP6723.0	3-PHENOXYPHENYLDIMETHYLCHLOROSILANE, 95%
$C_{14}H_{15}ClSi$	SIB0999.0	4-BIPHENYLYLDIMETHYLCHLOROSILANE
$C_{14}H_{16}Cl_2OSi_2$	SID3358.0	1,3-DICHLORO-1,3-DIPHENYL-1,3-DIMETHYLDISILOXANE, 96%
$C_{14}H_{16}F_{17}NSi$	SIH5840.5	(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)DIMETHYL(DIMETHYLAMINO)SILANE
$C_{14}H_{16}O_2Si$	SID4535.0	DIPHENYLDIMETHOXYSILANE, 98%
$C_{14}H_{18}N_2O_2Si$	SIB1022.0	BIS(p-AMINOPHENOXY)DIMETHYLSILANE
$C_{14}H_{19}F_{13}O_3Si$	SIT8175.0	(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)TRIETHOXYSILANE
$C_{14}H_{19}NO_2Si$	SIB1966.5	N-(t-BUTYLDIMETHYLSILYL)PHTHALIMIDE
$C_{14}H_{22}FeSi_2$	SIB1088.0	1,1′-BIS(DIMETHYLSILYL)FERROCENE
$C_{14}H_{22}OSi$	SIB1941.0	p-(t-BUTYLDIMETHYLSILOXY)STYRENE
$C_{14}H_{22}O_4Si$	SIT8177.0	p-(TRIETHOXYSILYL)ACETOPHENONE, 95%
$C_{14}H_{22}Si_2$	SIB1878.4	1,4-BIS(VINYLDIMETHYLSILYL)BENZENE
$C_{14}H_{23}ClSi$	SIB1972.5	p-(t-BUTYL)PHENETHYLDIMETHYLCHLOROSILANE
$C_{14}H_{23}ClSi$	SIP6720.8	PHENETHYLDIISOPROPYLCHLOROSILANE
$C_{14}H_{23}ClSi$	SIP6736.3	6-PHENYLHEXYLDIMETHYLCHLOROSILANE
$C_{14}H_{24}Cl_2Si_2$	SIB1030.0	BIS[2-(CHLORODIMETHYLSILYL)ETHYL]BENZENE
$C_{14}H_{24}N_2O_7Si$	SIT7909.7	(3-(3-THYMINYL)PROPIONOXY)PROPYLTRIMETHOXYSILANE
$C_{14}H_{24}O_5Si$	SIB1403.0	1,3-BIS(METHACRYLOXY)-2-TRIMETHYLSILOXYPROPANE, 95%
$C_{14}H_{24}O_5Si$	SID3544.0	3,5-DIMETHOXYPHENYLTRIETHOXYSILANE
$C_{14}H_{25}K_3N_2O_9Si$	SIT8403.0	N-(TRIMETHOXYSILYLPROPYL)ETHYLENEDIAMINETRIACETATE, TRIPOTASSIUM SALT, 30% in water
$C_{14}H_{25}N_2Na_3O_9Si$	SIT8402.0	N-(TRIMETHOXYSILYLPROPYL)ETHYLENEDIAMINETRIACETATE, TRISODIUM SALT, 35% in water
$C_{14}H_{26}N_2O_3Si$	SIA0588.0	(AMINOETHYLAMINOMETHYL)PHENETHYLTRIMETHOXYSILANE, 90%
$C_{14}H_{26}O_3Si$	SIC2520.0	(3-CYCLOPENTADIENYLPROPYL)TRIETHOXYSILANE
$C_{14}H_{26}O_6Si_2$	SIB1832.2	1,4-BIS(TRIMETHOXYSILYLMETHYL)BENZENE
$C_{14}H_{27}N_3O_3Si$	SIV9280.0	VINYLTRIS(METHYLETHYLKETOXIMINO)SILANE, tech-95
$C_{14}H_{28}O_3Si$	SIC2459.5	[2-(3-CYCLOHEXENYL)ETHYL]TRIETHOXYSILANE
$C_{14}H_{28}O_4Si$	SIE4668.0	2-(3,4-EPOXYCYCLOHEXYL)ETHYLTRIETHOXYSILANE
$C_{14}H_{29}ClO_2Si$	SIC2065.0	10-(CARBOMETHOXY)DECYLDIMETHYLCHLOROSILANE
$C_{14}H_{29}Cl_3OSi$	SIU9049.5	UNDECYLOXYPROPYLTRICHLOROSILANE
$C_{14}H_{29}Cl_3O_2Si$	SIM6491.5	11-(2-METHOXYETHOXY)UNDECYLTRICHLOROSILANE
$C_{14}H_{29}Cl_3Si$	SIT7093.0	TETRADECYLTRICHLOROSILANE
$C_{14}H_{30}OSi$	SIU9049.2	10-UNDECENYLOXYTRIMETHYLSILANE
$C_{14}H_{30}O_3Si$	SIU9049.0	10-UNDECENYLTRIMETHOXYSILANE
$C_{14}H_{30}O_3Si$	SIV9099.0	VINYLTRI-t-BUTOXYSILANE
$C_{14}H_{30}O_5Si$	SIT7122.6	TETRAHYDROFURFURYLOXYPROPYLTRIETHOXYSILANE
$C_{14}H_{30}O_6Si$	SIV9277.0	VINYLTRIS(1-METHOXY-2-PROPOXY)SILANE
$C_{14}H_{30}O_7Si$	SID4220.7	DIMETHYLSILA-20-CROWN-7, 90%
$C_{14}H_{31}BrO_3Si$	SIB1909.0	11-BROMOUNDECYLTRIMETHOXYSILANE, 95%
$C_{14}H_{31}ClO_3Si$	SIC2429.0	11-CHLOROUNDECYLTRIMETHOXYSILANE
$C_{14}H_{31}ClSi$	SID4627.0	DODECYLDIMETHYLCHLOROSILANE
$C_{14}H_{31}ClSi$	SIO6710.5	n-OCTYLDIISOPROPYLCHLOROSILANE
$C_{14}H_{31}NO_5Si$	SIT8186.5	N-(3-TRIETHOXYSILYLPROPYL) O-t-BUTYLCARBAMATE
$C_{14}H_{31}N_3O_3Si$	SIA0795.0	11-AZIDOUNDECYLTRIMETHOXYSILANE, 95%
$C_{14}H_{32}OSSi$	SIM6479.3	11-MERCAPTOUNDECYLOXYTRIMETHYLSILANE
$C_{14}H_{32}O_3Si$	SII6457.5	ISOOCTYLTRIETHOXYSILANE
$C_{14}H_{32}O_3Si$	SIO6715.0	n-OCTYLTRIETHOXYSILANE
$C_{14}H_{32}O_4SSi$	SIM6480.0	11-MERCAPTOUNDECYLTRIMETHOXYSILANE, 95%
$C_{14}H_{32}O_4Si_3$	SIM6486.0	3-METHACRYLOXYPROPYLBIS(TRIMETHYLSILOXY)METHYLSILANE, 95%
$C_{14}H_{32}O_6Si_2$	SIB1820.0	1,2-BIS(TRIETHOXYSILYL)ETHYLENE, 95%
$C_{14}H_{33}AlO_6Si$	SID2780.0	DI-s-BUTOXYALUMINOXYTRIETHOXYSILANE
$C_{14}H_{33}NO_3Si_3$	SIM6480.7	(3-METHACRYLAMIDOPROPYL)BIS(TRIMETHYLSILOXY)METHYLSILANE
$C_{14}H_{34}O_2Si_2$	SIB1026.8	1,2-BIS(t-BUTYLDIMETHYLSILOXY)ETHANE
$C_{14}H_{34}O_5SSi_3$	SIB1845.0	3-[BIS(TRIMETHYLSILOXY)METHYLSILYLPROPOXY]SULFOLANE
$C_{14}H_{34}O_5Si_2$	SIB1138.0	1,3-BIS(3-(2-HYDROXYETHOXY)PROPYL)TETRAMETHYLDISILOXANE, 95%
$C_{14}H_{34}O_5Si_4$	SIM6485.8	METHACRYLOXYMETHYLTRIS(TRIMETHYLSILOXY)SILANE, tech-95
$C_{14}H_{34}O_6Si_2$	SIB1817.0	1,2-BIS(TRIETHOXYSILYL)ETHANE
$C_{14}H_{34}O_6Si_2$	SIB1829.7	1,6-BIS(TRIMETHOXYSILYL)-2,5-DIMETHYLHEXANE
$C_{14}H_{34}O_6Si_2$	SIB1832.7	1,8-BIS(TRIMETHOXYSILYL)OCTANE
$C_{14}H_{35}NO_7Si_2$	SIH6171.5	N-(HYDROXYETHYL)-N,N-BIS(TRIMETHOXYSILYLPROPYL)AMINE, 65% in methanol
$C_{14}H_{36}N_2O_6Si_2$	SIB1834.0	N,N′-BIS[(3-TRIMETHOXYSILYL)PROPYL]ETHYLENEDIAMINE, 62% in methanol
$C_{14}H_{36}N_2O_6Si_2$	SIB1834.1	N,N′-BIS[(3-TRIMETHOXYSILYL)PROPYL]ETHYLENEDIAMINE, 95%
$C_{14}H_{40}Cl_2O_5Si_6$	SIB1054.0	1,3-BIS(CHLOROMETHYL)-1,1,3,3-TETRAKIS(TRIMETHYLSILOXY)DISILOXANE, 95%
$C_{14}H_{42}O_5Si_6$	SIT7089.0	TETRADECAMETHYLHEXASILOXANE
$C_{15}H_{14}Si$	SIE4901.9	ETHYNYLDIPHENYLMETHYLSILANE
$C_{15}H_{16}F_{16}O_3Si$	SIH5919.0	HEXADECAFLUORODODEC-11-EN-1-YLTRIMETHOXYSILANE
$C_{15}H_{16}Si$	SIV9076.5	VINYLDIPHENYLMETHYLSILANE
$C_{15}H_{18}OSi$	SID4553.0	DIPHENYLMETHYLETHOXYSILANE
$C_{15}H_{19}ClO_3Si$	SIC2266.8	7-[3-(CHLORODIMETHYLSILYL)PROPOXY]-4-METHYLCOUMARIN, 10% in acetonitrile

Molecular formula	Catalog #	Name
$C_{15}H_{19}NSi$	SID4552.5	(DIPHENYL)METHYL(DIMETHYLAMINO)SILANE
$C_{15}H_{19}PSi$	SID4558.5	(DIPHENYLPHOSPHINO)TRIMETHYLSILANE, 95%
$C_{15}H_{22}O_5Si$	SIA0184.0	(ACRYLOXYMETHYL)PHENETHYLTRIMETHOXYSILANE, tech-95
$C_{15}H_{24}O_5Si$	SIE4901.3	ETHYL 4-(TRIETHOXYSILYL)BENZOATE, 90%
$C_{15}H_{24}O_5Si$	SIT8185.9	2-(3-TRIETHOXYSILYLPHENYL)-1,3-DIOXOLANE
$C_{15}H_{25}N_3O_7Si$	SID4352.0	3-(2,4-DINITROPHENYLAMINO)PROPYLTRIETHOXYSILANE, 95%
$C_{15}H_{26}O_2Si_3$	SID4610.5	1,5-DIVINYL-3-PHENYLPENTAMETHYLTRISILOXANE, 95%
$C_{15}H_{28}BrCl_3O_2Si$	SIB1891.6	[11-(2-BROMO-2-METHYL)PROPIONYLOXY]UNDECYLTRICHLOROSILANE
$C_{15}H_{28}ClNO_3Si$	SIT8395.0	4-(TRIMETHOXYSILYLETHYL)BENZYLTRIMETHYLAMMONIUM CHLORIDE, 60% in methanol
$C_{15}H_{28}N_2O_3Si$	SIB0956.0	N-(2-N-BENZYLAMINOETHYL)-3-AMINOPROPYLTRIMETHOXYSILANE, tech-90
$C_{15}H_{28}N_2O_3Si\cdot HCl$	SIB0957.0	N-(2-N-BENZYLAMINOETHYL)-3-AMINOPROPYLTRIMETHOXYSILANE hydrochloride, 90%,50% in methanol, 90%
$C_{15}H_{28}O_4Si_2$	SIB1939.65	4-(t-BUTYLDIMETHYLSILOXY)PHENYLTRIMETHOXYSILANE
$C_{15}H_{29}NSi_2$	SIB1863.7	BIS(TRIMETHYLSILYLMETHYL)BENZYLAMINE
$C_{15}H_{30}N_2O_2Si$	SIV9801.0	VINYLMETHYLBIS(METHYLETHYLKETOXIMINO)SILANE, 95%
$C_{15}H_{30}O_3Si$	SIB1020.0	2,2-BIS(ALLYLOXYMETHYL)-1-TRIMETHYLSILOXYBUTANE, 95%
$C_{15}H_{30}O_5Si_5$	SIP6719.7	PENTAVINYLPENTAMETHYLCYCLOPENTASILOXANE, 95%
$C_{15}H_{31}NO_3Si$	SIC2456.5	11-CYANOUNDECYLTRIMETHOXYSILANE
$C_{15}H_{31}NO_6Si$	SIA0180.0	N-(3-ACRYLOXY-2-HYDROXYPROPYL)-3-AMINOPROPYLTRIETHOXYSILANE, 50% in ethanol
$C_{15}H_{31}NO_6Si$	SIT7122.3	3-(O-TETRAHYDROFURFURYL)CARBAMOYLPROPYLTRIETHOXYSILANE
$C_{15}H_{32}O_3Si$	SIC2067.0	10-(CARBOMETHOXY)DECYLDIMETHYLMETHOXYSILANE
$C_{15}H_{32}O_3Si_4$	SIP6827.0	PHENYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{15}H_{32}O_7SSi$	SIT8186.0	3-[2-(3-TRIETHOXYSILYLPROPOXY)ETHOXY]SULFOLANE, 95%
$C_{15}H_{33}NO_3Si$	SID4068.0	3-(1,3-DIMETHYLBUTYLIDENE)AMINOPROPYLTRIETHOXYSILANE, tech-95
$C_{15}H_{33}NO_3Si$	SID4068.1	3-(1,3-DIMETHYLBUTYLIDENE)AMINOPROPYLTRIETHOXYSILANE, 98%
$C_{15}H_{33}NO_9Si$	SIT8189.0	N-(3-TRIETHOXYSILYLPROPYL)GLUCONAMIDE, 50% in ethanol
$C_{15}H_{34}O_3Si$	SID4635.0	DODECYLTRIMETHOXYSILANE
$C_{15}H_{34}O_4Si$	SIT8627.0	TRI-t-PENTOXYSILANOL, 99%
$C_{15}H_{36}O_4Si_3$	SIT7122.4	3-(TETRAHYDROFURFURYLOXYPROPYL)HEPTAMETHYLTRISILOXANE
$C_{15}H_{36}O_5Si_4$	SIA0210.0	(3-ACRYLOXYPROPYL)TRIS(TRIMETHYLSILOXY)SILANE, tech-95
$C_{15}H_{36}O_6Si_3$	SIH5945.0	1,1,3,3,5,5-HEXAETHOXY-1,3,5-TRISILACYCLOHEXANE
$C_{15}H_{36}SiSn$	SNT8585	TRI-n-BUTYLSTANNYLTRIMETHYLSILANE
$C_{15}H_{36}Si_4$	SIT7307.0	TETRAKIS(TRIMETHYLSILYL)ALLENE
$C_{15}H_{37}NO_4Si_4$	SIA0150.0	3-ACRYLAMIDOPROPYLTRIS(TRIMETHYLSILOXY)SILANE, tech-95
$C_{15}H_{37}NO_8Si_2$	SIB1832.8	1,11-BIS(TRIMETHOXYSILYL)-4-OXA-8-AZAUNDECAN-6-OL, 50% in methanol
$C_{15}H_{38}O_2Si_3$	SIO6711.5	3-OCTYLHEPTAMETHYLTRISILOXANE
$C_{16}H_7Cl_3F_{26}Si$	SIT8176.3	5,5,6,6,7,7,8,8,9,9,10,10,10-TRIDECAFLUORO-2-(TRIDECAFLUOROHEXYL)DECYLTRICHLOROSILANE, 95%
$C_{16}H_{18}ClNOSi$	SIP6724.95	(S,S)-2-PHENYL-2-CHLORO-3,4-DIMETHYL-5-PHENYL-[1,3,2]-OXAZASILOLIDINE
$C_{16}H_{18}OSi$	SIV9076.0	VINYLDIPHENYLETHOXYSILANE
$C_{16}H_{19}ClSi$	SIB1968.0	t-BUTYLDIPHENYLCHLOROSILANE
$C_{16}H_{19}ClSi$	SIC2342.0	3-CHLOROPROPYLDIPHENYLMETHYLSILANE, 95%
$C_{16}H_{19}F_{17}O_3Si$	SIH5841.2	(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TRIETHOXYSILANE
$C_{16}H_{20}F_{18}OSi_2$	SIB1709.0	BIS(NONAFLUOROHEXYL)TETRAMETHYLDISILOXANE
$C_{16}H_{20}O_2Si$	SID4525.0	DIPHENYLDIETHOXYSILANE
$C_{16}H_{20}O_2Si$	SID4599.0	DI(p-TOLYL)DIMETHOXYSILANE
$C_{16}H_{20}O_3Si$	SID4555.6	(DIPHENYLMETHYL)TRIMETHOXYSILANE
$C_{16}H_{21}PSi$	SID4589.5	DIPHENYL(TRIMETHYLSILYLMETHYL)PHOSPHINE
$C_{16}H_{22}F_{17}N_3Si$	SIH5841.7	(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TRIS(DIMETHYLAMINO)SILANE
$C_{16}H_{22}N_2Si$	SIB1074.0	BIS(DIMETHYLAMINO)DIPHENYLSILANE
$C_{16}H_{22}OSi_2$	SIB1090.0	BIS[(p-DIMETHYLSILYL)PHENYL]ETHER, 96%
$C_{16}H_{22}OSi_2$	SID4588.0	1,3-DIPHENYLTETRAMETHYLDISILOXANE
$C_{16}H_{22}O_3Si$	SIN6596.8	1-NAPHTHYLTRIETHOXYSILANE
$C_{16}H_{22}Si_2$	SIB1858.0	1,3-BIS[(TRIMETHYLSILYL)ETHYNYL]BENZENE
$C_{16}H_{22}Si_2$	SIB1858.2	1,4-BIS[(TRIMETHYLSILYL)ETHYNYL]BENZENE
$C_{16}H_{22}Si_2$	SID4584.0	1,2-DIPHENYLTETRAMETHYLDISILANE
$C_{16}H_{23}NSi_2$	SID4586.0	1,3-DIPHENYL-1,1,3,3-TETRAMETHYLDISILAZANE
$C_{16}H_{24}O_{12}Si_8$	SIO6706.0	OCTAVINYL-T8-SILSESQUIOXANE
$C_{16}H_{26}N_2O_6Si$	SIT8191.0	3-(TRIETHOXYSILYLPROPYL)-p-NITROBENZAMIDE
$C_{16}H_{28}F_{12}O_4Si_4$	SIT8365.5	(3,3,3-TRIFLUOROPROPYL)METHYLCYCLOTETRASILOXANE
$C_{16}H_{29}NSi$	SIP6736.32	6-PHENYLHEXYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_{16}H_{30}O_6Si_2$	SIB1831.0	BIS(TRIMETHOXYSILYLETHYL)BENZENE, tech-95
$C_{16}H_{31}NO_3Si$	SIC2439.7	12-CYANODODEC-10-ENYLTRIMETHOXYSILANE, tech-95
$C_{16}H_{31}NO_7Si$	SIA0126.0	3-(N-ACETYL-4-HYDROXYPROLYLOXY)PROPYLTRIETHOXYSILANE, 25% in ethanol
$C_{16}H_{31}NO_7Si$	SIM6480.8	O-(METHACRYLOXYETHYL)-N-(TRIETHOXYSILYLPROPYL)CARBAMATE, 90%
$C_{16}H_{32}N_4O_4Si$	SIT7289.0	TETRAKIS(METHYLETHYLKETOXIMINO)SILANE (50% in toluene)
$C_{16}H_{32}O_{10}Si_2$	SIB1834.5	BIS(3-TRIMETHOXYSILYLPROPYL) FUMARATE, 96%
$C_{16}H_{32}O_5Si$	SIM6487.35	METHACRYLOXYPROPYLTRIISOPROPOXYSILANE
$C_{16}H_{32}O_8Si$	SIM6487.5	METHACRYLOXYPROPYLTRIS(METHOXYETHOXY)SILANE, tech-80
$C_{16}H_{33}Cl_3O_2Si$	SID4472.0	4,7-DIOXAOCTADECYLTRICHLOROSILANE, 95%
$C_{16}H_{33}Cl_3Si$	SIH5920.0	n-HEXADECYLTRICHLOROSILANE, 95%
$C_{16}H_{33}Cl_3Si$	SIT8162.4	7-(TRICHLOROSILYLMETHYL)PENTADECANE, tech-95
$C_{16}H_{33}NO_6Si$	SIM6481.1	N-(3-METHACRYLOXY-2-HYDROXYPROPYL)-3-AMINOPROPYLTRIETHOXYSILANE, 50% in methanol
$C_{16}H_{33}NO_6Si$	SIV9088.4	O-(VINYLOXYBUTYL)-N-TRIETHOXYSILYLPROPYL CARBAMATE, tech-95
$C_{16}H_{34}Cl_2Si$	SIB1097.0	BIS(2-ETHYLHEXYL)DICHLOROSILANE
$C_{16}H_{34}Cl_2Si$	SID4400.0	DI-n-OCTYLDICHLOROSILANE
$C_{16}H_{34}O_4Si_2$	SIB1870.0	BIS(TRIMETHYLSILYL) SEBACATE
$C_{16}H_{34}O_5Si_2$	SIB1115.0	1,3-BIS(GLYCIDOXYPROPYL)TETRAMETHYLDISILOXANE
$C_{16}H_{36}O_3Si$	SID2665.0	n-DECYLTRIETHOXYSILANE
$C_{16}H_{36}O_4Si$	SIT7062.0	TETRA-n-BUTOXYSILANE
$C_{16}H_{36}O_4Si_5$	SIT7312.0	TETRAKIS(VINYLDIMETHYLSILOXY)SILANE, 95%
$C_{16}H_{36}O_8Si$	SIT7282.0	TETRAKIS(ETHOXYETHOXY)SILANE, tech-95
$C_{16}H_{36}O_8Si$	SIT7288.0	TETRAKIS(1-METHOXY-2-PROPOXY)SILANE, tech-95
$C_{16}H_{36}Si$	SIT7082.0	TETRA-n-BUTYLSILANE
$C_{16}H_{37}NO_5Si_2$	SIT8187.2	(1-(3-TRIETHOXYSILYL)PROPYL)-2,2-DIETHOXY-1-AZA-2-SILACYCLOPENTANE, tech-90
$C_{16}H_{37}NSi$	SIO6710.7	n-OCTYLDIISOPROPYL(DIMETHYLAMINO)SILANE
$C_{16}H_{38}N_2O_3Si$	SIA0595.0	N-(2-AMINOETHYL)-11-AMINOUNDECYLTRIMETHOXYSILANE
$C_{16}H_{38}O_5Si_4$	SIM6487.6	METHACRYLOXYPROPYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{16}H_{38}O_6Si_2$	SIB1829.0	1,2-BIS(TRIMETHOXYSILYL)DECANE
$C_{16}H_{38}SiSn$	SIT8594.5	(TRIMETHYLSILYLMETHYL)TRI-n-BUTYLTIN
$C_{16}H_{39}NO_4Si_2$	SIB1620.0	BIS(METHYLDIETHOXYSILYLPROPYL)AMINE, 95%
$C_{16}H_{39}N_3Si$	SID2671.0	n-DECYLTRIS(DIMETHYLAMINO)SILANE
$C_{16}H_{42}O_5Si_6$	SID4611.4	1,3-DIVINYLTETRAKIS(TRIMETHYLSILOXY)DISILOXANE, 95%
$C_{16}H_{56}O_{20}Si_{16}$	SIO6696.5	OCTAKIS(DIMETHYLSILOXY)-T8-SILSESQUIOXANE
$C_{17}H_{22}OSi$	SIB1969.0	t-BUTYLDIPHENYLMETHOXYSILANE
$C_{17}H_{24}F_{18}O_2Si_3$	SIB1708.0	BIS(NONAFLUOROHEXYLDIMETHYLSILOXY)METHYLSILANE, 95%
$C_{17}H_{27}Cl_3OSi$	SIP6723.4	11-PHENOXYUNDECYLTRICHLOROSILANE
$C_{17}H_{30}N_2O_3Si$	SIS6993.0	3-(N-STYRYLMETHYL-2-AMINOETHYLAMINO)PROPYLTRIMETHOXYSILANE, 40% in methanol
$C_{17}H_{31}ClN_2O_3Si$	SIS6994.0	3-(N-STYRYLMETHYL-2-AMINOETHYLAMINO)PROPYLTRIMETHOXYSILANE HYDROCHLORIDE, 40% in methanol
$C_{17}H_{36}N_2O_5Si$	SIA0127.0	N-(N-ACETYLLEUCYL)-3-AMINOPROPYLTRIETHOXYSILANE, 12-15% in ethanol
$C_{17}H_{36}O_3Si_4$	SIP6722.8	PHENETHYLTRIS(TRIMETHYLSILOXY)SILANE
$C_{17}H_{36}O_4SSi$	SIO6704.0	S-(OCTANOYL)MERCAPTOPROPYLTRIETHOXYSILANE
$C_{17}H_{36}O_4Si$	SIA0482.0	11-ALLYLOXYUNDECYLTRIMETHOXYSILANE
$C_{17}H_{36}O_4Si$	SIT8194.0	TRIETHOXYSILYLUNDECANAL, tech-95
$C_{17}H_{36}SiSn$	SIT8588.8	TRIMETHYLSILYLETHYNYLTRI-n-BUTYLTIN
$C_{17}H_{37}ClO_3Si$	SIC2428.0	11-CHLOROUNDECYLTRIETHOXYSILANE
$C_{17}H_{37}NO_6Si_3$	SIM6481.05	O-(METHACRYLOXYETHYL)-3-[BIS(TRIMETHYLSILOXY)METHYLSILYL]PROPYLCARBAMATE, tech-95
$C_{17}H_{38}O_2Si$	SID4629.0	DODECYLMETHYLDIETHOXYSILANE
$C_{17}H_{38}O_2Si_3$	SIH6168.7	4-R-8-HYDRO-9-[BIS(TRIMETHYLSILOXY)METHYLSILYL]LIMONENE
$C_{17}H_{38}O_5Si$	SIM6491.7	11-(2-METHOXYETHOXY)UNDECYLTRIMETHOXYSILANE
$C_{17}H_{38}O_6Si_3$	SIM6481.15	3-(3-METHACRYLOXY-2-HYDROXYPROPOXY)PROPYLBIS(TRIMETHYLSILOXY)METHYLSILANE, tech-95
$C_{17}H_{39}NO_3Si$	SIA0630.0	11-AMINOUNDECYLTRIETHOXYSILANE
$C_{17}H_{44}O_3Si_4$	SIO6715.7	n-OCTYLTRIS(TRIMETHYLSILOXY)SILANE, 95%
$C_{17}H_{46}O_6Si_5$	SIT8721.2	TRIS(TRIMETHYLSILOXY)SILYLETHYLTRIETHOXYSILANE
$C_{18}H_{12}K_2O_6Si$	SID4590.0	DIPOTASSIUM TRIS(1,2-BENZENEDIOLATO)O,O' SILICATE
$C_{18}H_{15}ClSi$	SIT8645.0	TRIPHENYLCHLOROSILANE, 95%
$C_{18}H_{15}FSi$	SIT8655.0	TRIPHENYLFLUOROSILANE
$C_{18}H_{16}OSi$	SIT8695.0	TRIPHENYLSILANOL
$C_{18}H_{16}SSi$	SIT8690.0	TRIPHENYLSILANETHIOL
$C_{18}H_{16}Si$	SIB1760.0	BIS(PHENYLETHYNYL)DIMETHYLSILANE
$C_{18}H_{16}Si$	SIT8665.0	TRIPHENYLSILANE
$C_{18}H_{17}NSi$	SIT8628.0	TRIPHENYLAMINOSILANE
$C_{18}H_{20}O_6Si$	SID2754.6	DIBENZYLOXYDIACETOXYSILANE, tech-95
$C_{18}H_{20}Si$	SID2749.0	DIALLYLDIPHENYLSILANE, 95%
$C_{18}H_{22}Cl_2Si$	SID3540.0	DIMESITYLDICHLOROSILANE
$C_{18}H_{22}OSi_2$	SID4608.0	1,3-DIVINYL-1,3-DIPHENYL-1,3-DIMETHYLDISILOXANE
$C_{18}H_{22}O_2$	SID3379.0	DICUMYL PEROXIDE, 25%; in polydimethylsiloxane 40%, with 35% calcium carbonate
$C_{18}H_{23}NSi_2$	SID4607.0	1,3-DIVINYL-1,3-DIPHENYL-1,3-DIMETHYLDISILAZANE
$C_{18}H_{23}PSi$	SIV9077.0	VINYL(DIPHENYLPHOSPHINOETHYL)DIMETHYLSILANE
$C_{18}H_{24}O_3Si$	SIB0999.5	4-BIPHENYLYLTRIETHOXYSILANE
$C_{18}H_{25}OPSi$	SID4557.5	(2-DIPHENYLPHOSPHINO)ETHYLDIMETHYLETHOXYSILANE
$C_{18}H_{25}PSi$	SIB1955.0	(t-BUTYLDIMETHYLSILYL)DIPHENYLPHOSPHINE, 95%
$C_{18}H_{28}FeO_3Si$	SIF4908.0	2-FERROCENYLETHYLTRIETHOXYSILANE
$C_{18}H_{29}N_3O_3Si$	SIP6826.5	PHENYLTRIS(METHYLETHYLKETOXIMINO)SILANE, 95%
$C_{18}H_{30}O_3Si$	SIA0489.0	m-ALLYLPHENYLPROPYLTRIETHOXYSILANE
$C_{18}H_{32}N_2O_4Si$	SIP6731.5	(R)-N-1-PHENYLETHYL-N'-TRIETHOXYSILYLPROPYLUREA
$C_{18}H_{32}N_2O_4Si$	SIP6731.6	(S)-N-1-PHENYLETHYL-N'-TRIETHOXYSILYLPROPYLUREA
$C_{18}H_{32}O_3Si_4$	SIT8725.4	TRIS(VINYLDIMETHYLSILOXY)PHENYLSILANE, 95%
$C_{18}H_{34}O_5Si_2$	SIB1402.0	1,3-BIS(3-METHACRYLOXYPROPYL)TETRAMETHYLDISILOXANE
$C_{18}H_{34}O_6Si_2$	SIB1816.6	1,4-BIS(TRIETHOXYSILYL)BENZENE
$C_{18}H_{34}O_6Si_2$	SIB1833.4	1,3-BIS(TRIMETHOXYSILYLPROPYL)BENZENE
$C_{18}H_{36}Cl_6Si_2$	SIB1813.7	1,2-BIS(TRICHLOROSILYL)OCTADECANE
$C_{18}H_{36}N_2O_3Si_2$	SIB1380.0	1,3-BIS(3-METHACRYLAMIDOPROPYL)TETRAMETHYLDISILOXANE
$C_{18}H_{37}ClO_3Si_4$	SIC2295.7	CHLOROMETHYLPHENETHYLTRIS(TRIMETHYLSILOXY)SILANE, mixed m,p; α,β isomers

Molecular formula	Catalog #	Name
$C_{18}H_{37}Cl_3Si$	SIO6640.0	n-OCTADECYLTRICHLOROSILANE, 95%
$C_{18}H_{37}Cl_3Si$	SIO6640.1	n-OCTADECYLTRICHLOROSILANE
$C_{18}H_{39}ClSi$	SIT8374.0	TRI-n-HEXYLCHLOROSILANE
$C_{18}H_{39}NO_5Si$	SIT8186.45	4-(TRIETHOXYSILYLPROPOXY)-2,2,6,6-TETRAMETHYLPIPERIDINE OXIDE, tech-85
$C_{18}H_{40}O_2Si$	SID4400.4	DI-n-OCTYLDIMETHOXYSILANE
$C_{18}H_{40}O_3Si$	SID4632.0	DODECYLTRIETHOXYSILANE
$C_{18}H_{40}Si$	SIO6635.0	n-OCTADECYLSILANE
$C_{18}H_{40}Si$	SIT8376.0	TRI-n-HEXYLSILANE
$C_{18}H_{41}NO_9Si$	SIA0614.0	3-AMINOPROPYLTRIS(METHOXYETHOXYETHOXY)SILANE, 95%
$C_{18}H_{42}BrNO_3Si$	SIT8412.0	N-TRIMETHOXYSILYLPROPYL-N,N,N-TRI-n-BUTYLAMMONIUM BROMIDE, 50% in methanol
$C_{18}H_{42}ClNO_3Si$	SIT8414.0	N-TRIMETHOXYSILYLPROPYL-N,N,N-TRI-n-BUTYLAMMONIUM CHLORIDE, 50% in methanol
$C_{18}H_{42}O_6S_2Si_2$	SIB1824.6	BIS[3-(TRIETHOXYSILYL)PROPYL]DISULFIDE, 90%
$C_{18}H_{42}O_6S_4Si_2$	SIB1825.0	BIS[3-(TRIETHOXYSILYL)PROPYL]TETRASULFIDE, tech-95
$C_{18}H_{43}NO_6Si_2$	SIB1824.5	BIS(3-TRIETHOXYSILYLPROPYL)AMINE, 95%
$C_{18}H_{44}N_2O_8Si_2$	SIB1142.0	N,N'-BIS(2-HYDROXYETHYL)-N,N'-BIS(TRIMETHOXYSILYLPROPYL)ETHYLENEDIAMINE, 66-68% in methanol
$C_{18}H_{44}O_8Si_3$	SIO6660.0	OCTAETHOXY-1,3,5-TRISILAPENTANE
$C_{18}H_{46}O_5Si_6$	SID2752.0	1,3-DIALLYLTETRAKIS(TRIMETHYLSILOXY)DISILOXANE, 95%
$C_{18}H_{48}ClN_3Si_6Zr$	SIZ9920.0	ZIRCONIUM TRIS(2,2,5,5-TETRAMETHYL-2,5-DISILAPYRROLIDINE)CHLORIDE, tech-95
$C_{18}H_{48}Cl_2O_5Si_6$	SIB1055.8	1,3-BIS(3-CHLOROPROPYL)TETRAKIS(TRIMETHYLSILOXY)DISILOXANE, tech-95
$C_{18}H_{54}CeN_3Si_6$	SIC2264.6	CERIUM(III)TRIS[BIS(TRIMETHYLSILYL)AMIDE]
$C_{18}H_{54}ErN_3Si_6$	SIE4885.0	ERBIUM TRIS(HEXAMETHYLDISILAZIDE)
$C_{18}H_{54}EuN_3Si_6$	SIE4907.0	EUROPIUM(III)TRIS(HEXAMETHYLDISILAZIDE)
$C_{18}H_{54}GaN_3Si_6$	SIG4998.0	GALLIUM TRIS(HEXAMETHYDISILAZIDE)
$C_{18}H_{54}LaN_3Si_6$	SIL6464.0	LANTHANUM TRIS(HEXAMETHYLDISILAZIDE)
$C_{18}H_{54}N_3GdSi_6$	SIG4994.0	GADOLINIUM TRIS(HEXAMETHYLDISILAZIDE)
$C_{18}H_{54}N_3PrSi_6$	SIP6902.1	PRASEODYMIUM TRIS(HEXAMETHYLDISILAZIDE)
$C_{18}H_{54}N_3Si_6Sm$	SIS6943.4	SAMARIUM TRIS(HEXAMETHYLDISILAZIDE)
$C_{18}H_{54}N_3Si_6Tb$	SIT6997.0	TERBIUM TRIS(HEXAMETHYLDISILAZIDE)
$C_{18}H_{54}N_3Si_6Y$	SIY9680.0	YTTRIUM(III)TRIS[BIS(TRIMETHYLSILYLAMIDE)]
$C_{19}H_{18}Si$	SIT8689.0	TRIPHENYLMETHYLSILANE
$C_{19}H_{22}O_3Si$	SIT8570.5	2-TRIMETHYLSILOXY-4-ALLYLOXYDIPHENYLKETONE
$C_{19}H_{24}N_2O_3Si$	SIB1610.0	BIS(N-METHYLBENZAMIDO)ETHOXYMETHYLSILANE, tech-90
$C_{19}H_{25}NOSi$	SIB1966.3	t-BUTYLDIMETHYLSILYL-N-PHENYLBENZIMIDATE
$C_{19}H_{29}ClO_3Si_3$	SIB0950.0	BENZHYDRYLOXYBIS(TRIMETHYLSILOXY)CHLOROSILANE
$C_{19}H_{32}N_2O_9Si$	SIN6597.25	NITROVERATRYLOXYCARBONYLAMIDOPROPYLTRIETHOXYSILANE, 10% in tetrahydrofuran
$C_{19}H_{37}NO_4Si$	SIS6995.0	11-(SUCCINIMIDYLOXY)UNDECYLDIMETHYLETHOXYSILANE, 95%
$C_{19}H_{38}Cl_6O_3Si_2$	SIB1815.1	1,3-BIS(3-TRICHLOROSILYLPROPOXY)-2-DECYLOXYPROPANE
$C_{19}H_{38}O_5Si_4$	SIM6487.8	METHACRYLOXYPROPYLTRIS(VINYLDIMETHYLSILOXY)SILANE, tech-95
$C_{19}H_{39}N_3O_3Si$	SIM6590.2	METHYLTRIS(METHYLISOBUTYLKETOXIMINO)SILANE, tech-95
$C_{19}H_{39}N_3Si$	SIT8710.0	TRIS(CYCLOHEXYLAMINO)METHYLSILANE, tech-95
$C_{19}H_{40}Cl_2OSi$	SIO6624.0	n-OCTADECYLMETHOXYDICHLOROSILANE, tech-95
$C_{19}H_{40}Cl_2Si$	SIO6625.0	n-OCTADECYLMETHYLDICHLOROSILANE
$C_{19}H_{40}Cl_2Si$	SIO6625.1	n-OCTADECYLMETHYLDICHLOROSILANE
$C_{19}H_{40}O_5Si$	SIA0115.0	11-ACETOXYUNDECYLTRIETHOXYSILANE
$C_{19}H_{40}O_5Si$	SIT8194.5	TRIETHOXYSILYLUNDECANAL, ETHYLENE GLYCOL ACETAL
$C_{19}H_{40}Si$	SIV9073.8	VINYLDI-n-OCTYLMETHYLSILANE
$C_{19}H_{41}ClSi$	SIO6624.4	OCTADECYLMETHYLCHLOROSILANE
$C_{19}H_{41}Cl_3Si_2$	SID4401.5	2-(DI-n-OCTYLMETHYLSILYL)ETHYLTRICHLOROSILANE
$C_{19}H_{42}O_3Si$	SIH5925.0	HEXADECYLTRIMETHOXYSILANE, 95%
$C_{19}H_{42}O_9Si_2$	SIB1824.56	BIS(3-TRIETHOXYSILYLPROPYL)CARBONATE
$C_{19}H_{42}Si$	SIM6559.0	METHYLTRI-n-HEXYLSILANE
$C_{19}H_{44}N_2O_6SSi_2$	SIB1827.0	N,N'-BIS[3-(TRIETHOXYSILYL)PROPYL]THIOUREA, 90%
$C_{19}H_{44}N_2O_7Si_2$	SIB1828.0	N,N'-BIS[3-(TRIETHOXYSILYL)PROPYL]UREA, 60% in ethanol
$C_{19}H_{44}O_6Si_3$	SIB1818.0	BIS(TRIETHOXYSILYLETHYL)VINYLMETHYLSILANE
$C_{19}H_{46}O_2Si_3$	SID4627.6	1-DODECYLHEPTAMETHYLTRISILOXANE, 95%
$C_{20}H_{18}Cl_2Si$	SIT8686.0	(TRIPHENYLMETHYL)METHYLDICHLOROSILANE
$C_{20}H_{18}O_3Si$	SIV9264.0	VINYLTRIPHENOXYSILANE
$C_{20}H_{18}Si$	SIV9265.0	VINYLTRIPHENYLSILANE
$C_{20}H_{19}F_{17}O_3Si$	SIP6720.71	(4-PERFLUOROOCTYLPHENYL)TRIETHOXYSILANE
$C_{20}H_{20}F_{26}OSi_2$	SIB1816.0	1,3-BIS(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)TETRAMETHYLDISILOXANE
$C_{20}H_{20}OSi$	SIT8652.0	TRIPHENYLETHOXYSILANE, tech-95
$C_{20}H_{20}Si$	SIB1205.0	BIS(INDENYL)DIMETHYLSILANE
$C_{20}H_{24}O_3Si$	SIP6720.77	9-PHENANTHRENYLTRIETHOXYSILANE
$C_{20}H_{27}NOSi$	SID4589.0	(S)-(-)-[(DIPHENYL)TRIMETHYLSILOXYMETHYL]PYRROLIDINE
$C_{20}H_{27}NOSi$	SIT8571.28	(S)-2-[TRIMETHYLSILOXY(DIPHENYL)METHYL]PYRROLIDINE
$C_{20}H_{28}O_2Si_3$	SID4609.0	1,5-DIVINYL-3,3-DIPHENYL-1,1,5,5-TETRAMETHYLTRISILOXANE
$C_{20}H_{29}NO_7Si$	SIM6502.0	O-4-METHYLCOUMARINYL-N-[3-(TRIETHOXYSILYL)PROPYL]CARBAMATE
$C_{20}H_{29}O_3PSi$	SID4558.0	2-(DIPHENYLPHOSPHINO)ETHYLTRIETHOXYSILANE
$C_{20}H_{30}O_2Si_2$	SIB1082.0	4,4'-BIS(DIMETHYLETHOXYSILYL)BIPHENYL
$C_{20}H_{31}F_5O_4Si$	SIP6716.0	PENTAFLUOROPHENOXYUNDECYLTRIMETHOXYSILANE
$C_{20}H_{34}O_3Si_4$	SID4556.0	3,5-DIPHENYLOCTAMETHYLTETRASILOXANE, 95%
$C_{20}H_{35}ClOSi$	SIN6598.0	p-NONYLPHENOXYPROPYLDIMETHYLCHLOROSILANE, tech-95
$C_{20}H_{35}ClSi$	SIP6729.5	12-PHENYLDODECYLDIMETHYLCHLOROSILANE
$C_{20}H_{36}Cl_2OSi_2$	SIT7087.0	1,1,3,3-TETRACYCLOPENTYLDICHLORODISILOXANE
$C_{20}H_{38}O_3Si_2$	SIB1092.0	1,3-BIS[2-(3,4-EPOXYCYCLOHEXYL)ETHYL]TETRAMETHYLDISILOXANE, 90%
$C_{20}H_{38}O_5Si_6$	SID4582.0	1,3-DIPHENYLTETRAKIS(DIMETHYLSILOXY)DISILOXANE, 95%
$C_{20}H_{40}Cl_6O_3Si_2$	SIB1815.3	3,3-BIS(TRICHLOROSILYLPROPOXYMETHYL)-5-OXA-TRIDECANE, 95%
$C_{20}H_{41}Cl_3Si$	SIE4661.0	EICOSYLTRICHLOROSILANE, 95%
$C_{20}H_{41}NO_5Si$	SIT8190.0	(S)-N-TRIETHOXYSILYLPROPYL-O-MENTHOCARBAMATE
$C_{20}H_{41}O_3PSi$	SID3385.0	(2-DICYCLOHEXYLPHOSPHINOETHYL)TRIETHOXYSILANE
$C_{20}H_{42}O_5Si_2$	SIB1765.0	1,3-BIS(TETRAHYDROFURFURYLOXYPROPYL)TETRAMETHYLDISILOXANE
$C_{20}H_{43}ClSi$	SIO6615.0	n-OCTADECYLDIMETHYLCHLOROSILANE
$C_{20}H_{43}ClSi$	SIO6615.1	n-OCTADECYLDIMETHYLCHLOROSILANE, 97%
$C_{20}H_{43}ClSi$	SIO6615.2	n-OCTADECYLDIMETHYLCHLOROSILANE, 70% in toluene
$C_{20}H_{44}O_{12}Si$	SIT7285.0	TETRAKIS(METHOXYETHOXYETHOXY)SILANE, tech-95
$C_{20}H_{44}Si$	SIO6619.0	n-OCTADECYLDIMETHYLSILANE
$C_{20}H_{46}OSi_2$	SID4406.0	1,3-DI-n-OCTYLTETRAMETHYLDISILOXANE
$C_{20}H_{46}O_4Si_2$	SIT8572.8	11-(TRIMETHYLSILOXY)UNDECYLTRIETHOXYSILANE
$C_{20}H_{46}O_6Si_2$	SIB1824.0	1,8-BIS(TRIETHOXYSILYL)OCTANE
$C_{20}H_{47}NSi_2$	SID4404.0	1,3-DI-n-OCTYL-1,1,3,3-TETRAMETHYLDISILAZANE
$C_{20}H_{48}O_9Si_3$	SIT8716.6	1,1,2-TRIS(TRIETHOXYSILYL)ETHANE, tech-95
$C_{20}H_{50}O_7Si_4$	SIB1820.2	1,3-BIS(TRIETHOXYSILYLETHYL)TETRAMETHYLDISILOXANE
$C_{21}H_{20}Si$	SIA0575.0	ALLYLTRIPHENYLSILANE
$C_{21}H_{22}Si$	SIT6997.2	m-TERPHENYL-5'-YLTRIMETHYLSILANE
$C_{21}H_{23}ClF_{26}O_2Si_3$	SIB1815.5	BIS((TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)DIMETHYLSILOXY)METHYLCHLOROSILANE
$C_{21}H_{24}F_{26}O_2Si_3$	SIB1815.7	BIS((TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)DIMETHYLSILOXY)METHYLSILANE
$C_{21}H_{24}O_3Si_3$	SIT8705.0	1,3,5-TRIPHENYLTRIMETHYLCYCLOTRISILOXANE, 90%
$C_{21}H_{24}O_3Si_3$ - $C_{28}H_{32}O_4Si_4$	SIP6737.5	PHENYLMETHYLCYCLOSILOXANES, 95%
$C_{21}H_{28}O_5Si$	SIH6198.0	2-HYDROXY-4-(3-METHYLDIETHOXYSILYLPROPOXY)DIPHENYLKETONE, tech-90
$C_{21}H_{29}NO_3Si$	SIC2058.2	3-CARBAZOLYLPROPYLTRIETHOXYSILANE
$C_{21}H_{31}O_3PSi$	SID4558.2	3-(DIPHENYLPHOSPHINO)PROPYLTRIETHOXYSILANE
$C_{21}H_{32}O_2Si_2$	SIB1853.5	BIS(TRIMETHYLSILYL)BISPHENOLA
$C_{21}H_{33}ClF_{18}O_2Si_4$	SIB1706.0	[BIS(NONAFLUOROHEXYLDIMETHYLSILOXY)METHYL]SILYLETHYLDIMETHYLCHLOROSILANE, 95%
$C_{21}H_{34}N_2O_5SSi$	SIT8187.0	N-(TRIETHOXYSILYLPROPYL)DANSYLAMIDE
$C_{21}H_{45}N_3O_{12}Si_3$	SIT8717.0	TRIS(3-TRIMETHOXYSILYLPROPYL)ISOCYANURATE, tech-95
$C_{21}H_{46}OSi$	SIO6618.0	n-OCTADECYLDIMETHYLMETHOXYSILANE
$C_{21}H_{46}O_2Si$	SIO6629.0	n-OCTADECYLMETHYLDIMETHOXYSILANE
$C_{21}H_{46}O_3Si$	SIO6645.0	n-OCTADECYLTRIMETHOXYSILANE, 95%
$C_{21}H_{46}O_7Si$	SIM6493.7	METHOXYTRIETHYLENEOXYUNDECYLTRIMETHOXYSILANE
$C_{21}H_{47}ClSi_2$	SID4401.0	2-(DI-n-OCTYLMETHYLSILYL)ETHYLDIMETHYLCHLOROSILANE
$C_{21}H_{51}NO_9Si_3$	SIT8716.2	TRIS(TRIETHOXYSILYLMETHYL)AMINE, tech-90
$C_{22}H_{30}O_6Si$	SIH6200.0	2-HYDROXY-4-(3-TRIETHOXYSILYLPROPOXY)DIPHENYLKETONE, tech-90
$C_{22}H_{38}OSi_2$	SIB1026.2	1,3-BIS[(BICYCLO[2.2.1]HEPT-2-ENYL)ETHYL]TETRAMETHYLDISILOXANE
$C_{22}H_{42}O_5Si_4$	SIM6481.48	METHACRYLOXYMETHYLPHENETHYLTRIS(TRIMETHYLSILOXY)SILANE, mixed isomers
$C_{22}H_{43}Cl_3OSi$	SIU9049.4	11-UNDECENYLOXYUNDECYLTRICHLOROSILANE
$C_{22}H_{43}Cl_3Si$	SID4617.0	DOCOSENYLTRICHLOROSILANE, 90%,
$C_{22}H_{44}Cl_6OSi_2$	SIB1815.4	BIS(TRICHLOROSILYLUNDECYL) ETHER
$C_{22}H_{45}Cl_3Si$	SID4621.0	DOCOSYLTRICHLOROSILANE, blend
$C_{22}H_{47}ClO_2Si$	SIO6607.0	OCTADECYLDIETHOXYCHLOROSILANE, tech-95
$C_{22}H_{48}O_3Si$	SIH5922.0	HEXADECYLTRIETHOXYSILANE, 95%
$C_{22}H_{49}NSi$	SIO6617.0	n-OCTADECYLDIMETHYL(DIMETHYLAMINO)SILANE
$C_{22}H_{50}ClNO_3Si$	SIT7090.0	TETRADECYLDIMETHYL(3-TRIMETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 50% in methanol
$C_{22}H_{58}O_7Si_6$	SIB1932.5	[2-(9-BUTYLDECAMETHYLPENTASILOXANYL)ETHYL]TRIETHOXYSILANE
$C_{23}H_{33}NOSi$	SID4480.0	2-(S)-[(DIPHENYL)(t-BUTYLDIMETHYLSILOXY)METHYL]PYRROLIDINE
$C_{23}H_{33}N_5O_7Si$	SIN6597.24	4-NITRO-4'(N-ETHYL-N-TRIMETHOXYSILYLCARBAMATO)AMINOAZOBENZENE, tech-95
$C_{23}H_{42}O_6Si_3$	SIB1110.0	1,5-BIS(GLYCIDOXYPROPYL)-3-PHENYL-1,1,3,5,5-PENTAMETHYLTRISILOXANE
$C_{23}H_{48}Cl_2Si$	SID4620.0	DOCOSYLMETHYLDICHLOROSILANE, blend
$C_{23}H_{50}O_2Si$	SIO6627.0	n-OCTADECYLMETHYLDIETHOXYSILANE
$C_{23}H_{52}ClNO_3Si$	SIO6619.5	OCTADECYLDIMETHYL(3-TRIMETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 60% in methanol
$C_{24}H_{20}Cl_2OSi$	SID3374.0	1,3-DICHLOROTETRAPHENYLDISILOXANE
$C_{24}H_{20}F_{34}OSi_2$	SIB1120.0	1,3-BIS(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TETRAMETHYLDISILOXANE
$C_{24}H_{20}O_4Si$	SIT7600.0	TETRAPHENOXYSILANE, tech-95
$C_{24}H_{20}Si$	SIT7755.0	TETRAPHENYLSILANE
$C_{24}H_{26}BrPSi$	SIT8606.7	(3-TRIMETHYLSILYL-2-PROPYNYL)TRIPHENYLPHOSPHONIUM BROMIDE
$C_{24}H_{30}O_7Si$	SIT8186.2	7-TRIETHOXYSILYLPROPOXY-5-HYDROXYFLAVONE, 50% in xylene
$C_{24}H_{38}O_6Si_2$	SIB1816.8	4,4'-BIS(TRIETHOXYSILYL)BIPHENYL
$C_{24}H_{42}Cl_{12}Si_6$	SIH6080.0	1,2,3,4,5,6-HEXAKIS[2-(METHYLDICHLOROSILYL)ETHYL]BENZENE
$C_{24}H_{46}O_9Si_2$	SIB1390.0	1,3-BIS(3-METHACRYLOXY-2-HYDROXYPROPOXYPROPYL)TETRAMETHYLDISILOXANE, tech-95
$C_{24}H_{48}N_4O_4Si$	SIT7290.0	TETRAKIS(METHYLISOBUTYLKETOXIMINO)SILANE, tech-95
$C_{24}H_{52}O_3Si$	SIO6642.0	n-OCTADECYLTRIETHOXYSILANE, 95%
$C_{24}H_{52}Si$	SIT8625.0	TRIOCTYLSILANE
$C_{24}H_{54}O_3Pt_2Si_6$	SIP6830.3	PLATINUM-DIVINYLTETRAMETHYLDISILOXANE COMPLEX

Molecular formula	Catalog #	Name
$C_{24}H_{54}O_3Pt_2Si_6$	SIP6831.2	PLATINUM-DIVINYLTETRAMETHYLDISILOXANE COMPLEX in xylene
$C_{24}H_{54}O_3Pt_2Si_6$	SIP6831.2LC	PLATINUM-DIVINYLTETRAMETHYLDISILOXANE COMPLEX in xylene, LOW COLOR
$C_{24}H_{54}O_9Si_2$	SIB1550.0	BIS(METHOXYTRIETHYLENEOXYPROPYL)TETRAMETHYLDISILOXANE
$C_{24}H_{54}O_9Si_2$	SIB1824.4	2,2-BIS(3-TRIETHOXYSILYLPROPOXYMETHYL)BUTANOL, 50% in ethanol
$C_{24}H_{54}O_{11}Si_2(C_2H_4O)_{5-8}$	SIB1824.2	BIS-[3-(TRIETHOXYSILYLPROPOXY)-2-HYDROXYPROPOXY]POLYETHYLENE OXIDE, 65% in ethanol
$C_{24}H_{55}N_3Si$	SIO6648.0	n-OCTADECYLTRIS(DIMETHYLAMINO)SILANE
$C_{24}H_{58}O_9Si_4$	SIM6493.3	[METHOXYTRI(ETHYLENEOXY)PROPYL]HEXAMETHYLTRISILOXANYLETHYLTRIETHOXYSILANE, tech-95
$C_{25}H_{54}Si$	SIM6577.0	METHYLTRI-n-OCTYLSILANE
$C_{25}H_{58}O_2Si_3$	SIO6622.0	3-OCTADECYLHEPTAMETHYLTRISILOXANE, 95%
$C_{26}H_{26}OSi_2$	SIT7754.0	1,1,3,3-TETRAPHENYLDIMETHYLDISILOXANE
$C_{26}H_{26}Si_2$	SID4238.0	1,2-DIMETHYL-1,1,2,2-TETRAPHENYLDISILANE
$C_{26}H_{27}NSi_2$	SIT7753.0	1,1,3,3-TETRAPHENYL-1,3-DIMETHYLDISILAZANE
$C_{26}H_{53}Cl_3Si$	SIH5917.0	HEXACOSYLTRICHLOROSILANE
$C_{26}H_{55}ClSi$	SIC2266.5	11-(CHLORODIMETHYLSILYL)METHYLTRICOSANE, tech-95
$C_{26}H_{55}ClSi$	SIO6608.0	n-OCTADECYLDIISOBUTYLCHLOROSILANE, 95%
$C_{26}H_{56}N_2O_4Si$	SID4465.0	N,N-DIOCTYL-N'-TRIETHOXYSILYLPROPYLUREA
$C_{26}H_{56}Si$	SIO6611.0	n-OCTADECYLDIISOBUTYLSILANE
$C_{26}H_{58}BrNO_3Si$	SIT8422.0	N-TRIMETHOXYSILYLUNDECYL-N,N,N-TRI-n-BUTYLAMMONIUM BROMIDE, 25% in dimethylformamide
$C_{26}H_{58}ClNO_3Si$	SIO6620.0	OCTADECYLDIMETHYL(3-TRIMETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 60% in methanol
$C_{26}H_{58}O_9Si_6$	SIB1400.0	1,3-BIS(3-METHACRYLOXYPROPYL)TETRAKIS(TRIMETHYLSILOXY)DISILOXANE, tech-95
$C_{27}H_{42}O_4Si_5$	SIT8662.0	3,5,7-TRIPHENYLNONAMETHYLPENTASILOXANE, tech-95
$C_{27}H_{52}ClNO_6Si_2$	SIS6989.0	(STYRYLMETHYL)BIS(TRIETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 40% in ethanol
$C_{27}H_{56}O_8Si$	SIT8186.3	TRIETHOXYSILYLPROPOXY(POLYETHYLENEOXY)DODECANOATE, tech-95
$C_{27}H_{60}ClNO_3Si$	SID3392.0	N,N-DIDECYL-N-METHYL-N-(3-TRIMETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 40-42% in methanol
$C_{27}H_{63}NO_9Si_3$	SIT8716.3	TRIS(TRIETHOXYSILYLPROPYL)AMINE, tech-95
$C_{28}H_{26}OSi_2$	SID4616.0	1,3-DIVINYLTETRAPHENYLDISILOXANE, 95%
$C_{28}H_{28}Si$	SIT7888.0	TETRA-p-TOLYLSILANE
$C_{28}H_{31}NSi_2$	SIB1026.4	1,3-BIS(4-BIPHENYL)-1,1,3,3-TETRAMETHYLDISILAZANE, 95%
$C_{28}H_{32}O_2Si_3$	SIT7757.0	1,1,5,5-TETRAPHENYL-1,3,3,5-TETRAMETHYLTRISILOXANE
$C_{28}H_{38}O_5Si_2$	SIB1000.0	1,3-BIS[(ACRYLOXYMETHYL)PHENETHYL]TETRAMETHYLDISILOXANE, tech-95
$C_{28}H_{57}Cl_3Si$	SIT8162.0	13-(TRICHLOROSILYLMETHYL)HEPTACOSANE, 95%
$C_{28}H_{58}O_3Si$	SID4618.0	DOCOSENYLTRIETHOXYSILANE, 95%
$C_{28}H_{60}O_3Si$	SID4622.0	DOCOSYLTRIETHOXYSILANE, blend
$C_{28}H_{61}NSi$	SIO6610.0	n-OCTADECYLDIISOBUTYL(DIMETHYLAMINO)SILANE, 95%
$C_{30}H_{45}N_3O_6Si$	SIT8192.4	(R)-N-TRIETHOXYSILYLPROPYL-O-QUININEURETHANE, 95%
$C_{30}H_{50}O_6S_{(2-4)}Si_2$	SIB1820.5	BIS[m-(2-TRIETHOXYSILYLETHYL)TOLYL]POLYSULFIDE, tech-90
$C_{30}H_{56}O_9Si$	SIT8715.6	TRIS(GLYCIDOXYPROPYLDIMETHYLSILOXY)PHENYLSILANE, 95%
$C_{30}H_{61}Cl_3Si$	SIT8048.0	TRIACONTYLTRICHLOROSILANE, blend
$C_{30}H_{63}ClSi$	SIC2266.0	13-(CHLORODIMETHYLSILYLMETHYL)HEPTACOSANE, 95%
$C_{31}H_{62}O_3Si_3$	SIP6715.55	3-(m-PENTADECYLPHENOXYPROPYL)HEPTAMETHYLTRISILOXANE, tech-90
$C_{31}H_{64}Cl_2Si$	SIT8046.0	TRIACONTYLMETHYLDICHLOROSILANE, blend
$C_{32}H_{16}Cl_2N_8Si$	SIP6828.0	PHTHALOCYANATODICHLOROSILANE, tech-90
$C_{32}H_{58}O_2Si$	SIT8015.0	O-DL-a-TOCOPHEROLYLTRIMETHYLSILANE, tech-90
$C_{32}H_{67}ClSi$	SIT8045.0	TRIACONTYLDIMETHYLCHLOROSILANE, blend
$C_{32}H_{68}O_4Si$	SIT7283.0	TETRAKIS(2-ETHYLHEXOXY)SILANE
$C_{32}H_{68}O_{12}Si$	SIT7275.0	TETRAKIS(BUTOXYETHOXYETHOXY)SILANE, tech-95
$C_{32}H_{96}N_4O_{16}Si_8 \cdot XH_2O$	SIO6696.9	OCTAKIS(TETRAMETHYLAMMONIUM)-T8-SILSESQUIOXANE, hydrate
$C_{33}H_{34}O_2Si_3$	SIP6719.5	1,1,3,5,5-PENTAPHENYL-1,3,5-TRIMETHYLTRISILOXANE
$C_{34}H_{61}ClO_2Si$	SIT8010.0	O-DL-a-TOCOPHEROLYLPROPYLDIMETHYLCHLOROSILANE, tech-90
$C_{34}H_{74}OSi_2$	SIT7590.0	1,1,3,3-TETRA-n-OCTYLDIMETHYLDISILOXANE
$C_{35}H_{74}O_{14}Si_8$	SIM6486.65	METHACRYLOXYPROPYLHEPTAISOBUTYL-T8-SILSESQUIOXANE
$C_{36}H_{30}OSi_2$	SIH6161.0	HEXAPHENYLDISILOXANE
$C_{36}H_{30}O_3Si_3$	SIH6145.0	HEXAPHENYLCYCLOTRISILOXANE
$C_{36}H_{30}Si_2$	SIH6155.0	HEXAPHENYLDISILANE
$C_{36}H_{80}ClNO_6Si_2$	SIO6606.0	OCTADECYLBIS(TRIETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 50% in ethanol
$C_{37}H_{50}O_3P_2Si_2$	SIB1091.0	BIS(2-DIPHENYLPHOSPHINOETHYL)METHYLSILYLETHYLTRIETHOXYSILANE, mixed isomers
$C_{37}H_{82}O_2Si_3$	SIT8045.4	3-TRIACONTYLHEPTAMETHYLTRISILOXANE, tech-85
$C_{38}H_{70}O_5Si$	SIT8012.0	O-DL-a-TOCOPHEROLYLPROPYLTRIETHOXYSILANE, tech-90
$C_{39}H_{60}O_{12}Si_2$	SIB1824.8	1,7-BIS(4-TRIETHOXYSILYLPROPOXY-3-METHOXYPHENYL)-1,6-HEPTADIENE-3,5-DIONE, tech-90
$C_{39}H_{76}O_4Si_3$	SIT8011.0	O-DL-a-TOCOPHEROLYLPROPYLHEPTAMETHYLTRISILOXANE, tech-90
$C_{42}H_{34}Si_2$	SIB1878.2	*m*-BIS(TRIPHENYLSILYL)BENZENE
$C_{48}H_{40}O_4Si_4$	SIO6705.0	OCTAPHENYLCYCLOTETRASILOXANE, 95%
$C_{48}H_{40}O_4Si_4$	SIO6705.1	OCTAPHENYLCYCLOTETRASILOXANE, 98%
$C_{48}H_{40}O_{12}Si_8$	SIO6705.5	OCTAPHENYL-T8-SILSESQUIOXANE
$C_{48}H_{48}N_8O_{12}Si_8$	SIO6600.0	OCTA(AMINOPHENYL)-T8-SILSESQUIOXANE
$C_{50}H_{104}O_{20}Si_2$ (av)	SIB1824.9	1,3-[BIS(3-TRIETHOXYSILYLPROPYL)POLYETHYLENOXY]-2-METHYLENEPROPANE
$C_{60}H_{68}O_4P_4Si_4$	SIT7281.0	TETRAKIS(2-DIPHENYLPHOSPHINOETHYL)TETRAMETHYLCYCLOTETRASILOXANE, 95%
$C_{80}H_{164}O_4Si$	SIT7291.0	TETRAKIS(2-OCTYLDODECYLOXY)SILANE, tech-95

Molecular formula	Catalog #	Name
Cu_5Si	SIC2435.0	COPPER SILICIDE
F_4Si	SIT7120.0	TETRAFLUOROSILANE
F_4Si	SIT7120.1	TETRAFLUOROSILANE, 99.99+%
F_6K_2Si	SIP6885.0	POTASSIUM HEXAFLUOROSILICATE
$F_6Li_2Si \cdot 2H_2O$	SIL6466.5	LITHIUM HEXAFLUOROSILICATE, dihydrate
$F_6MgSi \cdot 6H_2O$	SIM6470.5	MAGNESIUM HEXAFLUOROSILICATE
F_6Na_2Si	SIS6981.0	SODIUM HEXAFLUOROSILICATE
$FeSi_2$	SIF4910.0	FERROSILICON
HBr_3Si	Ref. Comp. 9	TRIBROMOSILANE
HCl_3Si	SIT8155.0	TRICHLOROSILANE, 99%
HCl_3Si	SIT8155.1	TRICHLOROSILANE, 99.9+%
HCl_3Si	SIT8155.3	TRICHLOROSILANE, 2M (28-29%) in xylene
HCl_9Si_4	SIT8716.1	TRIS(TRICHLOROSILYL)SILANE
HF_3Si	SIT8373.0	TRIFLUOROSILANE, 50-75%
H_2Cl_2Si	SID3368.0	DICHLOROSILANE
H_2Cl_2Si	SID3368.1	DICHLOROSILANE, 99.9+%
H_2Cl_2Si	SID3368.3	DICHLOROSILANE, 25% in heptane
H_2Cl_2Si	SID3368.6	DICHLOROSILANE, 25% in xylene
$H_2F_6Si \cdot H_2O$	SIF4920.0	FLUOROSILICIC ACID, 22-25% in water
H_2I_2Si	SID3520.0	DIIODOSILANE, 95%
H_3ClSi	SIC2414.0	CHLOROSILANE, 95%
H_4Si	SIS6950.1	SILANE, 7.0 - 7.5% in argon
H_4Si	SIS6950.4	SILANE, 7.0 - 7.5% in nitrogen
H_6Si_2	SID4594.0	DISILANE, 99.9+%
$H_8F_6N_2Si$	SIA0705.0	AMMONIUM HEXAFLUOROSILICATE
H_8Si_3	SIT8709.6	TRISILANE
H_9NSi_3	SIT8715.8	TRISILYLAMINE
$H_{10}Si_4$	SII6463.4	ISOTETRASILANE
$H_{10}Si_4$	SIT7880.0	n-TETRASILANE
$H_{12}Si_5$	SIN6597.07	NEOPENTASILANE
I_4Si	SIT7123.0	TETRAIODOSILANE
Li_2O_3Si	SIL6469.0	LITHIUM METASILICATE
$Li_2O_{11}Si_5$	SIL6469.5	LITHIUM POLYSILICATE, 20% in water
Li_4O_4Si	SIL6469.2	LITHIUM ORTHOSILICATE, tech-95
$Li_{6-7}Si_2$	SIL6469.6	LITHIUM SILICIDE
Mg_2Si	SIM6472.0	MAGNESIUM SILICIDE, powder
$MoSi_2$	SIM6594.8	MOLYBDENUM DISILICIDE, 99+%
N_4Si_3	SIS6972.0	SILICON NITRIDE, powder
Na_4O_4Si	SIS6986.0	SODIUM ORTHOSILICATE, tech-90
$NbSi_2$	SIN6597.2	NIOBIUM DISILICIDE, 99+%
OSi	SIS6970.0	SILICON MONOXIDE
O_2Si	SID2754.2	DIATOMACEOUS EARTH, calcined
O_2Si	SIS6960.0	SILICON DIOXIDE, amorphous
O_2Si	SIS6961.0	SILICON DIOXIDE, amorphous, OCTAMETHYLCYCLOTETRASILOXANE TREATED
O_2Si	SIS6962.0	SILICON DIOXIDE, amorphous, HEXAMETHYLDISILAZANE TREATED
O_2Si	SIS6962.1M30	SILICON DIOXIDE, amorphous, HEXAMETHYLDISILAZANE TREATED
O_2Si	SIS6962.1N30	SILICON DIOXIDE, amorphous, CYCLIC AZASILANE/HEXAMETHYLDISILAZANE TREATED
O_2Si	SIS6963.0	SILICON DIOXIDE, amorphous GEL, 30% in isopropanol
O_2Si	SIS6963.2	SILICON DIOXIDE, amorphous GEL, 15% in water
O_2Si	SIS6963.4	SILICON DIOXIDE, amorphous GEL, 40% in water
O_2Si	SIS6964.0	SILICON DIOXIDE, crystalline
O_2Si	SIS6964.4	SILICON DIOXIDE, fused
O_2Si	SIS6966.0	SILICON DIOXIDE, precipitated
O_2Si	W-SIO-76-03	SILICON DIOXIDE WAFER
$O_2Si \cdot H_2O$	SID2754.4	DIATOMACEOUS EARTH, uncalcined
O_3PbSi	PBL6300	LEAD MONOSILICATE
O_4SiZr	SIZ9850.0	ZIRCONIUM SILICATE
S_2Si	SIS6967.0	SILICON DISULFIDE, 95%
Si	SIS6955.0	SILICON, 99% powder
Si	W-SI-76-0.4	SILICON WAFER
Si	W-SIN-76-0.4	SILICON WAFER
Si	W-SIP-76-0.4	SILICON WAFER
$SiTa_2$	SIT6996.0	TANTALUM SILICIDE, 99.9+%
Si_2Ti	SIT8005.0	TITANIUM SILICIDE, 95%, powder
Si_2W	SIT8787.0	TUNGSTEN SILICIDE
Si_2Zr	SIZ9860.0	ZIRCONIUM SILICIDE, powder, 99%

CAS Number	Catalog #	Name
56-33-7	SID4588.0	1,3-DIPHENYLTETRAMETHYLDISILOXANE
75-54-7	SIM6504.0	METHYLDICHLOROSILANE
75-76-3	SIT7555.0	TETRAMETHYLSILANE, 99+%
75-76-3	SIT7555.1	TETRAMETHYLSILANE, 99.9+%
75-77-4	SIT8510.0	TRIMETHYLCHLOROSILANE
75-77-4	SIT8510.1	TRIMETHYLCHLOROSILANE, 99+%
75-78-5	SID4120.0	DIMETHYLDICHLOROSILANE, 98%
75-78-5	SID4120.1	DIMETHYLDICHLOROSILANE, 99+%
75-79-6	SIM6520.0	METHYLTRICHLOROSILANE, 98%
75-79-6	SIM6520.1	METHYLTRICHLOROSILANE, 99%
75-94-5	SIV9110.0	VINYLTRICHLOROSILANE
76-86-8	SIT8645.0	TRIPHENYLCHLOROSILANE, 95%
78-07-9	SIE4901.2	ETHYLTRIETHOXYSILANE
78-08-0	SIV9112.0	VINYLTRIETHOXYSILANE
78-10-4	SIT7110.0	TETRAETHOXYSILANE, 98%
78-10-4	SIT7110.2	TETRAETHOXYSILANE, 99.9+%
78-62-6	SID4121.0	DIMETHYLDIETHOXYSILANE, 98%
80-10-4	SID4510.0	DIPHENYLDICHLOROSILANE, 95%
80-10-4	SID4510.1	DIPHENYLDICHLOROSILANE, 99%
80-43-3	SID3379.0	DICUMYL PEROXIDE, 25%; in polydimethylsiloxane 40%, with 35% calcium carbonate
98-12-4	SIC2480.0	CYCLOHEXYLTRICHLOROSILANE
98-13-5	SIP6810.0	PHENYLTRICHLOROSILANE
107-37-9	SIA0520.0	ALLYLTRICHLOROSILANE
107-46-0	SIH6115.0	HEXAMETHYLDISILOXANE, 98%
107-46-0	SIH6115.1	HEXAMETHYLDISILOXANE, 99.9%
107-51-7	SIO6703.0	OCTAMETHYLTRISILOXANE
107-52-8	SIT7089.0	TETRADECAMETHYLHEXASILOXANE
107-72-2	SIP6720.0	PENTYLTRICHLOROSILANE
112-04-9	SIO6640.0	n-OCTADECYLTRICHLOROSILANE, 95%
112-04-9	SIO6640.1	n-OCTADECYLTRICHLOROSILANE
115-21-9	SIE4901.0	ETHYLTRICHLOROSILANE
115-82-2	SIT7283.0	TETRAKIS(2-ETHYLHEXOXY)SILANE
124-70-9	SIV9084.0	VINYLMETHYLDICHLOROSILANE
126-80-7	SIB1115.0	1,3-BIS(GLYCIDOXYPROPYL)TETRAMETHYLDISILOXANE
133-14-2	SID3352.0	2,4-DICHLOROBENZOYL PEROXIDE, 50% in polydimethylsiloxane
141-57-1	SIP6915.0	n-PROPYLTRICHLOROSILANE
141-62-8	SID2655.0	DECAMETHYLTETRASILOXANE
141-63-9	SID4626.0	DODECAMETHYLPENTASILOXANE
144-79-6	SID4552.0	DIPHENYLMETHYLCHLOROSILANE
149-74-6	SIP6738.0	PHENYLMETHYLDICHLOROSILANE
287-55-8	Ref. Comp. 3	1,-3-DISILACYCLOBUTANE
291-27-0	SIT8709.3	1,3,5-TRISILACYCLOHEXANE
312-40-3	SID4530.0	DIPHENYLDIFLUOROSILANE
353-66-2	SID4122.0	DIMETHYLDIFLUOROSILANE
358-60-1	SIT8180.0	TRIETHOXYFLUOROSILANE, 95%
358-67-8	SIT8370.0	(3,3,3-TRIFLUOROPROPYL)METHYLDIMETHOXYSILANE
368-47-8	SIP6821.5	PHENYLTRIFLUOROSILANE, 95%
373-74-0	SIM6558.0	METHYLTRIFLUOROSILANE
379-50-0	SIT8655.0	TRIPHENYLFLUOROSILANE
400-53-3	SIT8618.0	TRIMETHYLSILYLTRIFLUOROACETATE
409-21-2	SIS6959.0	SILICON CARBIDE, powder
420-56-4	SIT8525.0	TRIMETHYLFLUOROSILANE
429-60-7	SIT8372.0	(3,3,3-TRIFLUOROPROPYL)TRIMETHOXYSILANE, 98%
429-67-4	SIT8365.5	(3,3,3-TRIFLUOROPROPYL)METHYLCYCLOTETRASILOXANE
455-17-4	SIF4930.0	4-FLUOROPHENYLTRIMETHYLSILANE
512-63-0	SIH6145.0	HEXAPHENYLCYCLOTRISILOXANE
540-97-6	SID4625.0	DODECAMETHYLCYCLOHEXASILOXANE
541-02-6	SID2650.0	DECAMETHYLCYCLOPENTASILOXANE
541-05-9	SIH6105.0	HEXAMETHYLCYCLOTRISILOXANE, 95%
541-05-9	SIH6105.1	HEXAMETHYLCYCLOTRISILOXANE, 98%
542-91-6	SID3415.0	DIETHYLSILANE
546-44-1	SIP6736.2	3-PHENYLHEPTAMETHYLTRISILOXANE, 95%
546-45-2	SIP6737.5	PHENYLMETHYLCYCLOSILOXANES, 95%
546-45-2	SIT8705.0	1,3,5-TRIPHENYLTRIMETHYLCYCLOTRISILOXANE, 90%
546-56-5	SIO6705.0	OCTAPHENYLCYCLOTETRASILOXANE, 95%
546-56-5	SIO6705.1	OCTAPHENYLCYCLOTETRASILOXANE, 98%
556-67-2	SIO6700.0	OCTAMETHYLCYCLOTETRASILOXANE, 98%
558-63-4	SID3207.0	DI-t-BUTYLDIFLUOROSILANE
562-90-3	SIT6998.0	TETRAACETOXYSILANE, 95%
592-09-6	SIT8371.0	(3,3,3-TRIFLUOROPROPYL)TRICHLOROSILANE
597-52-4	SIT8332.0	TRIETHYLSILANOL
597-67-1	SIT8285.0	TRIETHYLETHOXYSILANE
617-86-7	SIT8330.0	TRIETHYLSILANE, 98%
631-36-7	SIT7115.0	TETRAETHYLSILANE
675-62-7	SIT8369.0	(3,3,3-TRIFLUOROPROPYL)METHYLDICHLOROSILANE
681-84-5	SIT7510.0	TETRAMETHOXYSILANE, 98%
681-84-5	SIT7510.2	TETRAMETHOXYSILANE, 99+%
682-01-9	SIT7777.0	TETRA-n-PROPOXYSILANE
690-56-2	SIB1828.5	1,3-BIS(TRIFLUOROPROPYL)TETRAMETHYLDISILOXANE
694-53-1	SIP6750.0	PHENYLSILANE
701-35-9	SIT8040.0	p-TOLYLTRICHLOROSILANE
754-05-2	SIV9250.0	VINYLTRIMETHYLSILANE
757-44-8	SID3412.0	(2-DIETHYLPHOSPHATOETHYL)TRIETHOXYSILANE, tech-95
758-21-4	SIE4894.0	ETHYLDIMETHYLSILANE
760-32-7	SID3410.0	DIETHYLMETHYLSILANE
762-72-1	SIA0555.0	ALLYLTRIMETHYLSILANE
763-13-3	SIB1930.0	3-BUTENYLTRIMETHYLSILANE
766-08-5	SIP6742.0	PHENYLMETHYLSILANE
766-77-8	SIP6729.0	PHENYLDIMETHYLSILANE
768-32-1	SIP6823.0	PHENYLTRIMETHYLSILANE
768-33-2	SIP6728.0	PHENYLDIMETHYLCHLOROSILANE
770-09-2	SIB0973.0	BENZYLTRIMETHYLSILANE
770-10-5	SIB0970.0	BENZYLTRICHLOROSILANE
772-65-6	SIP6721.5	PHENETHYLMETHYLDICHLOROSILANE
775-12-2	SID4559.0	DIPHENYLSILANE
775-56-4	SIP6739.0	PHENYLMETHYLDIETHOXYSILANE
776-76-1	SID4555.0	DIPHENYLMETHYLSILANE
780-69-8	SIP6821.0	PHENYLTRIETHOXYSILANE
789-25-3	SIT8665.0	TRIPHENYLSILANE
791-29-7	SIT8689.0	TRIPHENYLMETHYLSILANE
791-31-1	SIT8695.0	TRIPHENYLSILANOL
807-28-3	SIT7754.0	1,1,3,3-TETRAPHENYLDIMETHYLDISILOXANE
814-98-2	SIT7541.0	1,1,2,2-TETRAMETHYLDISILANE
825-94-5	SIC2330.0	CHLOROPHENYLTRICHLOROSILANE, 95%
865-46-3	SID4145.0	DIMETHYLFLUOROSILANE
871-41-0	SIH5846.0	n-HEPTYLTRICHLOROSILANE
871-64-7	SIH6165.0	HEXYLDICHLOROSILANE
871-92-1	SIO6712.5	n-OCTYLSILANE
872-19-5	SID4629.6	DODECYLSILANE
919-30-2	SIA0610.0	3-AMINOPROPYLTRIETHOXYSILANE
919-30-2	SIA0610.1	3-AMINOPROPYLTRIETHOXYSILANE 99+%
919-31-3	SIC2445.0	2-CYANOETHYLTRIETHOXYSILANE
920-68-3	SIH5843.0	HEPTAMETHYLDISILAZANE
928-65-4	SIH6167.0	HEXYLTRICHLOROSILANE
931-70-4	SIT8038.0	p-TOLYLSILANE
940-41-0	SIP6722.0	PHENETHYLTRICHLOROSILANE
947-42-2	SID4560.0	DIPHENYLSILANEDIOL
992-94-9	SIM6515.0	METHYLSILANE
992-94-9	SIM6515.1	METHYLSILANE, 99.9+%
993-00-0	Ref. Comp. 7	METHYLCHLOROSILANE
993-07-7	SIT8570.0	TRIMETHYLSILANE
994-30-9	SIT8250.0	TRIETHYLCHLOROSILANE
994-49-0	SIH6070.0	HEXAETHYLDISILOXANE
994-79-6	SIT7082.0	TETRA-n-BUTYLSILANE
995-25-5	SIT8707.0	TRI-n-PROPYLCHLOROSILANE
995-45-9	SIT8091.0	TRI-n-BUTYLCHLOROSILANE
995-83-5	SID2653.0	1,1,3,3,5,5,7,7,9,9-DECAMETHYLPENTASILOXANE, 95%
996-50-9	SID3398.0	(DIETHYLAMINO)TRIMETHYLSILANE
998-29-8	SIT8709.0	TRI-n-PROPYLSILANE
998-30-1	SIT8185.0	TRIETHOXYSILANE
998-41-4	SIT8091.6	TRI-n-BUTYLSILANE
999-97-3	SIH6110.0	1,1,1,3,3,3-HEXAMETHYLDISILAZANE
999-97-3	SIH6110.1	1,1,1,3,3,3-HEXAMETHYLDISILAZANE, 99%
1000-05-1	SIO6702.0	1,1,3,3,5,5,7,7-OCTAMETHYLTETRASILOXANE, 80% in octamethylcyclotetrasiloxane
1000-50-6	SIB1934.0	n-BUTYLDIMETHYLCHLOROSILANE
1000-70-0	SIB1856.0	BIS(TRIMETHYLSILYL)CARBODIIMIDE
1001-52-1	SIB1937.5	n-BUTYLDIMETHYLSILANE
1009-93-4	SIH6102.0	1,1,3,3,5,5-HEXAMETHYLCYCLOTRISILAZANE
1012-12-0	SIT8570.8	4-TRIMETHYLSILOXYBENZALDEHYDE
1020-84-4	SIO6698.0	1,1,3,3,5,5,7,7-OCTAMETHYLCYCLOTETRASILAZANE
1027-62-9	SIB1074.0	BIS(DIMETHYLAMINO)DIPHENYLSILANE
1048-08-4	SIT7755.0	TETRAPHENYLSILANE
1066-35-9	SID4070.0	DIMETHYLCHLOROSILANE, 98%
1066-40-6	SIT8570.3	TRIMETHYLSILANOL, tech-95
1066-42-8	Ref. Comp. 5	DIMETHYLSILANEDIOL
1066-54-2	SIE4904.0	ETHYNYLTRIMETHYLSILANE, 98%

CAS Number	Catalog #	Name
1067-25-0	SIP6918.0	n-PROPYLTRIMETHOXYSILANE
1067-43-2	SIT7010.0	TETRAALLYLOXYSILANE
1067-47-6	SIC2455.0	3-CYANOPROPYLTRIETHOXYSILANE
1067-53-4	SIV9275.0	VINYLTRIS(2-METHOXYETHOXY)SILANE
1067-57-8	SIB1988.0	n-BUTYLTRIMETHOXYSILANE
1068-69-5	SIT8722.0	TRIS(TRIMETHYLSILYL)METHANE
1070-89-9	SIS6980.0	SODIUM BIS(TRIMETHYLSILYL)AMIDE, 95%
1070-89-9	SIS6980.2	SODIUM BIS(TRIMETHYLSILYL)AMIDE, 2M in tetrahydrofuran
1071-17-6	SIB1057.0	BIS(CYANOPROPYL)DICHLOROSILANE
1071-21-2	SIC2440.0	2-CYANOETHYLMETHYLDICHLOROSILANE
1071-22-3	SIC2442.0	2-CYANOETHYLTRICHLOROSILANE
1071-27-8	SIC2454.0	3-CYANOPROPYLTRICHLOROSILANE
1072-14-6	SIH6166.2	HEXYLSILANE
1072-54-4	SIC2566.0	CYCLOTETRAMETHYLENEDIMETHYLSILANE
1078-31-5	SIT8570.7	2-TRIMETHYLSILOXYBENZALDEHYDE
1078-96-2	SIC2453.7	3-CYANOPROPYLPHENYLDICHLOROSILANE
1111-74-6	SID4230.0	DIMETHYLSILANE
1112-39-6	SID4123.0	DIMETHYLDIMETHOXYSILANE, 96%
1112-39-6	SID4123.1	DIMETHYLDIMETHOXYSILANE, 99+%
1112-48-7	SIT8210.0	TRIETHYLBROMOSILANE
1112-49-8	SIT8290.0	TRIETHYLIODOSILANE
1112-54-5	SIV9116.0	VINYLTRIETHYLSILANE
1112-55-6	SIT7897.0	TETRAVINYLSILANE
1112-66-9	SIT7020.0	TETRAALLYLSILANE
1112-91-0	SIT8060.0	TRIALLYLMETHYLSILANE
1113-12-8	SID2745.0	DIALLYLDIMETHYLSILANE, 95%
1118-02-1	SIT8591.0	TRIMETHYLSILYLISOCYANATE, 85%
1125-26-4	SIV9093.0	VINYLPHENYLDIMETHYLSILANE
1125-27-5	SIP6730.0	PHENYLETHYLDICHLOROSILANE
1145-98-8	SID4584.0	1,2-DIPHENYLTETRAMETHYLDISILANE
1172-76-5	SID4238.0	1,2-DIMETHYL-1,1,2,2-TETRAPHENYLDISILANE
1174-72-7	SIT7600.0	TETRAPHENOXYSILANE, tech-95
1185-55-3	SIM6560.0	METHYLTRIMETHOXYSILANE
1185-55-3	SIM6560.1	METHYLTRIMETHOXYSILANE, 99%
1189-93-1	SIH6117.0	1,1,3,3,5,5-HEXAMETHYLTRISILOXANE
1190-16-5	SIC2453.0	3-CYANOPROPYLMETHYLDICHLOROSILANE
1206-46-8	SIP6716.8	PENTAFLUOROPHENYLTRIMETHYLSILANE
1223-16-1	SIB1022.0	BIS(p-AMINOPHENOXY)DIMETHYLSILANE
1295-15-4	SIB1088.0	1,1'-BIS(DIMETHYLSILYL)FERROCENE
1302-52-9	SIB0980.0	BERYL
1302-62-1	SIG5100.0	GARNET
1302-76-7	SIK6463.8	KYANITE
1302-93-8	SIM6594.85	MULLITE
1318-93-0	SIS6985.0	SODIUM MONTMORILLONITE CLAY
1319-41-1	SIM6470.7	MAGNESIUM MONTMORILLONATE
1332-58-7	SIK6463.5	KAOLIN, calcined
1332-58-7	SIK6463.6	KAOLIN, uncalcined
1332-58-7	SIS6975.0	SILLIMANITE
1386-66-3	SID3395.3	DIETHYLAMINODIMETHYLSILANE, 95%
1438-79-5	SIV9090.0	VINYLPENTAMETHYLDISILOXANE
1438-82-0	SIP6719.0	PENTAMETHYLDISILOXANE
1450-14-2	SIH6109.0	HEXAMETHYLDISILANE
1450-23-3	SIH6155.0	HEXAPHENYLDISILANE
1450-29-9	SID4611.6	1,2-DIVINYLTETRAMETHYLDISILANE, 95%
1473-61-6	SIB1857.9	1,2-BIS(TRIMETHYLSILYL)ETHYLENE, 90%
1481-41-0	SIT8364.0	(3,3,3-TRIFLUOROPROPYL)DIMETHYLCHLOROSILANE
1516-80-9	SIT8652.0	TRIPHENYLETHOXYSILANE, tech-95
1529-17-5	SIP6723.5	PHENOXYTRIMETHYLSILANE
1529-65-3	SIT8735.0	1,3,5-TRIVINYL-1,1,3,5,5-PENTAMETHYLTRISILOXANE, 95%
1558-25-4	SIC2298.0	CHLOROMETHYLTRICHLOROSILANE
1558-31-2	SID3362.0	(DICHLOROMETHYL)METHYLDICHLOROSILANE, tech-95
1558-33-4	SIC2290.0	CHLOROMETHYLMETHYLDICHLOROSILANE
1560-28-7	SIP6717.5	PENTAMETHYLCHLORODISILANE
1586-73-8	SIN6597.9	NONAMETHYLTRISILAZANE
1590-87-0	SID4594.0	DISILANE, 99.9+%
1591-02-2	SID4080.0	DIMETHYLDI-n-BUTOXYSILANE
1600-29-9	SIB1974.5	n-BUTYLSILANE
1624-01-7	SIT7276.0	TETRAKIS(DIMETHYLAMINO)SILANE
1627-98-1	SIT7538.0	1,1,3,3-TETRAMETHYL-1,3-DISILACYCLOBUTANE
1628-11-1	SIC2279.0	3-CHLOROISOBUTYLMETHYLDICHLOROSILANE
1631-70-5	SIB0964.0	BENZYLDIMETHYLSILANE
1631-82-9	SIP6737.0	PHENYLMETHYLCHLOROSILANE
1631-83-0	SID4495.0	DIPHENYLCHLOROSILANE, tech-95
1631-84-1	SIP6725.0	PHENYLDICHLOROSILANE
1719-53-5	SID3402.0	DIETHYLDICHLOROSILANE
1719-57-9	SIC2285.0	CHLOROMETHYLDIMETHYLCHLOROSILANE
1719-58-0	SIV9070.0	VINYLDIMETHYLCHLOROSILANE
1745-72-8	SID4600.0	DIVINYLDICHLOROSILANE, 90%
1747-56-4	SIT8617.0	1,3,5-TRIMETHYL-1,3,5-TRIETHOXY-1,3,5-TRISILACYCLOHEXANE
1759-88-2	SID4595.0	1,3-DISILAPROPANE
1760-24-3	SIA0591.0	N-(2-AMINOETHYL)-3-AMINOPROPYLTRIMETHOXYSILANE, tech-95
1760-24-3	SIA0591.1	N-(2-AMINOETHYL)-3-AMINOPROPYLTRIMETHOXYSILANE, 98%
1777-03-3	SIE4902.0	ETHYNYLTRIETHYLSILANE
1789-58-8	SIE4890.0	ETHYLDICHLOROSILANE
1795-31-9	SIT8723.6	TRIS(TRIMETHYLSILYL)PHOSPHITE, 95%
1822-00-0	SIT8593.5	TRIMETHYLSILYLMETHYLLITHIUM, 1M in hexane
1825-58-7	SIP6728.4	PHENYLDIMETHYLETHOXYSILANE
1825-59-8	SID4553.0	DIPHENYLMETHYLETHOXYSILANE
1825-61-2	SIT8566.0	TRIMETHYLMETHOXYSILANE
1825-62-3	SIT8515.0	TRIMETHYLETHOXYSILANE
1825-63-4	SIT8568.0	TRIMETHYL-n-PROPOXYSILANE
1825-68-9	SID4210.0	DIMETHYLMETHOXYCHLOROSILANE, 90%
1829-40-9	SIH6161.0	HEXAPHENYLDISILOXANE, 95%
1833-31-4	SIB0962.0	BENZYLDIMETHYLCHLOROSILANE
1833-51-8	SIC2287.0	(CHLOROMETHYL)DIMETHYLPHENYLSILANE
1833-53-0	SII6460.0	ISOPROPENOXYTRIMETHYLSILANE, 95%
1871-21-2	SIT8729.0	TRIVINYLCHLOROSILANE, 95%
1873-77-4	SIT8724.0	TRIS(TRIMETHYLSILYL)SILANE
1873-88-7	SIB1844.0	BIS(TRIMETHYLSILOXY)METHYLSILANE
1873-89-8	SIT8721.0	TRIS(TRIMETHYLSILOXY)SILANE
1873-92-3	SIA0470.0	ALLYLMETHYLDICHLOROSILANE, 95%
1992-48-9	SIT7271.0	TETRAISOPROPOXYSILANE
2004-14-0	SIL6469.7	LITHIUM TRIMETHYLSILANOLATE
2031-62-1	SIM6506.0	METHYLDIETHOXYSILANE
2031-67-6	SIM6555.0	METHYLTRIETHOXYSILANE
2031-79-0	SID3399.0	DIETHYLCYCLOSILOXANES
2039-96-5	SIT8599.0	TRIMETHYLSILYLPROPANESULFONIC ACID SODIUM SALT, monohydrate
2078-18-4	SIP6723.6	PHENYLACETOXYTRIMETHYLSILANE
2083-91-2	SID3605.0	(N,N-DIMETHYLAMINO)TRIMETHYLSILANE
2097-18-9	SIV9097.0	VINYLSILATRANE
2116-84-9	SIP6827.0	PHENYLTRIS(TRIMETHYLSILOXY)SILANE
2117-28-4	SIB1863.0	BIS(TRIMETHYLSILYL)METHANE
2157-45-1	SIT7286.0	TETRAKIS(METHOXYETHOXY)SILANE, tech-95
2170-06-1	SIP6736.0	PHENYLETHYNYLTRIMETHYLSILANE
2170-08-3	SIB1760.0	BIS(PHENYLETHYNYL)DIMETHYLSILANE
2182-66-3	SID4076.0	DIMETHYLDIACETOXYSILANE
2212-08-0	SIC2293.0	CHLOROMETHYLMETHYLDIISOPROPOXYSILANE
2212-10-4	SIC2292.0	CHLOROMETHYLMETHYLDIETHOXYSILANE
2212-11-5	SIC2293.2	CHLOROMETHYLMETHYLDIMETHOXYSILANE
2224-33-1	SIV9280.0	VINYLTRIS(METHYLETHYLKETOXIMINO)SILANE, tech-95
2227-29-4	SID3535.0	DIISOPROPYLCHLOROSILANE
2288-13-3	SIM6518.0	METHYLSILATRANE
2290-62-2	GET8595.5	TRIMETHYLSILYLMETHYLTRIMETHYLGERMANE
2290-65-5	SIT8592.0	TRIMETHYLSILYLISOTHIOCYANATE
2295-06-9	SIB1048.2	1,3-BIS(CHLORODIMETHYLSILYL)PROPANE
2295-12-7	SIC2570.0	CYCLOTRIMETHYLENEDIMETHYLSILANE
2295-17-2	SID3418.0	1,3-DIETHYLTETRAMETHYLDISILOXANE
2344-80-1	SIC2305.0	CHLOROMETHYLTRIMETHYLSILANE, 98%
2344-83-4	SIC2411.0	3-CHLOROPROPYLTRIMETHYLSILANE
2345-38-2	SIT8577.0	2-(TRIMETHYLSILYL)ACETIC ACID
2351-33-9	SIC2568.0	CYCLOTRIMETHYLENEDICHLOROSILANE
2351-34-0	SIC2572.0	CYCLOTRIMETHYLENEMETHYLCHLOROSILANE
2362-10-9	SIB1055.0	1,3-BIS(CHLOROMETHYL)TETRAMETHYLDISILOXANE
2370-88-9	SIT7530.0	1,3,5,7-TETRAMETHYLCYCLOTETRASILOXANE
2370-88-9	SIT7530.1	1,3,5,7-TETRAMETHYLCYCLOTETRASILOXANE, 99+%
2372-31-8	SIT8735.5	TRIVINYLSILANE, tech-95
2374-14-3	SIT8366.0	(3,3,3-TRIFLUOROPROPYL)METHYLCYCLOTRISILOXANE
2377-86-8	SIT7295.0	TETRAKIS(TRIFLUOROACETOXY)SILANE, tech-95
2401-73-2	SID3372.0	1,3-DICHLOROTETRAMETHYLDISILOXANE
2406-33-9	SIC2564.0	CYCLOTETRAMETHYLENEDICHLOROSILANE
2406-34-0	SIC2524.0	CYCLOPENTAMETHYLENEDICHLOROSILANE
2441-29-4	SIC2432.0	1-CHLOROVINYLTRIMETHYLSILANE
2469-55-8	SIB1024.0	1,3-BIS(3-AMINOPROPYL)TETRAMETHYLDISILOXANE
2474-02-4	SID3367.0	1,7-DICHLOROOCTAMETHYLTETRASILOXANE, 95%
2487-90-3	SIT8392.0	TRIMETHOXYSILANE, 95%
2488-01-9	SIB1086.0	1,4-BIS(DIMETHYLSILYL)BENZENE

CAS Number	Catalog #	Name
2504-64-5	SIB1810.0	1,2-BIS(TRICHLOROSILYL)ETHANE, 95%
2526-61-6	SIC2441.0	2-CYANOETHYLMETHYLDIMETHOXYSILANE
2526-62-7	SIC2446.0	2-CYANOETHYLTRIMETHOXYSILANE
2530-83-8	SIG5840.0	(3- GLYCIDOXYPROPYL)TRIMETHOXYSILANE
2530-83-8	SIG5840.1	(3- GLYCIDOXYPROPYL)TRIMETHOXYSILANE, 99+%
2530-85-0	SIM6487.4	METHACRYLOXYPROPYLTRIMETHOXYSILANE
2530-85-0	SIM6487.4LI	METHACRYLOXYPROPYLTRIMETHOXYSILANE, low inhibitor grade
2530-86-1	SID3547.0	(N,N-DIMETHYL-3-AMINOPROPYL)TRIMETHOXYSILANE
2530-87-2	SIC2410.0	3-CHLOROPROPYLTRIMETHOXYSILANE
2549-99-7	SIB0971.0	BENZYLTRIETHOXYSILANE
2550-02-9	SIP6917.0	n-PROPYLTRIETHOXYSILANE
2550-04-1	SIA0525.0	ALLYLTRIETHOXYSILANE
2550-06-3	SIC2405.0	3-CHLOROPROPYLTRICHLOROSILANE
2551-83-9	SIA0540.0	ALLYLTRIMETHOXYSILANE
2553-19-7	SID4525.0	DIPHENYLDIETHOXYSILANE
2554-06-5	SIT7900.0	1,3,5,7-TETRAVINYL-1,3,5,7-TETRAMETHYLCYCLOTETRASILOXANE
2587-46-4	SIH6103.0	1,2,3,4,5,6 HEXAMETHYLCYCLOTRISILAZANE, tech-95
2587-47-5	SIO6699.0	1,2,3,4,5,6,7,8-OCTAMETHYLCYCLOTETRASILAZANE, 95%
2602-34-8	SIG5839.0	(3-GLYCIDOXYPROPYL)TRIETHOXYSILANE
2615-18-1	SIB1816.6	1,4-BIS(TRIETHOXYSILYL)BENZENE
2627-95-4	SID4613.0	1,3-DIVINYLTETRAMETHYLDISILOXANE
2627-97-6	SID4608.0	1,3-DIVINYL-1,3-DIPHENYL-1,3-DIMETHYLDISILOXANE
2632-97-5	SIC2342.0	3-CHLOROPROPYLDIPHENYLMETHYLSILANE, 95%
2652-38-2	SIO6712.2	n-OCTYLMETHYLDIETHOXYSILANE
2652-41-7	SIT8339.0	1,1,1-TRIETHYL-3,3,3-TRIMETHYLDISILOXANE
2733-26-8	SIT8015.0	O-DL-a-TOCOPHEROLYLTRIMETHYLSILANE, tech-90
2750-44-9	SIB1837.0	BIS(TRIMETHYLSILOXY)DICHLOROSILANE
2750-45-0	SIT8572.6	TRIMETHYLSILOXYTRICHLOROSILANE
2754-27-0	SIA0110.0	ACETOXYTRIMETHYLSILANE
2754-32-7	SIB1135.0	1,4-BIS(HYDROXYDIMETHYLSILYL)BENZENE, tech-95
2761-24-2	SIP6720.2	PENTYLTRIETHOXYSILANE
2768-02-7	SIV9220.0	VINYLTRIMETHOXYSILANE
2814-79-1	SIE4898.0	ETHYLSILANE
2857-97-8	SIT8430.0	TRIMETHYLBROMOSILANE
2895-07-0	SIH5844.0	1,1,1,3,3,5,5-HEPTAMETHYLTRISILOXANE, 90%
2897-60-1	SIG5832.0	(3-GLYCIDOXYPROPYL)METHYLDIETHOXYSILANE
2916-68-9	SIT8589.2	2-(TRIMETHYLSILYL)ETHANOL
2916-76-9	SIM6571.5	METHYLTRIMETHYLSILYLACETATE
2917-46-6	SIB1051.0	BIS(CHLOROMETHYL)DIMETHYLSILANE
2917-47-7	SIT8602.0	3-(TRIMETHYLSILYL)-1-PROPANOL
2917-65-9	SIA0060.0	ACETOXYMETHYLTRIMETHYLSILANE
2929-52-4	SIT8376.0	TRI-n-HEXYLSILANE
2943-73-9	SID2665.0	n-DECYLTRIETHOXYSILANE
2943-75-1	SIO6715.0	n-OCTYLTRIETHOXYSILANE
2944-70-9	SIV9083.0	VINYLMETHYLDIACETOXYSILANE
2975-46-4	SIT8606.3	3-TRIMETHYLSILYLPROPYNAL
2996-92-1	SIP6822.0	PHENYLTRIMETHOXYSILANE
2996-92-1	SIP6822.1	PHENYLTRIMETHOXYSILANE, 99+%
3027-21-2	SIP6740.0	PHENYLMETHYLDIMETHOXYSILANE
3068-76-6	SIP6724.0	N-PHENYLAMINOPROPYLTRIMETHOXYSILANE
3068-78-8	SIC2464.4	N-CYCLOHEXYLAMINOPROPYLTRIMETHOXYSILANE
3069-19-0	SIH6168.5	HEXYLTRIMETHOXYSILANE
3069-21-4	SID4635.0	DODECYLTRIMETHOXYSILANE
3069-25-8	SIM6500.0	N-METHYLAMINOPROPYLTRIMETHOXYSILANE
3069-29-2	SIA0589.0	N-(2-AMINOETHYL)-3-AMINOPROPYLMETHYLDIMETHOXYSILANE, tech-95
3069-30-5	SIA0587.0	4-AMINOBUTYLTRIETHOXYSILANE, 95%
3069-40-7	SIO6715.5	n-OCTYLTRIMETHOXYSILANE
3069-42-9	SIO6645.0	n-OCTADECYLTRIMETHOXYSILANE, 95%
3102-79-2	SIH5840.6	(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)METHYLDICHLOROSILANE
3144-74-9	SIC2289.0	CHLOROMETHYLDIMETHYLSILANE
3179-76-8	SIA0605.0	3-AMINOPROPYLMETHYLDIETHOXYSILANE, 95%
3219-63-4	SIH6177.0	HYDROXYMETHYLTRIMETHYLSILANE
3277-26-7	SIT7546.0	1,1,3,3-TETRAMETHYLDISILOXANE, 98%
3353-68-2	SIB1027.0	1,3-BIS(3-CARBOXYPROPYL)TETRAMETHYLDISILOXANE
3353-69-3	SIB1614.0	1,2-BIS(METHYLDICHLOROSILYL)ETHANE
3371-62-8	SIB1834.5	BIS(3-TRIMETHOXYSILYLPROPYL) FUMARATE, 96%
3385-94-2	SIH6116.0	HEXAMETHYLDISILTHIANE
3388-04-3	SIE4670.0	2-(3,4-EPOXYCYCLOHEXYL)ETHYLTRIMETHOXYSILANE
3390-61-2	SIP6719.5	1,1,3,5,5-PENTAPHENYL-1,3,5-TRIMETHYLTRISILOXANE
3410-32-0	SIT8372.4	TRIFLUOROPROPYLTRIS(DIMETHYLSILOXY)SILANE
3410-77-3	SIT7125.0	TETRAISOCYANATOSILANE
3429-60-5	SIM6559.0	METHYLTRI-n-HEXYLSILANE
3439-38-1	SIE4901.5	ETHYLTRIMETHYLSILANE

CAS Number	Catalog #	Name
3449-26-1	SID4586.0	1,3-DIPHENYL-1,1,3,3-TETRAMETHYLDISILAZANE
3449-28-3	SID3203.0	DI-n-BUTYLDICHLOROSILANE
3473-76-5	SIP6723.7	N-PHENYLAMINOMETHYLTRIETHOXYSILANE
3510-72-3	SIM6577.0	METHYLTRI-n-OCTYLSILANE
3550-35-4	SID3603.0	(N,N-DIMETHYLAMINO)TRIETHYLSILANE
3555-47-3	SIT7298.0	TETRAKIS(TRIMETHYLSILOXY)SILANE
3582-71-6	SID3360.0	1,5-DICHLOROHEXAMETHYLTRISILOXANE, tech-95
3582-72-7	SID3358.0	1,3-DICHLORO-1,3-DIPHENYL-1,3-DIMETHYLDISILOXANE, 96%
3634-56-8	SII6462.0	ISOPROPYLDIMETHYLCHLOROSILANE
3634-67-1	SIT8374.0	TRI-n-HEXYLCHLOROSILANE
3651-23-8	SID2742.0	DIALLYLDICHLOROSILANE
3682-26-6	SID4611.0	1,3-DIVINYLTETRAETHOXYDISILOXANE, 95%
3721-17-3	SIT7307.0	TETRAKIS(TRIMETHYLSILYL)ALLENE, 95%
3728-43-6	SIT8043.0	p-TOLYLTRIMETHYLSILANE
3768-55-6	SIA0710.0	ANILINOTRIMETHYLSILANE
3768-56-7	SIP6828.6	(N-PIPERIDINO)TRIMETHYLSILANE
3768-57-8	SIT8712.0	TRIS(DIMETHYLAMINO)METHYLSILANE
3768-58-9	SIB1072.0	BIS(DIMETHYLAMINO)DIMETHYLSILANE
3844-94-8	SIT8589.7	1-TRIMETHYLSILYL-1-HEXYNE
3901-77-7	SIT8737.0	1,3,5-TRIVINYL-1,3,5-TRIMETHYLCYCLOTRISILOXANE
3908-55-2	SIM6518.5	(METHYLTHIO)TRIMETHYLSILANE
3937-28-8	SIA0445.0	ALLYLDICHLOROSILANE
3937-30-2	SIA0464.0	ALLYLDIMETHYLSILANE, 95%
3944-18-1	SIV9087.0	1-VINYL-1-METHYLSILACYCLOPENTANE
3978-58-3	SIM6481.46	(METHACRYLOXYMETHYL)METHYLDIMETHOXYSILANE
3982-82-9	SIT7757.0	1,1,5,5-TETRAPHENYL-1,3,3,5-TETRAMETHYLTRISILOXANE
3989-15-9	SIT8588.7	2-[(TRIMETHYLSILYL)ETHYNYL]TOLUENE
4028-23-3	SIA0460.0	ALLYLDIMETHYLCHLOROSILANE, 95%
4039-32-1	SIL6467.0	LITHIUM HEXAMETHYLDISILAZIDE
4039-32-1	SIL6467.2	LITHIUM HEXAMETHYLDISILAZIDE, 0.85M in hexane
4039-32-1	SIL6467.4	LITHIUM HEXAMETHYLDISILAZIDE, 1.25M in tetrahydrofuran
4040-74-8	SIC2525.0	CYCLOPENTAMETHYLENEDIMETHYLSILANE
4071-88-9	SIE4901.6	ETHYL(2-TRIMETHYLSILYL)ACETATE
4095-09-4	Ref. Comp. 8	METHYLTRIBROMOSILANE
4098-98-0	SIT7308.0	TETRAKIS(TRIMETHYLSILYL)SILANE
4099-46-1	SIB1871.0	BIS(TRIMETHYLSILYL)SELENIDE
4109-96-0	SID3368.0	DICHLOROSILANE
4109-96-0	SID3368.1	DICHLOROSILANE, 99.9+%
4109-96-0	SID3368.3	DICHLOROSILANE, 25% in heptane
4109-96-0	SID3368.6	DICHLOROSILANE, 25% in xylene
4112-23-6	Ref. Comp. 4	DIMETHYLMETHYLENESILANE
4130-08-9	SIV9098.0	VINYLTRIACETOXYSILANE
4142-85-2	SIB1813.0	BIS(TRICHLOROSILYL)METHANE
4170-46-1	SII6463.3	ISOPROPYLTRICHLOROSILANE
4170-50-7	SID2756.0	1,2-DIBROMOETHYLTRICHLOROSILANE
4206-67-1	SII6450.0	IODOMETHYLTRIMETHYLSILANE
4206-75-1	SIP6724.98	PHENYLCHLOROSILANE
4211-29-4	SIC2067.6	10-(CARBOMETHOXY)DECYLTRICHLOROSILANE
4215-80-9	SIT8628.0	TRIPHENYLAMINOSILANE
4253-34-3	SIM6519.0	METHYLTRIACETOXYSILANE, 95%
4253-34-3	SIM6519.2	METHYLTRIACETOXYSILANE-ETHYLTRIACETOXYSILANE 80:20 Blend
4325-85-3	SIT8718.0	TRIS(TRIMETHYLSILOXY)BORON
4342-61-4	SID3370.0	1,2-DICHLOROTETRAMETHYLDISILANE, 95%
4353-77-9	SIT8584.0	TRIMETHYLSILYLCHLOROSULFONATE, 95%
4364-07-2	SID4593.0	1,4-DISILABUTANE
4364-10-7	SID4593.5	1,10-DISILADECANE
4369-14-6	SIA0200.0	(3-ACRYLOXYPROPYL)TRIMETHOXYSILANE, 96%
4387-16-0	SIB1853.5	BIS(TRIMETHYLSILYL)BISPHENOLA
4405-22-5	SID4235.0	1,4-DIMETHYLDISILETHANE
4420-74-0	SIM6476.0	3-MERCAPTOPROPYLTRIMETHOXYSILANE
4420-74-0	SIM6476.1	3-MERCAPTOPROPYLTRIMETHOXYSILANE, 99+%
4451-96-1	SID4589.5	DIPHENYL(TRIMETHYLSILYLMETHYL)PHOSPHINE
4484-72-4	SID4630.0	DODECYLTRICHLOROSILANE
4518-94-9	SIP6912.0	n-PROPYLMETHYLDICHLOROSILANE
4519-17-9	SIB1878.4	1,4-BIS(VINYLDIMETHYLSILYL)BENZENE
4525-44-4	SIE4896.0	ETHYLMETHYLDICHLOROSILANE
4526-07-2	SIB1854.0	BIS(TRIMETHYLSILYL)BUTADIYNE
4551-15-9	SIP6770.0	PHENYLTHIOTRIMETHYLSILANE
4551-16-0	SIB1873.0	BIS(TRIMETHYLSILYL)TELLURIDE
4619-08-3	SID3349.4	1,3-DI-n-BUTYLTETRAMETHYLDISILOXANE
4648-54-8	SIT8580.0	TRIMETHYLSILYLAZIDE, 96%
4667-38-3	SID3393.0	DIETHOXYDICHLOROSILANE, tech-90
4667-99-6	SIT8178.0	TRIETHOXYCHLOROSILANE, tech-95

CAS Number	Catalog #	Name
12008-29-6	SIS6968.0	SILICON HEXABORIDE
12013-56-8	SIC2054.0	CALCIUM SILICIDE, tech-95, powder
12027-38-2	SIT8780.0	TUNGSTOSILICIC ACID hydrate
12033-89-5	SIS6972.0	SILICON NITRIDE, powder
12034-80-9	SIN6597.2	NIOBIUM DISILICIDE, 99+%
12039-79-1	SIT6996.0	TANTALUM SILICIDE, 99.9+%
12039-83-7	SIT8005.0	TITANIUM SILICIDE, 95%, powder
12039-88-2	SIT8787.0	TUNGSTEN SILICIDE
12039-90-6	SIZ9860.0	ZIRCONIUM SILICIDE, powder, 99%
12068-40-5	SIS6988.5	SPODUMENE
12136-78-6	SIM6594.8	MOLYBDENUM DISILICIDE, 99+%
12159-07-8	SIC2435.0	COPPER SILICIDE
12163-51-2	SIB1977.0	n-BUTYL-1,1,3,3-TETRAMETHYLDISILOXANE
12168-80-8	SIF4906.0	FELDSPAR-POTASSIUM
12173-10-3	SIC2433.0	CLINOPTILOLITE
12173-28-3	SIM6594.7	MOLECULAR SIEVES, 13X, powder
12173-47-6	SIH5840.2	HECTORITE
12174-11-7	SIA0760.0	ATTAPULGITE
12182-56-8	SIS6988.6	STAUROLITE
12251-00-2	SIP6827.7	PHLOGOPITE
12251-32-0	SIZ9692.0	ZEOLITE-CHABAZITE
12269-78-2	SIP6943.0	PYROPHYLLITE
12298-43-0	SIH5840.15	HALLOYSITE
12445-20-4	SIZ9696.0	ZEOLITE-MORDENITE
12627-14-4	SIL6469.5	LITHIUM POLYSILICATE, 20% in water
13058-24-7	SIB1932.0	t-BUTOXYTRIMETHYLSILANE
13083-94-8	SIB1812.0	1,6-BIS(TRICHLOROSILYL)HEXANE
13107-13-6	SIV9076.5	VINYLDIPHENYLMETHYLSILANE
13154-24-0	SIT8384.0	TRIISOPROPYLCHLOROSILANE
13154-25-1	SIT8378.6	TRIISOBUTYLCHLOROSILANE
13170-23-5	SID2790.0	DI-t-BUTOXYDIACETOXYSILANE, tech-96
13170-23-5	SID2790.1	DI-t-BUTOXYDIACETOXYSILANE, 98%
13170-43-9	SIT8594.0	TRIMETHYLSILYLMETHYLMAGNESIUM CHLORIDE, 1.0M in diethyl ether
13170-43-9	SIT8594.1	TRIMETHYLSILYLMETHYLMAGNESIUM CHLORIDE, 3M in methyltetrahydrofuran
13183-70-5	SIB1853.0	1,4-BIS(TRIMETHYLSILYL)BENZENE
13257-81-3	SIT8572.0	2-TRIMETHYLSILOXYPENT-2-ENE-4-ONE
13270-97-8	SID4556.0	3,5-DIPHENYLOCTAMETHYLTETRASILOXANE, 95%
13307-05-6	SIT8711.0	TRIS(DIMETHYLAMINO)CHLOROSILANE, 95%
13315-17-8	SIB1090.0	BIS[(p-DIMETHYLSILYL)PHENYL]ETHER, 96%
13368-42-8	SIT8596.0	N-(TRIMETHYLSILYL)MORPHOLINE
13368-45-1	SIB1080.0	BIS(DIMETHYLAMINO)VINYLMETHYLSILANE
13376-74-4	SIM6471.0	MAGNESIUM SILICATE, hydrous
13399-93-4	SIM6479.0	3-MERCAPTOPROPYLTRIMETHYLSILANE
13411-42-2	SIT8589.0	2-TRIMETHYLSILYL-1,3-DITHIANE
13411-46-6	SIB1857.7	2,2-BIS(TRIMETHYLSILYL)-1,3-DITHIANE
13411-48-8	SIA0130.0	ACETYLTRIMETHYLSILANE
13435-12-6	SIT8575.0	N-(TRIMETHYLSILYL)ACETAMIDE
13453-84-4	SIL6469.2	LITHIUM ORTHOSILICATE, tech-95
13465-71-9	SIT8373.0	TRIFLUOROSILANE, 50-75%
13465-77-5	SIH5905.0	HEXACHLORODISILANE
13465-77-5	SIH5905.1	HEXACHLORODISILANE, 99.9%
13465-78-6	SIC2414.0	CHLOROSILANE, 95%
13465-84-4	SIT7123.0	TETRAIODOSILANE
13472-30-5	SIS6986.0	SODIUM ORTHOSILICATE, tech-90
13497-18-2	SIB1824.5	BIS(3-TRIETHOXYSILYLPROPYL)AMINE, 95%
13508-51-5	SIC2268.0	2-CHLOROETHYLMETHYLDIMETHOXYSILANE
13508-53-7	SIC2286.0	CHLOROMETHYLDIMETHYLETHOXYSILANE
13508-63-9	SIC2337.0	3-CHLOROPROPYLDIMETHYLETHOXYSILANE
13518-80-4	SIT8612.9	2-TRIMETHYLSILYL-1,2,3-TRIAZOLE
13528-93-3	SIB1042.0	1,2-BIS(CHLORODIMETHYLSILYL)ETHANE
13596-23-1	SIO6601.0	OCTACHLOROTRISILANE, tech-95
13597-87-0	SII6463.4	ISOTETRASILANE
13598-42-0	Ref. Comp. 6	IODOSILANE
13617-28-2	SIM6512.5	(2-METHYL-2-PHENYLETHYL)METHYLDICHLOROSILANE
13617-40-8	SIP6744.6	(3-PHENYLPROPYL)TRICHLOROSILANE
13682-99-0	SIP6719.9	PENTYLMETHYLDICHLOROSILANE
13683-41-5	SIB1910.0	1-BROMOVINYLTRIMETHYLSILANE
13688-55-6	SIA0320.0	ACRYLOXYTRIMETHYLSILANE
13688-56-7	SIM6491.0	METHACRYLOXYTRIMETHYLSILANE
13688-90-9	SIC2296.0	(p-CHLOROMETHYL)PHENYLTRICHLOROSILANE, 95%
13716-38-6	SIH6074.0	1,1,1,5,5,5-HEXAETHYL-3-METHYLTRISILOXANE
13731-98-1	SIM6486.4	METHACRYLOXYPROPYLDIMETHYLETHOXYSILANE, 95%
13732-00-8	SIA0198.0	(3-ACRYLOXYPROPYL)METHYLDIMETHOXYSILANE, 95%

CAS Number	Catalog #	Name
13735-81-4	SIP6824.0	1-PHENYL-1-TRIMETHYLSILOXYETHYLENE
13737-04-7	SIP6942.0	2-PYRIDYLTRIMETHYLSILANE
13759-10-9	SIS6967.0	SILICON DISULFIDE, 95%
13760-02-6	SID3520.0	DIIODOSILANE, 95%
13822-56-5	SIA0611.0	3-AMINOPROPYLTRIMETHOXYSILANE
13829-21-5	SID2663.0	n-DECYLTRICHLOROSILANE
13862-16-3	SIT8715.8	TRISILYLAMINE
13883-39-1	SIB1905.0	3-BROMOPROPYLTRICHLOROSILANE
13983-17-0	SIC2050.0	CALCIUM METASILICATE
14031-97-1	SIU9049.2	10-UNDECENYLOXYTRIMETHYLSILANE
14031-97-1	SIU9049.4	11-UNDECENYLOXYUNDECYLTRICHLOROSILANE
14319-64-3	SIB0991.0	(5-BICYCLO[2.2.1]HEPT-2-ENYL)TRICHLOROSILANE
14513-34-9	SIM6486.9	METHACRYLOXYPROPYLMETHYLDIMETHOXYSILANE, 95%
14579-03-4	SIC2555.0	CYCLOPENTYLTRICHLOROSILANE
14579-90-9	SID4591.0	1,3-DI-n-PROPYL-1,1,3,3-TETRAMETHYLDISILAZANE
14606-42-9	SIT8690.0	TRIPHENYLSILANETHIOL
14630-40-1	SIB1850.0	BIS(TRIMETHYLSILYL)ACETYLENE
14642-79-6	SIB0968.0	BENZYLOXYTRIMETHYLSILANE
14697-86-0	SIA0038.0	ACETOXYHEPTAMETHYLCYCLOTETRASILOXANE
14704-14-4	SIM6492.0	METHOXYMETHYLTRIMETHYLSILANE
14760-26-0	SIZ9700.0	ZINC BIS(HEXAMETHYLDISILAZIDE)
14781-45-4	AKC252.8	COPPER(I)(II) HEXAFLUORO-2,4-PENTANEDIONATE - VINYLTRIMETHYLSILANE COMPLEX
14799-66-7	SIB1046.0	1,6-BIS(CHLORODIMETHYLSILYL)HEXANE, 95%
14799-93-0	SIO6712.0	n-OCTYLMETHYLDICHLOROSILANE
14799-94-1	SIH6165.6	HEXYLMETHYLDICHLOROSILANE
14814-09-6	SIM6475.0	3-MERCAPTOPROPYLTRIETHOXYSILANE, 95%
14857-34-2	SID4125.0	DIMETHYLETHOXYSILANE
14857-35-3	SIE4666.0	2-(3,4-EPOXYCYCLOHEXYL)ETHYLMETHYLDIETHOXYSILANE
14867-28-8	SII6452.0	3-IODOPROPYLTRIMETHOXYSILANE
14986-21-1	SIH5910.0	HEXACHLORODISILOXANE, 95%
15078-96-3	SIG5105.0	GARNET
15097-49-1	SIT8609.0	1-TRIMETHYLSILYLPYRROLIDINE, 95%
15112-89-7	SIT8714.0	TRIS(DIMETHYLAMINO)SILANE
15112-89-7	SIT8714.1	TRIS(DIMETHYLAMINO)SILANE, 99.9+%
15129-36-9	SIA0592.6	N-(6-AMINOHEXYL)AMINOMETHYLTRIETHOXYSILANE, 95%
15180-47-9	SID3395.4	(N,N-DIETHYLAMINOMETHYL)TRIETHOXYSILANE
15267-95-5	SIC2298.4	CHLOROMETHYLTRIETHOXYSILANE
15332-99-7	SIV9209.0	VINYLTRIISOPROPENOXYSILANE, tech-95
15396-00-6	SII6456.0	3-ISOCYANOTOPROPYLTRIMETHOXYSILANE, 95%
15538-93-9	SIH5842.0	(3-HEPTAFLUOROISOPROPOXY)PROPYLTRICHLOROSILANE
15573-38-3	SIT8723.4	TRIS(TRIMETHYLSILYL)PHOSPHINE, 10% in hexane
15573-39-4	SIB1868.6	BIS(TRIMETHYLSILYL)PHOSPHINE
15719-56-9	SIH5848.0	1-HEPTYNYLTRIMETHYLSILANE
15721-05-8	SIH5842.5	HEPTAMETHYLCYCLOTETRASILOXANE, tech-95
15901-40-3	SIT8710.0	TRIS(CYCLOHEXYLAMINO)METHYLSILANE, tech-95
15933-59-2	SIT7542.0	1,1,3,3-TETRAMETHYLDISILAZANE
15947-57-6	SIN6597.07	NEOPENTASILANE
15948-19-3	SID4604.0	1,3-DIVINYL-1,3-DIMETHYL-1,3-DICHLORODISILOXANE
15983-86-5	SIB1926.0	3-BUTENYLMETHYLDICHLOROSILANE
15990-66-6	SIT7305.0	TETRAKIS(TRIMETHYLSILOXY)TITANIUM
16029-98-4	SIT8564.0	TRIMETHYLIODOSILANE
16045-78-6	SIT7896.0	1,1,3,3-TETRAVINYLDIMETHYLDISILOXANE, 95%
16066-09-4	SIB1838.0	1,3-BIS(TRIMETHYLSILOXY)-1,3-DIMETHYLDISILOXANE, 95%
16066-10-7	SIT7112.0	1,3,5,7-TETRAETHYLCYCLOTETRASILOXANE, 95%
16068-37-4	SIB1817.0	1,2-BIS(TRIETHOXYSILYL)ETHANE
16116-78-2	SIB1899.0	(4-BROMOPHENYLETHYNYL)TRIMETHYLSILANE
16205-84-8	SIE4901.8	ETHYL 3-(TRIMETHYLSILYL)PROPYNOATE
16230-35-6	SIB1610.0	BIS(N-METHYLBENZAMIDO)ETHOXYMETHYLSILANE, tech-90
16415-12-6	SIH5925.0	HEXADECYLTRIMETHOXYSILANE, 95%
16415-13-7	SIH5922.0	HEXADECYLTRIETHOXYSILANE, 95%
16532-02-8	SIB1890.0	BROMOMETHYLDIMETHYLCHLOROSILANE
16589-43-8	SIS6984.0	SODIUM METHYLSILICONATE, 30% in water
16687-12-0	SIT8598.0	TRIMETHYLSILYL PERRHENATE
16709-86-7	SIV9065.0	VINYL(CHLOROMETHYL)DIMETHYLSILANE
16753-62-1	SIV9086.0	VINYLMETHYLDIMETHOXYSILANE
16871-90-2	SIP6885.0	POTASSIUM HEXAFLUOROSILICATE
16881-77-9	SIM6508.0	METHYLDIMETHOXYSILANE
16893-85-9	SIS6981.0	SODIUM HEXAFLUOROSILICATE
16919-19-0	SIA0705.0	AMMONIUM HEXAFLUOROSILICATE
16949-65-8	SIM6470.5	MAGNESIUM HEXAFLUOROSILICATE
16961-83-4	SIF4920.0	FLUOROSILICIC ACID, 22-25% in water
17043-05-9	SIB1904.0	BROMOPHENYLTRIMETHOXYSILANE
17043-05-9	SIB1904.3	p-BROMOPHENYLTRIMETHOXYSILANE

CAS Number	Catalog #	Name
17070-70-1	SII6454.0	3-ISOCYANATOPROPYLDIMETHYLCHLOROSILANE
17082-46-1	SIM6582.0	METHYLTRIS(DIMETHYLSILOXY)SILANE
17082-47-2	SIT7278.0	TETRAKIS(DIMETHYLSILOXY)SILANE
17082-61-0	SIB1836.0	1,2-BIS(TRIMETHYLSILOXY)CYCLOBUTENE, 95%
17082-69-8	SIT8157.0	2-[2-(TRICHLOROSILYL)ETHYL]PYRIDINE
17082-70-1	SIT8158.0	4-[2-(TRICHLOROSILYL)ETHYL]PYRIDINE, 15-20% in toluene
17095-20-4	SIB1878.6	(4-BROMOBENZYL)TRIMETHYLSILANE
17096-07-0	SIM6487.6	METHACRYLOXYPROPYLTRIS(TRIMETHYLSILOXY)SILANE
17096-07-0	SIM6487.6-06	METHACRYLOXYPROPYLTRIS(TRIMETHYLSILOXY)SILANE, 94%
17096-07-0	SIM6487.6-20	METHACRYLOXYPROPYLTRIS(TRIMETHYLSILOXY)SILANE, 80%
17096-10-5	SIM6487.8	METHACRYLOXYPROPYLTRIS(VINYLDIMETHYLSILOXY)SILANE, tech-95
17096-12-7	SIA0210.0	(3-ACRYLOXYPROPYL)TRIS(TRIMETHYLSILOXY)SILANE, tech-95
17146-08-6	SIP6721.0	PHENETHYLDIMETHYLCHLOROSILANE
17146-09-7	SIP6743.0	(3-PHENYLPROPYL)DIMETHYLCHLOROSILANE
17154-34-6	SID4558.5	(DIPHENYLPHOSPHINO)TRIMETHYLSILANE, 95%
17156-65-9	SIE4901.9	ETHYNYLDIPHENYLMETHYLSILANE
17196-12-2	SIO6707.0	7-OCTENYLDIMETHYLCHLOROSILANE, tech-95
17201-83-1	SIC2294.0	CHLOROMETHYLPENTAMETHYLDISILOXANE
17201-87-5	SIC2289.5	3-(CHLOROMETHYL)HEPTAMETHYLTRISILOXANE
17242-85-2	SIB1858.6	BIS(TRIMETHYLSILYL)-5-FLUOROURACIL
17256-27-8	SIC2280.4	3-CHLOROISOBUTYLTRIMETHOXYSILANE
17306-05-7	SIV9094.0	VINYLPHENYLMETHYLCHLOROSILANE
17347-95-4	SIL6466.5	LITHIUM HEXAFLUOROSILICATE, dihydrate
17407-09-9	SIM6481.0	METHACRYLOXYETHOXYTRIMETHYLSILANE
17425-88-6	SID3533.0	(DIISOPROPYLAMINO)TRIMETHYLSILANE
17477-29-1	SIP6910.0	n-PROPYLDIMETHYLCHLOROSILANE
17596-96-2	SIB1861.0	O,O-BIS(TRIMETHYLSILYL) LACTATE
17622-94-5	SIT7283.5	TETRAKIS(2-HYDROXYETHOXY)SILANE, tech 90
17689-77-9	SIE4899.0	ETHYLTRIACETOXYSILANE
17704-22-2	SIP6719.7	PENTAVINYLPENTAMETHYLCYCLOPENTASILOXANE, 95%
17760-13-3	SIT8153.0	TRICHLOROMETHYLTRICHLOROSILANE, 50% in toluene
17776-66-8	SIP6744.0	(3-PHENYLPROPYL)METHYLDICHLOROSILANE
17776-69-1	SIP6724.8	4-PHENYLBUTYLMETHYLDICHLOROSILANE
17861-35-7	SIT8572.7	TRIMETHYLSILOXYTRIETHOXYSILANE
17861-60-8	SIE4895.0	3-ETHYLHEPTAMETHYLTRISILOXANE
17864-93-6	SIC2458.0	[2-(3-CYCLOHEXENYL)ETHYL]METHYLDICHLOROSILANE
17865-32-6	SIC2469.0	CYCLOHEXYLMETHYLDIMETHOXYSILANE
17865-54-2	SIC2482.0	CYCLOHEXYLTRIMETHOXYSILANE
17869-76-0	SIT8571.25	3-(TRIMETHYLSILOXY)-1-BUTYNE
17872-93-4	SIP6725.2	PHENYLDIETHOXYSILANE
17873-01-7	SIT8042.0	p-TOLYLTRIMETHOXYSILANE
17873-08-4	SIP6775.0	(PHENYLTHIOMETHYL)TRIMETHYLSILANE
17873-30-2	SIT8035.6	p-TOLYLMETHYLDIMETHOXYSILANE
17878-23-8	SID2772.0	3,5-DIBROMO-1-TRIMETHYLSILYLBENZENE
17878-39-6	SIV9096.0	VINYLPHENYLMETHYLSILANE
17882-06-3	SIT8580.7	TRIMETHYLSILYL BENZENESULFONATE
17882-91-6	SIB1863.3	BIS(TRIMETHYLSILYLMETHYL)AMINE
17886-88-3	SIP6724.9	4-PHENYLBUTYLTRICHLOROSILANE
17887-25-1	SIB1094.0	BIS(ETHOXYDIMETHYLSILYL)METHANE
17887-41-1	SIB1974.0	t-BUTYLPHENYLDICHLOROSILANE
17887-60-4	SIP6726.0	PHENYLDIMETHYLACETOXYSILANE
17890-10-7	SIP6723.67	(PHENYLAMINOMETHYL)METHYLDIMETHOXYSILANE, 95%
17902-95-3	SID4610.5	1,5-DIVINYL-3-PHENYLPENTAMETHYLTRISILOXANE, 95%
17905-99-6	SIT8719.0	TRIS(TRIMETHYLSILOXY)CHLOROSILANE
17906-35-3	SIT8627.0	TRI-t-PENTOXYSILANOL, 99%
17909-34-1	SIB1054.0	1,3-BIS(CHLOROMETHYL)-1,1,3,3-TETRAKIS(TRIMETHYLSILOXY)DISILOXANE, 95%
17928-13-1	SID3394.0	1,5-DIETHOXYHEXAMETHYLTRISILOXANE
17928-28-8	SIM6592.0	METHYLTRIS(TRIMETHYLSILOXY)SILANE
17933-85-6	SIV9076.0	VINYLDIPHENYLETHOXYSILANE
17938-06-6	SIN6596.8	1-NAPHTHYLTRIETHOXYSILANE
17945-05-0	SIT8188.0	TRIETHOXYSILYLPROPYL ETHYLCARBAMATE
17947-99-8	SIB1909.0	11-BROMOUNDECYLTRIMETHOXYSILANE, 95%
17948-05-9	SIC2429.0	11-CHLOROUNDECYLTRIMETHOXYSILANE
17955-46-3	SNT8585	TRI-n-BUTYLSTANNYLTRIMETHYLSILANE
17955-67-8	SIH5945.0	1,1,3,3,5,5-HEXAETHOXY-1,3,5-TRISILACYCLOHEXANE
17955-81-6	SID2754.0	1,3-DIALLYLTETRAMETHYLDISILOXANE, 95%
17955-88-3	SIO6711.5	3-OCTYLHEPTAMETHYLTRISILOXANE
17962-34-4	SIP6742.5	3-PHENYL-1,1,3,5,5-PENTAMETHYLTRISILOXANE
17963-04-1	SIG5825.0	(3-GLYCIDOXYPROPYL)DIMETHYLETHOXYSILANE
17963-29-0	SIU9047.0	10-UNDECENYLTRICHLOROSILANE
17963-32-5	SIC2427.0	11-CHLOROUNDECYLTRICHLOROSILANE
17980-29-9	SIG5838.5	(3-GLYCIDOXYPROPYL)-1,1,3,3-TETRAMETHYLDISILOXANE
17980-32-4	SID3530.0	DIISOBUTYLDIMETHOXYSILANE
17980-47-1	SII6453.5	ISOBUTYLTRIETHOXYSILANE, 98%
17980-64-2	SIM6585.0	METHYLTRIS(METHOXYETHOXY)SILANE
17985-72-7	SIB1084.0	1,2-BIS(DIMETHYLSILYL)BENZENE
17988-79-3	SIB1053.5	3,5-BIS(CHLOROMETHYL)OCTAMETHYLTETRASILOXANE, 95%
17995-04-9	SIB1852.3	N-6,9-BIS(TRIMETHYLSILYL)ADENINE
17998-59-3	SIN6596.0	(1-NAPHTHYLMETHYL)TRICHLOROSILANE
18001-60-0	SIT7095.0	1,1,3,3-TETRAETHOXY-1,3-DIMETHYLDISILOXANE, 95%
18001-97-3	SIB1145.0	1,3-BIS(HYDROXYPROPYL)TETRAMETHYLDISILOXANE, 95%
18023-33-1	SIV9210.0	VINYLTRIISOPROPOXYSILANE
18027-10-6	SIS6988.0	SODIUM TRIMETHYLSILANOLATE, 96%
18027-45-7	SIP6826.0	PHENYLTRIS(DIMETHYLSILOXY)SILANE
18027-80-0	SIB1058.0	1,3-BIS(CYANOPROPYL)TETRAMETHYLDISILOXANE, 95%
18035-33-1	SIP6736.4	6-PHENYLHEXYLTRICHLOROSILANE
18035-74-0	SID3382.0	DICYCLOHEXYLDICHLOROSILANE
18037-10-0	SIB1857.0	BIS(TRIMETHYLSILYL)CYTOSINE
18038-55-6	SIB1805.0	BIS(TRICHLOROSILYL)ACETYLENE
18042-54-1	SIP6790.0	PHENYLTRIACETOXYSILANE, tech-90
18043-71-5	SIT7274.0	1,1,3,3-TETRAISOPROPYLDISILOXANE
18043-74-8	SIB1615.0	1,2-BIS(METHYLDIETHOXYSILYL)ETHANE
18044-09-2	SIA0088.0	3-(3-ACETOXYPROPYL)HEPTAMETHYLTRISILOXANE
18044-44-5	SIG5838.0	(3-GLYCIDOXYPROPYL)PENTAMETHYLDISILOXANE
18048-06-1	SID3411.0	(2-DIETHYLPHOSPHATOETHYL)METHYLDIETHOXYSILANE, tech-95
18051-88-2	SID2662.0	n-DECYLMETHYLDICHLOROSILANE
18052-07-8	SIU9050.0	UNDECYLTRICHLOROSILANE
18052-76-1	SIN6597.0	1-NAPHTHYLTRIMETHOXYSILANE
18052-92-1	SIM6481.5	(METHACRYLOXYMETHYL)PHENYLDIMETHYLSILANE
18053-74-2	SID3388.0	DI(CYCLOPENTADIENYL)DIMETHYLSILANE
18056-97-8	SIB0999.5	4-BIPHENYLYLTRIETHOXYSILANE
18077-31-1	SIC2413.0	3-CHLOROPROPYLTRIS(TRIMETHYLSILOXY)SILANE
18077-42-4	SIT8722.7	TRIS(TRIMETHYLSILYLMETHYL)PHOSPHINE
18081-42-0	SIB1064.0	BIS(DICHLOROSILYL)METHANE, tech-95
18089-94-6	SID4555.5	(DIPHENYLMETHYL)TRICHLOROSILANE
18098-86-7	SIT8163.0	3-(TRICHLOROSILYL)PROPYLCHLOROFORMATE
18105-31-2	SIB1852.6	BIS(TRIMETHYLSILYL) ADIPATE
18105-64-1	SIT8085.0	TRI-t-BUTOXYCHLOROSILANE, 95%
18107-18-1	SIT8588.0	TRIMETHYLSILYLDIAZOMETHANE, 2.0M in hexanes
18107-18-1	SIT8588.3	TRIMETHYLSILYLDIAZOMETHANE, 2M in diethyl ether
18132-63-3	SID3214.0	DI-n-BUTYLDIMETHOXYSILANE
18132-72-4	SIB1056.0	1,3-BIS(3-CHLOROPROPYL)TETRAMETHYLDISILOXANE
18142-37-5	SIP6904.0	1-PROPENYLMETHYLDICHLOROSILANE, 95%
18145-83-0	SIC2277.0	3-CHLOROISOBUTYLDIMETHYLCHLOROSILANE
18145-84-1	SIC2265.0	4-CHLOROBUTYLDIMETHYLCHLOROSILANE
18146-00-4	SIA0480.0	ALLYLOXYTRIMETHYLSILANE
18146-08-2	SID2758.0	1,2-DIBROMOETHYLTRIMETHYLSILANE, 95%
18147-09-6	SIM6574.0	METHYL N-TRIMETHYLSILYLCARBAMATE
18147-18-7	SIB1972.2	t-BUTYLMETHYLDICHLOROSILANE
18147-23-4	SIB1972.0	n-BUTYLMETHYLDICHLOROSILANE
18147-35-8	SIA0447.0	ALLYLDIMETHOXYSILANE
18147-81-4	SIC2070.0	2-(CARBOMETHOXY)ETHYLTRICHLOROSILANE, tech 95
18147-84-7	SIC2281.0	2-(CHLOROMETHYL)ALLYLTRICHLOROSILANE
18151-32-1	SIC2446.5	2-CYANOETHYLTRIMETHYLSILANE
18151-53-6	SIT7906.6	THEXYLTRICHLOROSILANE
18151-85-4	SIM6487.0	METHACRYLOXYPROPYLPENTAMETHYLDISILOXANE, 95%
18156-15-5	SIC2452.0	3-CYANOPROPYLDIMETHYLCHLOROSILANE
18156-25-7	SIB1872.0	BIS(TRIMETHYLSILYL)SULFUR DIIMIDE, 95%
18156-74-6	SIT8590.0	N-(TRIMETHYLSILYL)IMIDAZOLE
18157-31-8	SIC2340.0	3-CHLOROPROPYLDIMETHYLSILANE
18159-55-2	SIT8092.0	TRI-t-BUTYLSILANE, 95%
18162-48-6	SIB1935.0	t-BUTYLDIMETHYLCHLOROSILANE
18162-48-6	SIB1935.2	t-BUTYLDIMETHYLCHLOROSILANE, 1.0M in methylene chloride
18162-48-6	SIB1935.4	t-BUTYLDIMETHYLCHLOROSILANE, 3M in tetrahydrofuran
18162-48-6	SIB1935.5	t-BUTYLDIMETHYLCHLOROSILANE, 2.85M in toluene, 48-52% solution
18162-82-8	SIC2298.5	CHLOROMETHYLTRIISOPROPOXYSILANE
18162-84-0	SIO6711.0	n-OCTYLDIMETHYLCHLOROSILANE
18163-07-0	SIP6905.0	2-PROPENYLTRIMETHYLSILANE, 95%
18163-34-3	SIA0015.0	ACETOXYETHYLMETHYLDICHLOROSILANE
18163-42-3	SIC2068.0	2-(CARBOMETHOXY)ETHYLMETHYLDICHLOROSILANE, tech-95
18163-47-8	SII6452.2	1-IODO-2-(TRIMETHYLSILYL)ACETYLENE
18165-19-0	SIC2268.5	2-CHLOROETHYLSILANE
18166-02-4	SIA0596.0	AMINOMETHYLTRIMETHYLSILANE
18166-37-5	SIH6167.5	HEXYLTRIETHOXYSILANE
18166-40-0	SIM6481.2	(METHACRYLOXYMETHYL)BIS(TRIMETHYLSILOXY)METHYLSILANE, 95%
18166-43-3	SIT8088.0	TRI-t-BUTOXYSILANOL

CAS Number	Catalog #	Name
18169-57-8	SII6453.0	ISOBUTYLTRICHLOROSILANE
18171-11-4	SIC2286.5	CHLOROMETHYLDIMETHYLISOPROPOXYSILANE
18171-14-7	SIC2338.0	3-CHLOROPROPYLDIMETHYLMETHOXYSILANE, 95%
18171-19-2	SIC2355.0	3-CHLOROPROPYLMETHYLDIMETHOXYSILANE
18171-50-1	SIB1815.0	1,3-BIS(TRICHLOROSILYL)PROPANE
18171-56-7	SIB1053.0	BIS(CHLOROMETHYL)METHYLCHLOROSILANE, 95%
18171-59-0	SID3361.0	(DICHLOROMETHYL)DIMETHYLCHLOROSILANE, tech-95
18171-70-5	SID3360.5	(DICHLOROMETHYL)(CHLOROMETHYL)DIMETHYLSILANE, tech-95
18171-74-9	SIB1985.0	t-BUTYLTRICHLOROSILANE
18173-64-3	SIB1939.0	t-BUTYLDIMETHYLSILANOL
18173-73-4	SIP6914.0	n-PROPYLMETHYLDIMETHOXYSILANE
18178-60-4	SIB1857.9	1,2-BIS(TRIMETHYLSILYL)ETHYLENE, 90%
18182-14-4	SIP6911.0	n-PROPYLDIMETHYLMETHOXYSILANE
18186-97-5	SID4236.0	1,3-DIMETHYLTETRAMETHOXYDISILOXANE, 95%
18187-14-9	SIA0612.0	3-AMINOPROPYLTRIMETHYLSILANE
18191-40-7	SIC2263.0	CARBOXYETHYLSILANETRIOL, DISODIUM SALT, 25% in water
18204-80-3	SIA0020.0	ACETOXYETHYLTRICHLOROSILANE
18204-93-8	SID3425.0	1,3-DIETHYNYLTETRAMETHYLDISILOXANE
18204-93-8	SID3510.0	DI-n-HEXYLDICHLOROSILANE
18209-60-4	SID3546.5	(N,N-DIMETHYLAMINO)DIMETHYLCHLOROSILANE, 95%
18209-61-5	SII6463.1	ISOPROPYLDIMETHYLSILANE
18209-66-0	SID3539.4	DIISOPROPYLSILANE
18209-83-1	SID2768.0	1,2-DIBROMOTETRAMETHYLDISILANE, tech-95
18230-61-0	SID3538.0	DIISOPROPYLDIMETHOXYSILANE
18236-87-8	SII6452.3	ISOBUTYLDICHLOROSILANE
18236-89-0	SII6463.0	ISOPROPYLMETHYLDICHLOROSILANE
18243-10-2	SIH5915.0	2,2,4,4,6,6-HEXACHLORO-2,4,6-TRISILAHEPTANE
18243-27-1	SIV9073.5	VINYLDIMETHYLSILANE
18243-41-9	SIB1892.0	BROMOMETHYLTRIMETHYLSILANE
18243-89-5	SIT7907.5	THIOBIS(HEXAMETHYLDISILAZANE)
18244-08-1	SIC2278.0	3-CHLOROISOBUTYLDIMETHYLMETHOXYSILANE
18244-95-6	SIT8734.0	TRIVINYLMETHYLSILANE
18245-28-8	SIT7907.0	2-THIENYLTRIMETHYLSILANE
18245-29-9	SIB0997.0	(5-BICYCLO[2.2.1]HEPTYL)TRICHLOROSILANE
18245-94-8	SIB0990.0	(5-BICYCLO[2.2.1]HEPT-2-ENYL)METHYLDICHLOROSILANE, 95%
18246-33-8	SIA0592.0	N-(2-AMINOETHYL)-2,2,4-TRIMETHYL-1-AZA-2-SILACYCLOPENTANE
18269-42-6	SIC2264.0	2-(CARBOXYMETHYLTHIO)ETHYLTRIMETHYLSILANE, 95%
18269-64-2	SIT8584.5	TRIMETHYLSILYL CROTONATE
18269-97-1	SIM6485.6	METHACRYLOXYMETHYLTRIMETHYLSILANE
18269-99-3	SIA0160.0	(2-ACRYLOXYETHOXY)TRIMETHYLSILANE
18279-67-9	SIC2271.0	2-CHLOROETHYLTRIETHOXYSILANE, 95%
18279-73-7	SID3526.0	DIISOBUTYLCHLOROSILANE
18290-59-0	SIC2490.0	CYCLOOCTYLTRICHLOROSILANE, 95%
18290-60-3	SIC2459.0	[2-(3-CYCLOHEXENYL)ETHYL]TRICHLOROSILANE
18291-27-5	SIC2362.0	(3-CHLOROPROPYL)PENTAMETHYLDISILOXANE
18291-80-0	SIT8582.0	TRIMETHYLSILYL BROMOACETATE
18292-29-0	SIV9068.0	VINYLDIETHYLMETHYLSILANE
18292-36-9	SIB1879.1	4-BROMOBUTOXYTRIMETHYLSILANE
18292-38-1	SIM6513.0	(2-METHYL-2-PROPENYL)TRIMETHYLSILANE
18293-53-3	SIT8579.0	TRIMETHYLSILYLACETONITRILE
18293-54-4	SIT8613.0	1-TRIMETHYLSILYL-1,2,4-TRIAZOLE
18293-82-8	SII6452.8	ISOBUTYLMETHYLDIMETHOXYSILANE
18295-89-1	SIM6480.6	METHACRYLAMIDOTRIMETHYLSILANE, tech-95
18297-14-8	SID3528.0	DIISOBUTYLDIETHOXYSILANE
18297-63-7	SIB1878.0	N,N'-BIS(TRIMETHYLSILYL)UREA
18297-79-5	SIB1635.0	BIS(METHYLDIMETHOXYSILYL)METHANE
18301-56-9	SIM6486.7	METHACRYLOXYPROPYLMETHYLDICHLOROSILANE, 95%
18306-45-1	SIA0010.0	ACETOXYETHYLDIMETHYLCHLOROSILANE
18306-79-1	SIA0603.0	3-AMINOPROPYLDIMETHYLETHOXYSILANE
18339-94-1	SID4220.4	DIMETHYLSILA-11-CROWN-4
18379-25-4	SII6457.0	ISOOCTYLTRICHLOROSILANE
18387-19-4	SIM6501.4	N-METHYL-AZA-2,2,4-TRIMETHYLSILACYCLOPENTANE
18387-26-3	SIA0490.0	1-ALLYL-1,1,3,3-TETRAMETHYLDISILOXANE
18388-03-9	SIC2320.0	2-CHLOROMETHYL-3-TRIMETHYLSILYL-1-PROPENE
18388-16-4	SIC2470.0	(CYCLOHEXYLMETHYL)TRICHLOROSILANE
18388-70-0	SIB1048.8	1,3-BIS(3-CHLOROISOBUTYL)TETRAMETHYLDISILOXANE
18395-29-4	SIB1989.0	t-BUTYLTRIMETHOXYSILANE
18395-30-7	SII6453.7	ISOBUTYLTRIMETHOXYSILANE
18395-90-9	SID3205.0	DI-t-BUTYLDICHLOROSILANE
18395-93-2	SIH5845.0	n-HEPTYLMETHYLDICHLOROSILANE
18401-43-9	SIB0992.0	(5-BICYCLO[2.2.1]HEPT-2-ENYL)TRIETHOXYSILANE
18402-22-7	SIT7093.0	TETRADECYLTRICHLOROSILANE
18406-41-2	SIB1830.0	1,2-BIS(TRIMETHOXYSILYL)ETHANE
18406-97-8	SIU9045.0	10-UNDECENYLDIMETHYLCHLOROSILANE
18407-07-3	SID4628.0	DODECYLMETHYLDICHLOROSILANE
18407-94-8	SIT7282.0	TETRAKIS(ETHOXYETHOXY)SILANE, tech-95
18407-95-9	SIT7288.0	TETRAKIS(1-METHOXY-2-PROPOXY)SILANE, tech-95
18408-42-9	SIB1870.0	BIS(TRIMETHYLSILYL) SEBACATE
18412-57-2	SIT8041.0	p-TOLYLTRIETHOXYSILANE
18414-38-5	SID4598.0	DI(p-TOLYL)DICHLOROSILANE, tech-95
18414-52-3	SID2755.0	DIBENZYLOXYDICHLOROSILANE, tech-95
18416-07-4	SID4400.0	DI-n-OCTYLDICHLOROSILANE
18418-53-6	SIB1835.5	N,N'-BIS(3-TRIMETHOXYSILYLPROPYL)UREA, 95%
18418-54-7	SIT8185.8	1-(TRIETHOXYSILYL)-2-(DIETHOXYMETHYLSILYL)ETHANE
18418-72-9	SIB1821.0	BIS(TRIETHOXYSILYL)METHANE
18419-53-9	SIV9074.0	VINYLDIPHENYLCHLOROSILANE
18419-84-6	SID3395.2	1,2-DIETHOXYTETRAMETHYLDISILANE
18420-09-2	SIT7534.0	1,1,3,3-TETRAMETHYL-1,3-DIETHOXYDISILOXANE
18420-19-4	SIB1865.0	BIS(TRIMETHYLSILYLMETHYL)DICHLOROSILANE
18441-88-8	SIC2485.0	(4-CYCLOOCTENYL)TRICHLOROSILANE, 95%
18457-04-0	SIB1862.0	BIS(TRIMETHYLSILYL) MALONATE
18536-91-9	SID4632.0	DODECYLTRIETHOXYSILANE
18547-93-8	SIB1402.0	1,3-BIS(3-METHACRYLOXYPROPYL)TETRAMETHYLDISILOXANE
18586-22-6	SID4609.0	1,5-DIVINYL-3,3-DIPHENYL-1,1,5,5-TETRAMETHYLTRISILOXANE
18586-39-5	SID4558.0	2-(DIPHENYLPHOSPHINO)ETHYLTRIETHOXYSILANE
18623-11-5	SIO6635.0	n-OCTADECYLSILANE
18642-94-9	SID4406.0	1,3-DI-n-OCTYLTETRAMETHYLDISILOXANE
18643-08-8	SIO6615.0	n-OCTADECYLDIMETHYLCHLOROSILANE
18643-08-8	SIO6615.1	n-OCTADECYLDIMETHYLCHLOROSILANE, 97%
18643-08-8	SIO6615.2	n-OCTADECYLDIMETHYLCHLOROSILANE, 70% in toluene
18666-65-4	SIV9264.0	VINYLTRIPHENOXYSILANE
18666-68-7	SIV9265.0	VINYLTRIPHENYLSILANE
18724-32-8	SIB1092.0	1,3-BIS[2-(3,4-EPOXYCYCLOHEXYL)ETHYL]TETRAMETHYLDISILOXANE, 90%
18733-57-8	SIE4661.0	EICOSYLTRICHLOROSILANE, 95%
18752-21-1	SIA0575.0	ALLYLTRIPHENYLSILANE
18765-09-8	SIT8625.0	TRIOCTYLSILANE
18766-53-5	GET7296	TETRAKIS(TRIMETHYLSILOXY)GERMANE
18769-05-6	SID4616.0	1,3-DIVINYLTETRAPHENYLDISILOXANE, 95%
18784-74-2	SIT8716.3	TRIS(TRIETHOXYSILYLPROPYL)AMINE, tech-95
18817-29-3	SIH6164.0	5-HEXENYLTRICHLOROSILANE, 95%
18920-16-6	SIB1878.2	*m*-BIS(TRIPHENYLSILYL)BENZENE
19086-72-7	SIO6715.9	OLIVINE
19116-61-1	SIH5842.2	3-(HEPTAFLUOROISOPROPOXY)PROPYLTRIMETHOXYSILANE
19309-90-1	SIM6486.0	3-METHACRYLOXYPROPYLBIS(TRIMETHYLSILOXY)METHYLSILANE, 95%
19333-10-9	SIP6828.0	PHTHALOCYANATODICHLOROSILANE, tech-90
19938-13-5	SIB1858.2	1,4-BIS[(TRIMETHYLSILYL)ETHYNYL]BENZENE
19980-43-9	SIC2552.0	(CYCLOPENTENYLOXY)TRIMETHYLSILANE
20006-68-2	SIH5841.9	(3-HEPTAFLUOROISOPROPOXY)PROPYLMETHYLDICHLOROSILANE
20082-71-7	SIP6716.1	PENTAFLUOROPHENYLDIMETHYLCHLOROSILANE
20083-34-5	SIP6716.7	PENTAFLUOROPHENYLTRIETHOXYSILANE
20152-11-8	SIT7537.0	1,1,4,4-TETRAMETHYL-1,4-DISILABUTANE
20160-69-4	SIB1250.0	BIS(3-ISOCYANATOPROPYL)TETRAMETHYLDISILOXANE, 96%
21130-91-6	SIM6492.53	p-METHOXYPHENYLTRIETHOXYSILANE
21134-38-3	SIA0182.0	ACRYLOXYMETHYLTRIMETHOXYSILANE
21142-29-0	SIM6487.3	METHACRYLOXYPROPYLTRIETHOXYSILANE
21331-86-2	SIT8715.5	TRIS(DIMETHYLSILYL)AMINE, 95%
21591-53-7	SIP6720.77	9-PHENANTHRENYLTRIETHOXYSILANE
21619-76-1	SIC2464.1	3-CYCLOHEXENYLTRIMETHOXYSILANE
21700-74-3	SIC2332.0	CHLOROPHENYLTRIETHOXYSILANE (*p*-)
21700-74-3	SIC2332.3	p-CHLOROPHENYLTRIETHOXYSILANE
22538-45-0	SIA0025.0	ACETOXYETHYLTRIETHOXYSILANE
22705-32-4	SID3546.6	(N,N-DIMETHYLAMINO)DIMETHYLSILANE, 95%
22705-33-5	SIB1075.0	BIS(DIMETHYLAMINO)METHYLSILANE, 96%
22737-36-6	SIT8589.8	O-TRIMETHYLSILYLHYDROXYLAMINE, 95%
22737-37-7	SIB1859.0	N,O-BIS(TRIMETHYLSILYL)HYDROXYLAMINE
22831-39-6	SIM6472.0	MAGNESIUM SILICIDE, powder
22984-54-9	SIM6590.0	METHYLTRIS(METHYLETHYLKETOXIMINO)SILANE, tech-95
23029-21-2	SIA0607.0	3-AMINOPROPYLPENTAMETHYLDISILOXANE
23038-10-0	SID4607.0	1,3-DIVINYL-1,3-DIPHENYL-1,3-DIMETHYLDISILAZANE
23410-40-4	SIA0587.5	N-(2-AMINOETHYL)-3-AMINOISOBUTYLMETHYLDIMETHOXYSILANE, 95%
23432-62-4	SIT8407.0	N-TRIMETHOXYSILYLPROPYLMETHYLCARBAMATE
23779-32-0	SIU9055.0	UREIDOPROPYLTRIETHOXYSILANE, 50% in methanol
23843-64-3	SIU9058.0	UREIDOPROPYLTRIMETHOXYSILANE
24400-84-8	SIA0535.0	ALLYLTRIISOPROPYLSILANE
24413-04-5	SIC2296.2	(p-CHLOROMETHYL)PHENYLTRIMETHOXYSILANE, 95%
24589-78-4	SIM6576.0	N-METHYL-N-TRIMETHYLSILYLTRIFLUOROACETAMIDE, 96%

CAS Number	Catalog #	Name
24636-31-5	SIM6486.2	3-METHACRYLOXYPROPYLDIMETHYLCHLOROSILANE, tech-95
24685-89-0	SIT7285.0	TETRAKIS(METHOXYETHOXYETHOXY)SILANE, tech-95
24801-88-5	SII6455.0	3-ISOCYANATOPROPYLTRIETHOXYSILANE, 95%
24858-02-4	SIV9063.0	VINYL-t-BUTYLDIMETHYLSILANE, 95%
25134-15-0	SIC2522.0	CYCLOPENTADIENYLTRIMETHYLSILANE
25195-85-1	SIM6497.0	(2-METHYLALLYLOXY)TRIMETHYLSILANE, 95%
25357-81-7	SIA0620.0	3-AMINOPROPYLTRIS(TRIMETHYLSILOXY)SILANE, 95%
25374-10-1	SIP6724.6	PHENYLBIS(DIMETHYLAMINO)CHLOROSILANE, 95%
25436-07-1	SIT8616.0	TRIMETHYLSILYLTRICHLOROACETATE
25438-37-3	SIT8572.3	1-(TRIMETHYLSILOXY)PHENYLACETONITRILE
25498-02-6	SIT7510.3	TETRAMETHOXYSILANE, oligomeric hydrolysate
25561-30-2	SIB1876.0	N,O-BIS(TRIMETHYLSILYL)TRIFLUOROACETAMIDE
25898-35-5	SIC2328.0	(CHLOROPHENYL)METHYLDICHLOROSILANE, 95%
25898-37-7	SIT8035.0	p-TOLYLMETHYLDICHLOROSILANE
26115-70-8	SIT8717.0	TRIS(3-TRIMETHOXYSILYLPROPYL)ISOCYANURATE, tech-95
26495-91-0	SIC2464.2	(N-CYCLOHEXYLAMINOMETHYL)TRIETHOXYSILANE, 95%
26798-98-1	SID3546.9	N,N-DIMETHYLAMINOPENTAMETHYLDISILANE
26798-99-2	SIB1077.0	1,2-BIS(DIMETHYLAMINO)TETRAMETHYLDISILANE
26903-85-5	SID3545.0	2,2-DIMETHOXY-1-THIA-2-SILACYCLOPENTANE
27137-85-5	SID3367.6	DICHLOROPHENYLTRICHLOROSILANE, 95%
27306-78-1	SIM6492.6	2-[METHOXY(POLYETHYLENEOXY)PROPYL]HEPTAMETHYLTRISILOXANE, tech-90
27326-65-4	SIP6930.0	2-(2-PYRIDYLETHYL)TRIMETHOXYSILANE
27490-70-6	SII6452.5	ISOBUTYLDIMETHYLCHLOROSILANE
27607-77-8	SIT8620.0	TRIMETHYLSILYLTRIFLUOROMETHANESULFONATE
27668-52-6	SIO6620.0	OCTADECYLDIMETHYL(3-TRIMETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 60% in methanol
27692-57-5	SIM6487.1	METHACRYLOXYPROPYLSILATRANE, 95%
27703-88-4	SIT8365.0	3-(3,3,3-TRIFLUOROPROPYL)HEPTAMETHYLTRISILOXANE
27752-77-8	SIB1903.0	BROMOPHENYLTRICHLOROSILANE
27804-64-4	SIB1069.0	BIS(DIETHYLAMINO)SILANE
28229-56-3	SIP6723.25	3-PHENOXYPROPYLMETHYLDICHLOROSILANE
29098-72-4	SIP6926.2	3-(2-PYRIDYLETHYL)THIOPROPYLTRIMETHOXYSILANE
29159-37-3	SIA0608.0	3-AMINOPROPYLSILANETRIOL, 22-25% in water
29489-57-4	SIT8711.6	TRIS(DIMETHYLAMINO)ETHYLSILANE
29681-57-0	SIB1938.0	t-BUTYLDIMETHYLSILANE
29706-30-7	SIB1144.0	1,3-BIS(3-HYDROXYISOBUTYL)TETRAMETHYLDISILOXANE
30102-73-9	SIH6163.0	5-HEXENYLDIMETHYLCHLOROSILANE, 95%
30736-07-3	SID3342.0	DI-t-BUTYLSILANE
31001-77-1	SIM6474.0	3-MERCAPTOPROPYLMETHYLDIMETHOXYSILANE, 96%
31020-47-0	SIB1620.0	BIS(METHYLDIETHOXYSILYLPROPYL)AMINE, 95%
31024-35-8	SIM6498.0	N-METHYLAMINOPROPYLMETHYLDIMETHOXYSILANE
31024-46-1	SIA0400.0	3-(N-ALLYLAMINO)PROPYLTRIMETHOXYSILANE, 95%
31024-49-4	SIA0587.2	N-(2-AMINOETHYL)-3-AMINOISOBUTYLDIMETHYLMETHOXYSILANE, 95%
31024-56-3	SIB1932.2	n-BUTYLAMINOPROPYLTRIMETHOXYSILANE
31024-65-4	SIB1869.5	BIS(3-TRIMETHYLSILYLPROPYL)AMINE
31024-70-1	SIB1835.0	BIS(3-TRIMETHOXYSILYLPROPYL)-N-METHYLAMINE
31323-44-1	SIO6605.0	OCTACHLOROTRISILOXANE, 95%
31469-15-5	SIM6496.0	1-METHOXY-1-(TRIMETHYLSILOXY)-2-METHYL-1-PROPENE
31795-24-1	SIP6898.0	POTASSIUM METHYLSILICONATE, 40% in water
32328-67-9	SIP6724.7	4-PHENYLBUTYLDIMETHYLCHLOROSILANE
32395-58-7	SIO6619.0	n-OCTADECYLDIMETHYLSILANE
33287-52-4	SIB1070.0	BIS(DIMETHYLAMINO)DIETHYLSILANE
33317-65-6	SIB1055.3	BIS(3-CHLOROPROPYL)DICHLOROSILANE
33491-28-0	SII6454.45	3-ISOCYANATOPROPYLMETHYLDIETHOXYSILANE, 95%
33525-68-7	SIT8189.8	TRIETHOXYSILYLPROPYLMALEAMIC ACID, tech-90
33558-36-0	SIB1828.2	3,5-BIS(TRIFLUOROMETHYL)PHENYLDIMETHYLSILANE, 95%
33567-83-8	SIP6736.8	PHENYLMETHYLBIS(DIMETHYLAMINO)SILANE
33580-59-5	SIM6493.0	3-METHOXYPROPYLTRIMETHOXYSILANE
33581-77-0	SIT8622.0	TRIMETHYLSILYL(TRIMETHYLSILOXY)ACETATE
33734-79-1	SIO6607.0	OCTADECYLDIETHOXYCHLOROSILANE, tech-95
33861-17-5	SIP6747.0	PHENYLSELENOTRIMETHYLSILANE, 95%
33976-43-1	SIA0599.1	p-AMINOPHENYLTRIMETHOXYSILANE, 95%
34036-80-1	SIP6826.5	PHENYLTRIS(METHYLETHYLKETOXIMINO)SILANE, tech-95
34206-40-1	SIT7289.0	TETRAKIS(METHYLETHYLKETOXIMINO)SILANE (50% in toluene)
34396-03-7	SII6458.0	ISOOCTYLTRIMETHOXYSILANE
34708-08-2	SIT7908.0	3-THIOCYANATOPROPYLTRIETHOXYSILANE, 96%
34937-00-3	SIS6993.0	3-(N-STYRYLMETHYL-2-AMINOETHYLAMINO)PROPYLTRIMETHOXYSILANE, 40% in methanol
34937-00-3	SIS6994.0	3-(N-STYRYLMETHYL-2-AMINOETHYLAMINO)PROPYLTRIMETHOXYSILANE HYDROCHLORIDE, 40% in methanol
35141-30-1	SIT8398.0	(3-TRIMETHOXYSILYLPROPYL)DIETHYLENETRIAMINE, tech-95
35141-36-7	SIT8415.0	N-TRIMETHOXYSILYLPROPYL-N,N,N-TRIMETHYLAMMONIUM CHLORIDE, 50% in methanol
35192-54-2	SIB1809.5	1,6-BIS(TRICHLOROSILYLETHYL)DODECAFLUOROHEXANE
35239-30-6	SIT8030.0	p-TOLYLDIMETHYLCHLOROSILANE
35435-21-3	SII6457.5	ISOOCTYLTRIETHOXYSILANE
35450-28-3	SIG4998.0	GALLIUM TRIS(HEXAMETHYDISILAZIDE)
35692-27-4	SIM6492.55	p-METHOXYPHENYLTRIMETHOXYSILANE
35788-99-9	SIL6464.0	LANTHANUM TRIS(HEXAMETHYLDISILAZIDE)
35789-00-5	SIP6902.1	PRASEODYMIUM TRIS(HEXAMETHYLDISILAZIDE)
35789-01-6	SIS6943.4	SAMARIUM TRIS(HEXAMETHYLDISILAZIDE)
35789-02-7	SIE4907.0	EUROPIUM(III) TRIS(HEXAMETHYLDISILAZIDE)
35789-03-8	SIG4994.0	GADOLINIUM TRIS(HEXAMETHYLDISILAZIDE)
36198-87-5	SID4245.0	O,O'-DIMETHYL(TRIMETHYLSILYL)PHOSPHITE, tech-95
36493-41-1	SIM6492.66	2-[METHOXY(POLYETHYLENEOXY)PROPYL]TRICHLOROSILANE, tech-90
37244-96-5	SIN6597.23	NEPHELINE
37843-11-1	SIA0325.0	ADAMANTYLETHYLTRICHLOROSILANE
37843-14-4	SIE4897.0	(ETHYLMETHYLKETOXIMINO)TRIMETHYLSILANE, 95%
37859-57-7	SIM6590.2	METHYLTRIS(METHYLISOBUTYLKETOXIMINO)SILANE, tech-95
38002-45-8	SIB1907.0	3-BROMO-1-(TRIMETHYLSILYL)-1-PROPYNE, 95%
38051-57-9	SID2660.0	n-DECYLDIMETHYLCHLOROSILANE
38053-91-7	SIT8571.2	2-(TRIMETHYLSILOXY)-1,3-BUTADIENE
38170-80-8	SIB1858.0	1,3-BIS[(TRIMETHYLSILYL)ETHYNYL]BENZENE
38436-16-7	SIN6597.5	NONAFLUOROHEXYLMETHYLDICHLOROSILANE
38595-89-0	SIA0199.0	(3-ACRYLOXYPROPYL)TRICHLOROSILANE
38755-76-9	SIV9073.0	VINYLDIMETHYLFLUOROSILANE
38958-24-6	SIB1612.0	1,4-BIS(METHYLDICHLOROSILYL)BUTANE, 95%
39197-94-9	SIC2282.0	2-(CHLOROMETHYL)ALLYLTRIMETHOXYSILANE
39443-39-5	SIS6952.0	SILICLAD®
39482-87-6	SIB1828.4	1,3-BIS(TRIFLUOROPROPYL)-1,1,3,3-TETRAMETHYLDISILAZANE, 95%
40195-27-5	SIV9092.2	VINYLPHENYLDIETHOXYSILANE
40372-72-3	SIB1825.0	BIS[3-(TRIETHOXYSILYL)PROPYL]TETRASULFIDE, tech-95
40934-68-7	SIO6711.4	n-OCTYLDIMETHYLSILANE
40949-94-8	SIP6890.0	POTASSIUM HEXAMETHYLDISILAZIDE, 11% in toluene, 0.5M
40949-94-8	SIP6890.1	POTASSIUM HEXAMETHYLDISILAZIDE, 20% in THF
40965-80-8	SIM6500.5	N-METHYLAMINOPROPYLTRIS(TRIMETHYLSILOXY)SILANE
41051-80-3	SID3396.0	(N,N-DIETHYL-3-AMINOPROPYL)TRIMETHOXYSILANE
41081-31-6	SIB0999.0	4-BIPHENYLYLDIMETHYLCHLOROSILANE
41309-43-7	SIB1910.1	2-BROMOVINYLTRIMETHYLSILANE
41318-68-7	SIP6723.0	3-PHENOXYPHENYLDIMETHYLCHLOROSILANE, 95%
41591-87-1	SIT7090.0	TETRADECYLDIMETHYL(3-TRIMETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 50% in methanol
41836-21-9	SIC2264.6	CERIUM(III) TRIS[BIS(TRIMETHYLSILYL)AMIDE]
41836-28-6	SIY9680.0	YTTRIUM(III) TRIS[BIS(TRIMETHYLSILYLAMIDE)]
41879-39-4	SIB1963.0	O-(t-BUTYLDIMETHYLSILYL)HYDROXYLAMINE, 95%
41919-30-6	SIC2325.0	CHLOROMETHYLTRIS(TRIMETHYLSILOXY)SILANE
41966-94-3	SID4069.4	(3,3-DIMETHYLBUTYL)TRIETHOXYSILANE
42003-39-4	SIC2297.0	CHLOROMETHYLSILATRANE
42134-49-6	SIT8606.7	(3-TRIMETHYLSILYL-2-PROPYNYL)TRIPHENYLPHOSPHONIUM BROMIDE
42201-71-8	SIM6575.0	METHYL 3-TRIMETHYLSILYLPROPYNOATE
42292-18-2	SIA0604.5	3-AMINOPROPYLMETHYLBIS(TRIMETHYLSILOXY)SILANE
48183-36-4	SIT8581.0	1-TRIMETHYLSILYLBENZOTRIAZOLE
49539-88-0	SIP6722.6	PHENETHYLTRIMETHOXYSILANE, tech-95
49539-88-0	SIP6731.8	2-PHENYLETHYLTRIMETHOXYSILANE
49749-84-0	SIB1927.4	(Z)-2-BUTENYLTRICHLOROSILANE
50350-62-4	SIT7294.0	TETRAKIS(TRICHLOROSILYL)SILANE
51772-85-1	SIM6481.17	3-METHACRYLOXYPROPYLTRIACETOXYSILANE, tech-90
51826-90-5	SIB1906.0	3-BROMOPROPYLTRIMETHOXYSILANE
51851-37-7	SIP6720.3	PERFLUOROALKYLETHYLTRIETHOXYSILANE
51851-37-7	SIT8175.0	(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)TRIETHOXYSILANE
51895-58-0	SIA0594.0	N-(6-AMINOHEXYL)AMINOPROPYLTRIMETHOXYSILANE, 95%
52034-14-7	SIH6164.2	5-HEXENYLTRIETHOXYSILANE, 95%
52090-23-0	SID4558.2	3-(DIPHENYLPHOSPHINO)PROPYLTRIETHOXYSILANE
52112-26-2	SIB1879.2	4-BROMOBUTYLDIMETHYLCHLOROSILANE
52217-52-4	SIO6708.0	7-OCTENYLTRICHLOROSILANE, tech-95
52217-53-5	SIB1814.0	1,8-BIS(TRICHLOROSILYL)OCTANE
52217-57-9	SIO6709.0	7-OCTENYLTRIMETHOXYSILANE, tech-95
52217-60-4	SIB1824.0	1,8-BIS(TRIETHOXYSILYL)OCTANE
52217-62-6	SIB1809.0	1,10-BIS(TRICHLOROSILYL)DECANE, tech-95
52770-61-3	SIO6707.5	7-OCTENYLDIMETHYLSILANE, tech-95
52783-38-7	SIS6990.0	STYRYLETHYLTRIMETHOXYSILANE, tech-90
52885-13-9	SIB1927.2	(E)-2-BUTENYLTRICHLOROSILANE
53116-81-7	SIT7516.0	TETRAMETHYLAMMONIUM SILICATE, 16-20% in water
53215-95-5	SIB0960.0	N-BENZYLAMINOMETHYLTRIMETHYLSILANE
53392-05-5	SIC2332.0	CHLOROPHENYLTRIETHOXYSILANE (*m*-)
53605-77-9	SIA0114.0	11-ACETOXYUNDECYLTRICHLOROSILANE
53749-38-5	SIC2065.0	10-(CARBOMETHOXY)DECYLDIMETHYLCHLOROSILANE
53883-59-3	SIT8343.0	m-(TRIFLUOROMETHYL)PHENYLTRIMETHOXYSILANE
54076-73-2	SIB0986.0	[(5-BICYCLO[2.2.1]HEPT-2-ENYL)ETHYL]TRICHLOROSILANE, tech-95, endo/exo isomers
54125-02-9	SIM6494.0	1-METHOXY-3-(TRIMETHYLSILOXY)BUTADIENE, 95%
54586-78-6	SIM6483.0	METHACRYLOXYMETHYLTRIMETHOXYSILANE

CAS Number	Catalog #	Name
54655-07-1	SIL6470.0	LITHIUM (TRIMETHYLSILYL)ACETYLIDE, 0.5M in tetrahydrofuran
54925-64-3	SIB1964.0	1-(t-BUTYLDIMETHYLSILYL)IMIDAZOLE
55153-99-6	SIV9079.0	VINYL(p-METHOXYPHENYL)DIMETHYLSILANE
55161-63-2	SIM6473.0	(MERCAPTOMETHYL)METHYLDIETHOXYSILANE, 95%
55289-47-9	SID3385.0	(2-DICYCLOHEXYLPHOSPHINOETHYL)TRIETHOXYSILANE
55290-25-0	GEB1025	GERMANIUM(II) BIS(HEXAMETHYLDISILYL)AMIDE
55453-24-2	SIC2456.0	3-CYANOPROPYLTRIMETHOXYSILANE
55494-04-7	SIB1860.0	BIS(TRIMETHYLSILYL) ITACONATE
55648-29-8	SIA0598.0	3-(m-AMINOPHENOXY)PROPYLTRIMETHOXYSILANE, tech-95
55816-62-1	SIM6492.8	(1-METHOXY-2-PROPOXY)TRIMETHYLSILANE
55967-52-7	SIV9097.5	VINYL-1,1,3,3-TETRAMETHYLDISILOXANE
56253-60-2	SIP6745.0	(PHENYLSELENOMETHYL)TRIMETHYLSILANE, 95%
56310-18-0	SID3120.0	DI-t-BUTYLCHLOROSILANE
56310-20-4	SID3258.0	DI-t-BUTYLMETHYLSILANE
56522-24-8	SIB1965.0	t-BUTYLDIMETHYLSILYLNITRILE
56706-10-6	SIB1824.6	BIS[3-(TRIETHOXYSILYL)PROPYL]DISULFIDE, 90%
56929-77-2	SIH6171.0	HYDROXYETHOXYSILATRANE
57069-48-4	SIM6487.5	METHACRYLOXYPROPYLTRIS(METHOXYETHOXY)SILANE, tech-80
57455-37-5	SIU8850.0	ULTRAMARINE BLUE
57577-96-5	SIA0146.0	3-ACRYLAMIDOPROPYLTRIMETHOXYSILANE, tech-95
57757-66-1	SIA0006.0	(3-ACETAMIDOPROPYL)TRIMETHOXYSILANE
57813-67-9	SIB1928.0	3-BUTENYLTRIETHOXYSILANE, 95%
58068-97-6	SIT8187.5	N-(3-TRIETHOXYSILYLPROPYL)-4,5-DIHYDROIMIDAZOLE
58160-99-9	SIA0608.0	3-AMINOPROPYLSILANETRIOL, 22-25% in water
58274-32-1	SIC2295.3	((CHLOROMETHYL)PHENYLETHYL)TRICHLOROSILANE
58298-01-4	SIB1831.0	BIS(TRIMETHOXYSILYLETHYL)BENZENE, tech-95
58479-61-1	SIB1968.0	t-BUTYLDIPHENYLCHLOROSILANE
58572-15-9	SIA0740.0	APOPHYLLITE, pieces
59004-18-1	SIA0100.0	3-ACETOXYPROPYLTRIMETHOXYSILANE
59218-87-0	SIT8715.0	TRIS(DIMETHYLAMINO)SULFUR(TRIMETHYLSILYL)DIFLUORIDE, tech-95
59863-13-7	SNB1025	TIN(II) BIS(HEXAMETHYLDISILAZIDE)
60085-14-5	SIH5917.0	HEXACOSYLTRICHLOROSILANE
60111-46-8	SIP6921.0	PROPYLTRIS(TRIMETHYLSILOXY)SILANE
60111-47-9	SIT8725.4	TRIS(VINYLDIMETHYLSILOXY)PHENYLSILANE, 95%
60111-52-6	SIT8725.0	TRIS(VINYLDIMETHYLSILOXY)METHYLSILANE, 95%
60111-54-8	SIT7312.0	TETRAKIS(VINYLDIMETHYLSILOXY)SILANE, 95%
60317-40-0	SID4629.0	DODECYLMETHYLDIETHOXYSILANE
60333-76-8	SIP6723.3	3-PHENOXYPROPYLTRICHLOROSILANE
60676-86-0	SIS6964.4	SILICON DIOXIDE, fused
60871-86-5	SIT8191.0	3-(TRIETHOXYSILYLPROPYL)-p-NITROBENZAMIDE
61550-02-5	SIT8571.3	2-(TRIMETHYLSILOXY)FURAN
61790-53-2	SID2754.4	DIATOMACEOUS EARTH, uncalcined
62257-60-7	SIT8716.1	TRIS(TRICHLOROSILYL)SILANE
62269-44-7	SIM6570.0	METHYL-3-(TRIMETHYLSILOXY)CROTONATE
63126-87-4	SIM6511.0	p-(METHYLPHENETHYL)METHYLDICHLOROSILANE, 95%
63231-69-6	SIM6593.0	MOLECULAR SIEVES, 3A, powder
63744-11-6	SIB1852.8	BIS(TRIMETHYLSILYL)AMINODIMETHYLPHOSPHINE
63800-37-3	SIS6948.0	SEPIOLITE
63802-82-4	SIB1880.0	2-BROMOETHYLTRICHLOROSILANE, 95%
64035-64-9	SIT8595.0	TRIMETHYLSILYLMETHYLTRIFLUOROMETHANESULFONATE, 96%
64712-50-1	SIB1937.3	n-BUTYLDIMETHYLMETHOXYSILANE
65100-04-1	SIM6486.8	METHACRYLOXYPROPYLMETHYLDIETHOXYSILANE, 95%
65625-39-0	SIA0055.0	ACETOXYMETHYLTRIMETHOXYSILANE, 95%
65799-47-5	SIG5836.0	(3-GLYCIDOXYPROPYL)METHYLDIMETHOXYSILANE
65994-07-2	SIM6492.7	2-[METHOXY(POLYETHYLENEOXY)PROPYL]TRIMETHOXYSILANE, tech-90
65994-07-2	SIM6492.72	2-[METHOXY(POLYETHYLENEOXY)PROPYL]TRIMETHOXYSILANE, tech-90
65994-07-2	SIM6492.73	2-[METHOXY(POLYETHYLENEOXY)PROPYL]TRIMETHOXYSILANE, tech-90
65994-07-2	SIT8408.0	TRIMETHOXYSILYLPROPOXYPOLYETHYLENEOXIDE, METHYL ETHER, tech-85
65997-17-3	SIG5210.0	GLASS SPHERES, (SOLID BOROSILICATE)
66130-90-3	SID3420.0	DIETHYL(TRIMETHYLSILOXYCARBONYLMETHYL)PHOSPHONATE, 95%
66548-22-9	SIB1026.8	1,2-BIS(t-BUTYLDIMETHYLSILOXY)ETHANE
66604-31-7	SID4627.0	DODECYLDIMETHYLCHLOROSILANE
66753-64-8	SIM6486.5	METHACRYLOXYPROPYLDIMETHYLMETHOXYSILANE, 95%
66817-59-2	SID4582.0	1,3-DIPHENYLTETRAKIS(DIMETHYLSILOXY)DISILOXANE, 95%
67059-49-8	SID3395.0	1,1-DIETHOXY-1-SILACYCLOPENT-3-ENE, tech-95
67186-35-0	SIA0186.0	ACRYLOXYMETHYLTRIMETHYLSILANE
67187-53-6	SIB1955.0	(t-BUTYLDIMETHYLSILYL)DIPHENYLPHOSPHINE, 95%
67240-22-2	SIP6731.6	(S)-N-1-PHENYLETHYL-N'-TRIETHOXYSILYLPROPYLUREA
67353-42-8	SID3546.94	(N,N-DIMETHYL-3-AMINOPROPYL)METHYLDIMETHOXYSILANE
67373-56-2	SIT7906.0	THEXYLDIMETHYLCHLOROSILANE
67475-66-5	SID3395.6	(N,N-DIETHYLAMINOMETHYL)TRIMETHOXYSILANE, 955
67592-36-3	SIC2460.0	[2-(3-CYCLOHEXENYL)ETHYL]TRIMETHOXYSILANE
67674-67-3	SIH6185.0	3-[HYDROXY(POLYETHYLENEOXY)PROPYL]HEPTAMETHYLTRISILOXANE, 90%
67681-66-7	SIA0485.0	ALLYLMETHYLDIMETHOXYSILANE, tech-95
67776-46-9	SIT7292.0	TETRAKIS(2-TRICHLOROSILYLETHYL)SILANE, 95%
67859-75-0	SIO6627.0	n-OCTADECYLMETHYLDIETHOXYSILANE
67873-85-2	SIB1820.5	BIS[m-(2-TRIETHOXYSILYLETHYL)TOLYL]POLYSULFIDE, tech-90
67892-56-2	SID4620.0	DOCOSYLMETHYLDICHLOROSILANE, blend
67909-31-3	SIM6565.0	4-METHYL-7-TRIMETHYLSILOXYCOUMARIN
67963-68-2	SIB1895.0	p-BROMOPHENOXY(t-BUTYL)DIMETHYLSILANE
68037-53-6	SIM6510.0	METHYLHYDROCYCLOSILOXANES, 95%
68092-71-7	SIC2295.0	((CHLOROMETHYL)PHENYLETHYL)DIMETHYLCHLOROSILANE
68128-25-6	SIC2295.5	((CHLOROMETHYL)PHENYLETHYL)TRIMETHOXYSILANE
68187-15-5	SIP6902.2	PRASEODYMIUM ZIRCONIUM SILICATE
68323-30-8	SIB0988.0	[(5-BICYCLO[2.2.1]HEPT-2-ENYL)ETHYL]TRIMETHOXYSILANE, tech-95, endo/exo isomers
68400-09-9	SIA0590.0	N-(2-AMINOETHYL)-3-AMINOPROPYLSILANETRIOL, 25% in water, mainly oligomers
68412-37-3	SIT7110.3	TETRAETHOXYSILANE, oligomeric hydrolysate
68412-56-6	SIP6833.2	PLATINUM-OCTANAL/OCTANOL COMPLEX
68440-88-0	SIT7520.0	TETRAMETHYLAMMONIUM SILOXANOLATE
68469-60-3	SIA0469.0	ALLYL(4-METHOXYPHENYL)DIMETHYLSILANE
68476-25-5	SIF4907.0	FELDSPAR-SODIUM
68478-92-2	SIP6830.3	PLATINUM-DIVINYLTETRAMETHYLDISILOXANE COMPLEX
68478-92-2	SIP6831.2	PLATINUM-DIVINYLTETRAMETHYLDISILOXANE COMPLEX in xylene
68478-92-2	SIP6831.2LC	PLATINUM-DIVINYLTETRAMETHYLDISILOXANE COMPLEX in xylene, LOW COLOR
68479-60-7	SIA0790.0	4-(AZIDOSULFONYL)PHENETHYLTRIMETHOXYSILANE, 22-25% in methanol/toluene
68479-61-8	SIT8190.0	(S)-N-TRIETHOXYSILYLPROPYL-O-MENTHOCARBAMATE
68583-49-3	SIS6961.0	SILICON DIOXIDE, amorphous, OCTAMETHYLCYCLOTETRASILOXANE TREATED
68585-32-0	SIP6832.2	PLATINUM-CYCLOVINYLMETHYLSILOXANE COMPLEX
68733-63-1	SID4552.5	(DIPHENYL)METHYL(DIMETHYLAMINO)SILANE
68845-16-9	SIB1834.0	N,N'-BIS[(3-TRIMETHOXYSILYL)PROPYL]ETHYLENEDIAMINE, 62% in methanol
68845-16-9	SIB1834.1	N,N'-BIS[(3-TRIMETHOXYSILYL)PROPYL]ETHYLENEDIAMINE, 95%
68848-64-6	SIL6469.6	LITHIUM SILICIDE
68855-54-9	SID2754.2	DIATOMACEOUS EARTH, calcined
68909-20-6	SIS6962.0	SILICON DIOXIDE, amorphous, HEXAMETHYLDISILAZANE TREATED
68909-20-6	SIS6962.1M30	SILICON DIOXIDE, amorphous, HEXAMETHYLDISILAZANE TREATED
68959-06-8	SID2780.0	DI-s-BUTOXYALUMINOXYTRIETHOXYSILANE
68959-20-6	SID3392.0	N,N-DIDECYL-N-METHYL-N-(3-TRIMETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 40-42% in methanol
69097-20-7	SIT8720.0	TRIS(TRIMETHYLSILOXY)ETHYLENE, 96%
69304-37-6	SIT7273.0	1,1,3,3-TETRAISOPROPYL-1,3-DICHLORODISILOXANE
69404-97-3	SIB1940.0	2-(t-BUTYLDIMETHYLSILOXY)PENT-2-EN-4-ONE
69465-84-5	SIB1828.0	N,N'-BIS[3-(TRIETHOXYSILYL)PROPYL]UREA, 60% in ethanol
69519-51-3	SID4404.0	1,3-DI-n-OCTYL-1,1,3,3-TETRAMETHYLDISILAZANE
69655-76-1	SIO6706.0	OCTAVINYL-T8-SILSESQUIOXANE
69667-29-4	SIO6696.9	OCTAKIS(TETRAMETHYLAMMONIUM)-T8-SILSESQUIOXANE, hydrate
69733-73-9	SIP6723.2	3-PHENOXYPROPYLDIMETHYLCHLOROSILANE
69739-34-0	SIB1967.0	t-BUTYLDIMETHYLSILYLTRIFLUOROMETHANESULFONATE
69858-29-3	SIB1879.6	4-BROMOBUTYLTRICHLOROSILANE
69861-02-5	SIM6481.15	3-(3-METHACRYLOXY-2-HYDROXYPROPOXY)PROPYLBIS(TRIMETHYLSILOXY)METHYLSILANE, tech-95
69912-79-4	SIM6594.5	MOLECULAR SIEVES, 5A, powder
69952-89-2	SIB1827.0	N,N'-BIS[3-(TRIETHOXYSILYL)PROPYL]THIOUREA, 90%
70240-34-5	SIA0588.8	N-(2-AMINOETHYL)-3-AMINOPROPYLMETHYLDIETHOXYSILANE
70411-42-6	SIA0599.0	m-AMINOPHENYLTRIMETHOXYSILANE, 95%
70693-47-9	SIP6717.0	1,1,1,3,3-PENTAMETHYL-3-ACETOXYDISILOXANE
70693-56-0	SIT8730.0	TRIVINYLETHOXYSILANE, 95%
70851-48-8	SIT8048.0	TRIACONTYLTRICHLOROSILANE, blend
70851-49-9	SID4220.5	DIMETHYLSILA-14-CROWN-5
70851-50-2	SIO6629.0	n-OCTADECYLMETHYLDIMETHOXYSILANE
70851-52-4	SIT8045.0	TRIACONTYLDIMETHYLCHLOROSILANE, blend
70880-05-6	SIT8187.0	N-(TRIETHOXYSILYLPROPYL)DANSYLAMIDE
70892-81-8	SID3255.0	DI-t-BUTYLMETHYLCHLOROSILANE
70942-24-4	SIT8378.3	3-(TRIHYDROXYSILYL)-1-PROPANESULFONIC ACID, 30-35% in water
70955-01-0	SIM6594.0	MOLECULAR SIEVES, 4A, powder
70955-01-0	SIM6594.2	MOLECULAR SIEVES, 4A, beads
70969-28-7	SIZ9810.0	ZIRCONIUM BIS(HEXAMETHYLDISILAZIDE)DICHLORIDE
71223-24-0	SIB1390.0	1,3-BIS(3-METHACRYLOXY-2-HYDROXYPROPOXYPROPYL)TETRAMETHYLDISILOXANE, tech-95
71363-70-7	SIB1816.0	1,3-BIS(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)TETRAMETHYLDISILOXANE
71550-62-4	SIC2437.0	(3-CYANOBUTYL)METHYLDICHLOROSILANE
71550-63-5	SIA0196.0	(3-ACRYLOXYPROPYL)METHYLDICHLOROSILANE
71783-41-0	SID4352.0	3-(2,4-DINITROPHENYLAMINO)PROPYLTRIETHOXYSILANE, 95%
71808-65-6	SIO6618.0	n-OCTADECYLDIMETHYLMETHOXYSILANE
71864-47-6	SIC2465.0	CYCLOHEXYLDIMETHYLCHLOROSILANE
72269-53-5	SID4074.0	(DIMETHYLCHLOROSILYL)METHYL-7,7-DIMETHYLNORPINANE
72878-29-6	SIA0030.0	ACETOXYETHYLTRIMETHOXYSILANE, 95%
73018-55-0	SIP6829.2	PLATINUM CARBONYL CYCLOVINYLMETHYLSILOXANE COMPLEX

CAS Number	Catalog #	Name
73160-32-4	SIV9080.0	VINYLMETHYLBIS(METHYLETHYLKETOXIMINO)SILANE, 95%
73609-36-6	SIT8172.0	(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)METHYLDICHLOROSILANE
73842-99-6	SIB1939.7	3-(t-BUTYLDIMETHYLSILOXY)PROPAN-1-OL
74113-77-2	SIA0588.0	(AMINOETHYLAMINOMETHYL)PHENETHYLTRIMETHOXYSILANE, tech-90
74129-20-7	SIB1030.0	BIS[2-(CHLORODIMETHYLSILYL)ETHYL]BENZENE
74173-08-3	SIB1939.55	2-(t-BUTYLDIMETHYLSILOXY)CYCLOHEXANONE
74542-82-8	SIT8582.5	3-(TRIMETHYLSILYL)-1,2-BUTADIENE, 95%
74612-30-9	SIH5840.4	(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)DIMETHYLCHLOROSILANE
74681-63-3	SIM6485.8	METHACRYLOXYMETHYLTRIS(TRIMETHYLSILOXY)SILANE, tech-95
74695-91-3	SIT8192.0	N-(TRIETHOXYSILYLPROPYL)-O-POLYETHYLENE OXIDE URETHANE, 95%
75009-88-0	SIB1660.0	BIS[(3-METHYLDIMETHOXYSILYL)PROPYL]POLYPROPYLENE OXIDE
75108-40-6	SIT8571.5	2-TRIMETHYLSILOXY-1,1,1,5,5,5-HEXAFLUOROPENT-2-ENE-4-ONE
75144-60-4	SIH6162.0	HEXAVINYLDISILOXANE, 95%
75389-03-6	SIT8572.8	11-(TRIMETHYLSILOXY)UNDECYLTRIETHOXYSILANE
75422-66-1	SIA0440.0	ALLYL(CHLOROMETHYL)DIMETHYLSILANE, 95%
76181-99-2	SID3351.5	DI-tert-BUTYL(TRIMETHYLSILYLMETHYL)PHOSPHINE
76241-02-6	SIB0959.0	BENZOYLOXYPROPYLTRIMETHOXYSILANE
76301-00-3	SIC2072.0	2-(CARBOMETHOXY)ETHYLTRIMETHOXYSILANE
76328-77-3	SIO6617.0	n-OCTADECYLDIMETHYL(DIMETHYLAMINO)SILANE
76358-47-9	SIB1969.0	t-BUTYLDIPHENYLMETHOXYSILANE
76513-69-4	SIT8588.5	2-(TRIMETHYLSILYL)ETHOXYMETHYL CHLORIDE, 95%
76734-22-0	SIV9077.0	VINYL(DIPHENYLPHOSPHINOETHYL)DIMETHYLSILANE
76734-92-4	SIB1852.0	BIS(TRIMETHYLSILYL)ACETYLENEDICARBOXYLATE
76782-82-6	SIP6902.4	PROPARGYLOXY-t-BUTYLDIMETHYLSILANE
77303-23-2	SIP6910.3	n-PROPYLDIMETHYL(DIMETHYLAMINO)SILANE
77377-52-7	SIB1966.0	N-(t-BUTYLDIMETHYLSILYL)-N-METHYLTRIFLUOROACETAMIDE
77425-85-5	SIT8594.5	(TRIMETHYLSILYLMETHYL)TRI-n-BUTYLTIN
77756-79-7	SIC2459.5	[2-(3-CYCLOHEXENYL)ETHYL]TRIETHOXYSILANE
78560-44-8	SIH5841.0	(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TRICHLOROSILANE
78560-45-9	SIT8174.0	(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)TRICHLOROSILANE
78560-47-1	SIN6597.6	NONAFLUOROHEXYLTRICHLOROSILANE
78592-82-2	SIB1939.5	4-(t-BUTYLDIMETHYLSILOXY)BUTYNE
78900-02-4	SIP6716.4	PENTAFLUOROPHENYLPROPYLTRICHLOROSILANE
78948-04-6	SIB1813.5	1,1-BIS(TRICHLOROSILYLMETHYL)ETHYLENE
79265-30-8	SIT8612.0	2-TRIMETHYLSILYLTHIAZOLE
79271-56-0	SIT8335.0	TRIETHYLSILYLTRIFLUOROMETHANESULFONATE
79293-84-8	SIB1966.5	N-(t-BUTYLDIMETHYLSILYL)PHTHALIMIDE
79678-01-6	SIM6496.3	(1-METHOXYVINYL)TRIMETHYLSILANE, 95%
79769-48-5	SIB1908.0	11-BROMOUNDECYLTRICHLOROSILANE, 95%
79793-00-3	SIC2415.0	2-(4-CHLOROSULFONYLPHENYL)ETHYLTRICHLOROSILANE, 50% in methylene chloride
79793-00-3	SIC2415.4	2-(4-CHLOROSULFONYLPHENYL)ETHYLTRICHLOROSILANE, 50% in toluene
79876-59-8	SIH6200.0	2-HYDROXY-4-(3-TRIETHOXYSILYLPROPOXY)DIPHENYLKETONE, tech-90
79957-95-2	SII6456.6	ISOOCTYLDIMETHYLCHLOROSILANE
80249-74-7	SIC2554.0	CYCLOPENTYLSILANE
80252-60-4	SIV9095.0	VINYLPHENYLMETHYLMETHOXYSILANE
80522-42-5	SIT8387.0	TRIISOPROPYLSILYLTRIFLUOROMETHANESULFONATE
80722-63-0	SIB1400.0	1,3-BIS(3-METHACRYLOXYPROPYL)TETRAKIS(TRIMETHYLSILOXY)DISILOXANE, tech-95
80722-63-0	SIM6487.6-06	METHACRYLOXYPROPYLTRIS(TRIMETHYLSILOXY)SILANE, 94%
80722-63-0	SIM6487.6-20	METHACRYLOXYPROPYLTRIS(TRIMETHYLSILOXY)SILANE, 80%
80750-05-6	SIM6487.35	METHACRYLOXYPROPYLTRIISOPROPOXYSILANE
80906-67-8	SIT8410.0	N-(3-TRIMETHOXYSILYLPROPYL)PYRROLE
80907-11-5	SIT8280.0	1,1,1-TRIETHYL-3,3-DIMETHYLDISILOXANE
81290-20-2	SIT8362.0	TRIFLUOROMETHYLTRIMETHYLSILANE
81353-38-0	SIT8588.8	TRIMETHYLSILYLETHYNYLTRI-n-BUTYLTIN
81870-64-6	SIC2295.1	((CHLOROMETHYL)PHENYLETHYL)METHYLDICHLOROSILANE
82356-80-7	SID3349.0	1,3-DI-n-BUTYL-1,1,3,3-TETRAMETHYLDISILAZANE
82985-35-1	SIB1833.0	BIS(3-TRIMETHOXYSILYLPROPYL)AMINE, 96%
83048-65-1	SIH5841.5	(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TRIMETHOXYSILANE
83315-69-9	SIA0777.0	3-AZIDOPROPYLTRIETHOXYSILANE
83315-74-6	SIA0774.0	p-AZIDOMETHYLPHENYLTRIMETHOXYSILANE, 90%
83890-22-6	SID4220.6	DIMETHYLSILA-17-CROWN-6, 90%
83890-22-6	SID4221.0	DIMETHYLSILACROWNS, mixed
83890-23-7	SID4220.7	DIMETHYLSILA-20-CROWN-7, 90%
83890-23-7	SID4221.0	DIMETHYLSILACROWNS, mixed
83936-41-8	SIB1021.5	1,3-BIS(2-AMINOETHYLAMINOMETHYL)TETRAMETHYLDISILOXANE, tech-95
84442-77-3	SIV9208.0	VINYL(3,3,3-TRIFLUOROPROPYL)DIMETHYLSILANE
84494-81-5	SIB1941.0	p-(t-BUTYLDIMETHYLSILOXY)STYRENE
84677-98-5	SID4614.0	1,4-DIVINYL-1,1,4,4-TETRAMETHYL-1,4-DISILABUTANE
84682-36-0	SIT8405.0	S-(TRIMETHOXYSILYLPROPYL)ISOTHIOURONIUM CHLORIDE, 50% in water
84962-98-1	SIT8378.5	3-(TRIHYDROXYSILYL)PROPYL METHYLPHOSPHONATE, MONOSODIUM SALT, 42% in water
85121-42-2	SIB1933.0	t-BUTYLDICHLOROSILANE
85272-30-6	SID3534.0	DIISOPROPYLBIS(TRIFLUOROMETHANESULFONYL)SILANE
85272-31-7	SID3345.0	DI-t-BUTYLSILYLBIS(TRIFLUOROMETHANESULFONATE)

CAS Number	Catalog #	Name
85712-15-8	SIO6712.4	n-OCTYLMETHYLDIMETHOXYSILANE
85807-85-8	SIA0476.0	ALLYLOXY-t-BUTYLDIMETHYLSILANE
85857-16-5	SIT8176.0	(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)TRIMETHOXYSILANE
85877-79-8	SIN6597.7	NONAFLUOROHEXYLTRIMETHOXYSILANE
85912-75-0	SIB1820.5	BIS[m-(2-TRIETHOXYSILYLETHYL)TOLYL]POLYSULFIDE, tech-90
86050-32-0	SID4045.0	DIMETHYL[BIS(CYCLOPENTADIENYL)SILYL] ZIRCONIUM DICHLORIDE
86138-01-4	SIE4675.0	5,6-EPOXYHEXYLTRIETHOXYSILANE
86318-61-8	SIE4901.83	ETHYNYL-t-BUTYLDIMETHYLSILANE
86864-60-0	SIB1939.59	2-(t-BUTYLDIMETHYLSILOXY)ETHYLBROMIDE
87061-56-1	SIB1820.0	1,2-BIS(TRIETHOXYSILYL)ETHYLENE, 95%
87135-01-1	SIB1832.0	1,6-BIS(TRIMETHOXYSILYL)HEXANE
87290-97-9	SIP6732.0	PHENYLETHYNYLDIMETHYLSILANE
87576-94-1	SIA0775.0	(AZIDOMETHYL)TRIMETHYLSILANE, 95%
87630-35-1	SIT8384.8	1-(TRIISOPROPYLSILYL)PYRROLE
87994-64-7	SIA0614.0	3-AMINOPROPYLTRIS(METHOXYETHOXYETHOXY)SILANE, 95%
88276-92-0	SIT8185.3	TRIETHOXSILYLBUTYRALDEHYDE, tech-90
88284-48-4	SIT8598.5	2-(TRIMETHYLSILYL)PHENYLTRIFLUOROMETHANESULFONATE
88321-11-3	SIB1824.56	BIS(3-TRIETHOXYSILYLPROPYL)CARBONATE
88346-87-6	SIB1939.35	1-(t-BUTYLDIMETHYLSILOXY)-1,3-BUTADIENE, 95%
88456-93-3	SIV9066.0	1-VINYL-3-(CHLOROMETHYL)-1,1,3,3-TETRAMETHYLDISILOXANE
89031-82-3	SIB1939.52	1-(t-BUTYLDIMETHYLSILOXY)-3-CHLOROPROPANE
89031-84-5	SIB1904.5	3-BROMOPROPOXY-t-BUTYLDIMETHYLSILANE
89530-43-7	SIP6824.6	1-PHENYL-3-TRIMETHYLSILYL-2-PROPYN-1-OL
90162-40-6	SIB1835.8	1,4-BIS(TRIMETHYLSILOXY)BENZENE
90393-83-2	SIT8715.6	TRIS(GLYCIDOXYPROPYLDIMETHYLSILOXY)PHENYLSILANE, 95%
90633-16-2	SID3539.0	DIISOPROPYLETHOXYSILANE
91166-50-6	SIB1073.0	1,2-BIS(DIMETHYLAMINODIMETHYLSILYL)ETHANE, 96%
92511-12-1	SII6400.0	(4-IODOBUTOXY)-t-BUTYLDIMETHYLSILANE
92779-72-1	SID4599.0	DI(p-TOLYL)DIMETHOXYSILANE
93102-05-7	SIB0966.0	N-BENZYL-N-METHOXYMETHYL-N-(TRIMETHYLSILYLMETHYL)AMINE, 96%
93254-88-7	SIH6116.6	1,1,1,5,5,5-HEXAMETHYLTRISILOXANE
93502-75-1	SIB1972.5	p-(t-BUTYL)PHENETHYLDIMETHYLCHLOROSILANE
93642-68-3	SIT8192.6	(3-TRIETHOXYSILYL)PROPYLSUCCINIC ANHYDRIDE, 95%
93763-70-3	SIP6720.73	PERLITE
93777-98-1	SID4040.0	DIMETHYLBIS(s-BUTYLAMINO)SILANE, 95%
93804-29-6	SIO6711.1	n-OCTYLDIMETHYLMETHOXYSILANE
94071-24-6	SID4611.4	1,3-DIVINYLTETRAKIS(TRIMETHYLSILOXY)DISILOXANE, 95%
96132-98-8	SIM6481.1	N-(3-METHACRYLOXY-2-HYDROXYPROPYL)-3-AMINOPROPYLTRIETHOXYSILANE, 50% in methanol
96164-66-8	SIH6168.0	HEXYLTRIFLUOROSILANE
96220-76-7	SID4065.0	(3,3-DIMETHYLBUTYL)DIMETHYLCHLOROSILANE
96550-26-4	SIA0780.0	6-AZIDOSULFONYLHEXYLTRIETHOXYSILANE, tech-95
96836-74-7	SID3546.8	(DIMETHYLAMINO)METHYLETHOXYSILANE, tech-95
97057-70-0	SIB1940.6	3-(t-BUTYLDIMETHYLSILOXY)-1-PROPYLLITHIUM, 1M in cyclohexane - 20-23 wgt%
97451-53-1	SIP6736.3	6-PHENYLHEXYLDIMETHYLCHLOROSILANE
97927-35-0	SIT8623.0	TRIMETHYLSILYL(TRIMETHYLSILYL)PROPYNOATE
98299-74-2	SIP6928.0	2-(4-PYRIDYLETHYL)TRIETHOXYSILANE
98789-40-3	SIB1632.0	1,2-BIS(METHYLDIMETHOXYSILYL)ETHANE
101519-13-5	SID4590.0	DIPOTASSIUM TRIS(1,2-BENZENEDIOLATO)O,O' SILICATE
101947-16-4	SIH5841.2	(HEPTADECAFLUORO-1,1,2,2-TETRAHYDRODECYL)TRIETHOXYSILANE
101947-16-4	SIP6720.3	PERFLUOROALKYLETHYLTRIETHOXYSILANE
102056-64-4	SIC2520.0	(3-CYCLOPENTADIENYLPROPYL)TRIETHOXYSILANE
102191-92-4	SIB1939.3	t-BUTYLDIMETHYLSILOXYACETALDEHYDE, 90%
102229-10-7	SIB1939.58	2-(t-BUTYLDIMETHYLSILOXY)ETHANOL
102390-98-7	SIN6597.65	NONAFLUOROHEXYLTRIETHOXYSILANE
102488-47-1	SIT8170.0	(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)DIMETHYLCHLOROSILANE
102488-49-3	SIH5840.25	HENEICOSAFLUORODODECYLTRICHLOROSILANE
103457-72-3	SIE4885.0	ERBIUM TRIS(HEXAMETHYLDISILAZIDE)
104164-54-7	GET8721.5	TRIS(TRIMETHYLSILYL)GERMANE
104275-58-3	SIT8189.0	N-(3-TRIETHOXYSILYLPROPYL)GLUCONAMIDE, 50% in ethanol
105566-68-5	SIB1832.7	1,8-BIS(TRIMETHOXYSILYL)OCTANE
105732-02-3	SID4069.0	(3,3-DIMETHYLBUTYL)TRICHLOROSILANE
106359-89-1	SIT8570.5	2-TRIMETHYLSILOXY-4-ALLYLOXYDIPHENYLKETONE
106868-88-6	SIS6944.0	3-(4-SEMICARBAZIDYL)PROPYLTRIETHOXYSILANE, tech-95
106948-24-7	SIA0461.0	ALLYLDIMETHYL(DIISOPROPYLAMINO)SILANE
106996-32-1	SIT8394.0	N-[5-(TRIMETHOXYSILYL)-2-AZA-1-OXOPENTYL]CAPROLACTAM, 95%
107602-27-7	SIB1811.0	BIS(TRICHLOROSILYLETHYL)BENZENE, tech-95
108534-47-0	SIB1939.6	4-(t-BUTYLDIMETHYLSILOXY)PHENOL
108587-59-3	SIM6481.48	METHACRYLOXYMETHYLPHENETHYLTRIS(TRIMETHYLSILOXY)SILANE, mixed isomers
108587-60-6	SIM6481.48	METHACRYLOXYMETHYLPHENETHYLTRIS(TRIMETHYLSILOXY)SILANE, mixed isomers
109144-59-4	SIB1971.0	t-BUTYLISOPROPYLDIMETHOXYSILANE
109213-85-6	SIM6480.73	(3-METHACRYLAMIDOPROPYL)TRIETHOXYSILANE, tech-95
109433-86-5	SIT6997.0	TERBIUM TRIS(HEXAMETHYLDISILAZIDE)
110348-62-4	SIO6711.3	n-OCTYLDIMETHYL(DIMETHYLAMINO)SILANE

CAS Number	Catalog #	Name
211931-07-6	SID2752.0	1,3-DIALLYLTETRAKIS(TRIMETHYLSILOXY)DISILOXANE, 95%
211934-50-8	SIO6624.0	n-OCTADECYLMETHOXYDICHLOROSILANE, tech-95
211935-21-6	SIP6722.8	PHENETHYLTRIS(TRIMETHYLSILOXY)SILANE
211945-95-8	SIT8716.0	TRIS(TRICHLOROSILYLETHYL)METHYLSILANE, tech-95
211985-18-1	SIV9062.0	VINYL(BROMOMETHYL)DIMETHYLSILANE
211985-85-2	SIV9088.0	VINYLOCTYLDICHLOROSILANE
211985-86-3	SIV9205.0	VINYL(TRIFLUOROMETHYL)DIMETHYLSILANE
213602-91-6	SIP6932.0	2-PYRIDYLTRIETHOXYSILANE
214268-06-1	SIT8605.0	3-TRIMETHYLSILYLPROPARGYLMETHACRYLATE, 95%
214362-07-9	SIB1142.0	N,N'-BIS(2-HYDROXYETHYL)-N,N'-BIS(TRIMETHOXYSILYLPROPYL)ETHYLENEDIAMINE, 66-68% in methanol
220527-24-2	SIC2265.5	(CHLORODIMETHYLSILYL)-5-[2-(CHLORODIMETHYLSILYL)ETHYL]BICYCLOHEPTANE
220727-26-4	SIO6704.0	S-(OCTANOYL)MERCAPTOPROPYLTRIETHOXYSILANE
221105-38-0	SIC2058.2	3-CARBAZOLYLPROPYLTRIETHOXYSILANE
223668-64-2	SIP6716.73	PENTAFLUOROPHENYLTRIMETHOXYSILANE
223668-68-6	SIB1710.0	BIS(PENTAFLUOROPHENYL)DIMETHOXYSILANE
225794-57-0	SIT8719.5	[TRIS(TRIMETHYLSILOXY)SILYLETHYL]DIMETHYLCHLOROSILANE
226558-82-3	SIB1879.7	4-BROMOBUTYLTRIMETHOXYSILANE
227085-51-0	SIE4886.0	(3-(N-ETHYLAMINO)ISOBUTYL)TRIMETHOXYSILANE
228700-87-6	SIM6493.2	METHOXYTRIETHYLENEOXYPROPYLTRICHLOROSILANE
229621-70-9	SIB1770.0	1,2-BIS(TETRAMETHYLDISILOXANYL)ETHANE, 95%
247244-66-2	SIB1403.0	1,3-BIS(METHACRYLOXY)-2-TRIMETHYLSILOXYPROPANE, 95%
251453-07-3	SIM6492.3	1-(4-METHOXYPHENYL)-1-CHLOROSILACYCLOBUTANE
253279-88-8	SIE4897.2	m,p-ETHYLPHENETHYLDIMETHYLCHLOROSILANE, tech-95
253788-37-3	SIC2456.5	11-CYANOUNDECYLTRIMETHOXYSILANE
254455-63-5	SIT7275.0	TETRAKIS(BUTOXYETHOXYETHOXY)SILANE, tech-95
255727-67-4	SIB1891.6	[11-(2-BROMO-2-METHYL)PROPIONYLOXY]UNDECYLTRICHLOROSILANE
256343-28-9	SIT8686.0	(TRIPHENYLMETHYL)METHYLDICHLOROSILANE
259727-10-1	SID4465.0	N,N-DIOCTYL-N'-TRIETHOXYSILYLPROPYLUREA
259818-29-6	SIE4897.5	m,p-ETHYLPHENETHYLTRIMETHOXYSILANE, tech-95
261717-41-3	SIH5844.5	(E)-HEPTENYLDIISOPROPYLSILANOL
264128-94-1	SIH6171.5	N-(HYDROXYETHYL)-N,N-BIS(TRIMETHOXYSILYLPROPYL)AMINE, 65% in methanol
275378-62-6	SIE4885.8	(3-(N-ETHYLAMINO)ISOBUTYL)METHYLDIETHOXYSILANE
282534-42-3	SIA0070.0	4-ACETOXYPHENETHYLTRICHLOROSILANE
303191-26-6	SIP6716.6	PENTAFLUOROPHENYLPROPYLTRIMETHOXYSILANE
303746-21-6	SIV9277.0	VINYLTRIS(1-METHOXY-2-PROPOXY)SILANE
307531-94-8	SIM6486.65	METHACRYLOXYPROPYLHEPTAISOBUTYL-T8-SILSESQUIOXANE, tech-95
309963-45-9	SIB0950.0	BENZHYDRYLOXYBIS(TRIMETHYLSILOXY)CHLOROSILANE
314021-97-1	SIT8397.0	(3-TRIMETHOXYSILYL)PROPYL 2-BROMO-2-METHYLPROPIONATE
314270-00-3	SIP6917.2	PROPYLTRIETHOXYSILANE, oligomeric hydrolysate
330457-42-6	SIB1907.6	11-BROMOUNDECYLDIMETHYLCHLOROSILANE, 95%
330457-44-8	SID4618.0	DOCOSENYLTRIETHOXYSILANE, 95%
330457-46-0	SIH6172.0	N-(HYDROXYETHYL)-N-METHYLAMINOPROPYLTRIMETHOXYSILANE, 75% in methanol
334521-23-2	SIA0795.0	11-AZIDOUNDECYLTRIMETHOXYSILANE, 95%
359859-29-3	SID4557.5	(2-DIPHENYLPHOSPHINO)ETHYLDIMETHYLETHOXYSILANE
376353-50-3	SIM6509.0	3,4-METHYLENEDIOXYPHENYLTRIETHOXYSILANE
383189-04-6	AKB159.5	BORON VINYLDIMETHYLSILOXIDE
388606-32-4	SIA0604.0	N-(3-AMINOPROPYLDIMETHYLSILYL)AZA-2,2-DIMETHYL-2-SILACYCLOPENTANE
394210-97-0	SIM6479.3	11-MERCAPTOUNDECYLOXYTRIMETHYLSILANE
401514-97-4	SIT8045.4	3-TRIACONTYLHEPTAMETHYLTRISILOXANE, tech-85
404392-70-7	SIB1966.3	t-BUTYLDIMETHYLSILYL-N-PHENYLBENZIMIDATE
438569-05-2	SIT8177.0	p-(TRIETHOXYSILYL)ACETOPHENONE, 95%
441307-02-4	SIB1138.0	1,3-BIS(3-(2-HYDROXYETHOXY)PROPYL)TETRAMETHYLDISILOXANE, 95%
445303-83-3	SIB1811.5	1,8-BIS(TRICHLOROSILYLETHYL)HEXADECAFLUOROOCTANE
447440-43-9	SIA0433.0	(S,S)-2-ALLYL-2-CHLORO-3,4-DIMETHYL-5-PHENYL-[1,3,2]-OXAZASILOLIDINE
469904-32-3	SIT8173.0	(TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)SILANE
469904-33-4	SIB1907.8	11-BROMOUNDECYLSILANE
475213-01-5	SIV9073.8	VINYLDI-n-OCTYLMETHYLSILANE
475213-02-6	SID4401.5	2-(DI-n-OCTYLMETHYLSILYL)ETHYLTRICHLOROSILANE
475213-03-7	SID4401.0	2-(DI-n-OCTYLMETHYLSILYL)ETHYLDIMETHYLCHLOROSILANE
502925-36-2	SIB1845.0	3-[BIS(TRIMETHYLSILOXY)METHYLSILYLPROPOXY]SULFOLANE
502925-40-8	SIT8186.0	3-[2-(3-TRIETHOXYSILYLPROPOXY)ETHOXY]SULFOLANE, 95%
518359-82-5	SIO6600.0	OCTA(AMINOPHENYL)-T8-SILSESQUIOXANE
521069-00-1	SIB1815.7	BIS((TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)DIMETHYLSILOXY)METHYLSILANE
521069-01-2	SIB1815.5	BIS((TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)DIMETHYLSILOXY)METHYLCHLOROSILANE
526204-46-6	SIP6723.4	11-PHENOXYUNDECYLTRICHLOROSILANE
561069-04-3	SIT8345.0	p-TRIFLUOROMETHYLTETRAFLUOROPHENYLTRIETHOXYSILANE
618914-44-6	SIB1932.4	N-n-BUTYL-AZA-2,2-DIMETHOXYSILACYCLOPENTANE
618914-49-1	SIA0415.0	N-ALLYL-AZA-2,2-DIMETHOXYSILACYCLOPENTANE
620987-03-3	SIB1808.0	1,2-BIS(TRICHLOROSILYL)DECANE
623938-90-9	SIB0957.0	N-(2-N-BENZYLAMINOETHYL)-3-AMINOPROPYLTRIMETHOXYSILANE hydrochloride, 90%,50% in methanol, 90%
627882-90-0	SIA0070.0	4-ACETOXYPHENETHYLTRICHLOROSILANE
666829-33-0	SIB1824.84	BIS(3-TRIETHOXYSILYLPROPYL)POLYETHYLENE OXIDE (25-30 EO)
675129-70-1	SIN6597.24	4-NITRO-4'(N-ETHYL-N-TRIMETHOXYSILYLCARBAMATO)AMINOAZOBENZENE, tech-95
680592-40-9	SIP6724.95	(S,S)-2-PHENYL-2-CHLORO-3,4-DIMETHYL-5-PHENYL-[1,3,2]-OXAZASILOLIDINE
684284-12-6	SIC2056.2	(-)-CAMPHANYLDIMETHYLCHLOROSILANE
718635-97-3	SIM6511.0	p-(METHYLPHENETHYL)METHYLDICHLOROSILANE, 95%
722542-79-2	SIM6511.2	(p-METHYLPHENETHYL)METHYLDIMETHOXYSILANE, 95%
722542-80-5	SIM6511.2	(p-METHYLPHENETHYL)METHYLDIMETHOXYSILANE, 95%
724460-16-6	SIC2456.3	11-CYANOUNDECYLTRICHLOROSILANE
773893-02-0	SIB1894.2	5-BROMOPENTYLTRIMETHOXYSILANE
793681-94-4	SIC2437.5	(3-CYANOBUTYL)METHYLDIMETHOXYSILANE
832079-33-1	SIB1829.0	1,2-BIS(TRIMETHOXYSILYL)DECANE
848821-58-9	SID4589.0	(S)-(-)-[(DIPHENYL)TRIMETHYLSILOXYMETHYL]PYRROLIDINE
862911-98-6	SIB1824.4	2,2-BIS(3-TRIETHOXYSILYLPROPOXYMETHYL)BUTANOL, 50% in ethanol
862911-99-7	SIB1815.3	3,3-BIS(TRICHLOROSILYLPROPOXYMETHYL)-5-OXA-TRIDECANE, 95%
862912-02-5	SIB1815.1	1,3-BIS(3-TRICHLOROSILYLPROPOXY)-2-DECYLOXYPROPANE
864466-71-7	SID4480.0	2-(S)-[(DIPHENYL)(t-BUTYLDIMETHYLSILOXY)METHYL]PYRROLIDINE
865811-55-8	SIT8715.4	TRIS(DIMETHYLSILOXY)ETHOXYSILANE, tech-95
865811-56-9	SIT7087.0	1,1,3,3-TETRACYCLOPENTYLDICHLORODISILOXANE
865811-59-2	SIB1110.0	1,5-BIS(GLYCIDOXYPROPYL)-3-PHENYL-1,1,3,5,5-PENTAMETHYLTRISILOXANE
866935-66-2	SIT8194.5	TRIETHOXYSILYLUNDECANAL, ETHYLENE GLYCOL ACETAL
870987-68-1	SIP6902.6	O-(PROPARGYL)-N-(TRIETHOXYSILYLPROPYL) CARBAMATE, 90%
870998-79-0	SIP6720.72	[PERFLUORO(POLYPROPYLENEOXY)]METHOXYPROPYLTRIMETHOXYSILANE, 20% in fluorinated hydrocarbon
872575-06-9	SIU9049.0	10-UNDECENYLTRIMETHOXYSILANE
876338-08-8	SIT8378.1	TRIHYDROXYSILYLETHYL PHENYLSULPHONIC ACID, 25% in water
877593-17-4	SIM6480.0	11-MERCAPTOUNDECYLTRIMETHOXYSILANE, 95%
879197-67-8	SIT7909.7	(3-(3-THYMINYL)PROPIONOXY)PROPYLTRIMETHOXYSILANE
879904-87-7	SIS6987.0	SODIUM (2-THIENYL)DIMETHYLSILANOLATE, 2M in tetrahydrofuran
879904-88-8	SIS6980.6	SODIUM (2-FURYL)DIMETHYLSILANOLATE
899823-76-8	SIB0981.0	(5-BICYCLO[2.2.1]HEPT-2-ENYL)DIMETHYLETHOXYSILANE
913375-27-6	SIT8186.45	4-(TRIETHOXYSILYLPROPOXY)-2,2,6,6-TETRAMETHYLPIPERIDINE N-OXIDE, tech-85
916667-75-9	SIB1026.4	1,3-BIS(4-BIPHENYL)-1,1,3,3-TETRAMETHYLDISILAZANE, 95%
917773-12-7	SIT8185.3	TRIETHOXSILYLBUTYRALDEHYDE, tech-90
920741-92-0	SIT8011.0	O-DL-a-TOCOPHEROLYLPROPYLHEPTAMETHYLTRISILOXANE, tech-90
937202-23-8	SIT8571.28	(S)-2-[TRIMETHYLSILOXY(DIPHENYL)METHYL]PYRROLIDINE
943349-49-3	SIM6491.5	11-(2-METHOXYETHOXY)UNDECYLTRICHLOROSILANE
944721-47-5	SIP6716.0	PENTAFLUOROPHENOXYUNDECYLTRIMETHOXYSILANE
945761-08-0	SIT8186.2	7-TRIETHOXYSILYLPROPOXY-5-HYDROXYFLAVONE, 50% in xylene
947155-81-9	SID4400.4	DI-n-OCTYLDIMETHOXYSILANE
947329-82-0	SIB1824.8	1,7-BIS(4-TRIETHOXYSILYLPROPOXY-3-METHOXYPHENYL)-1,6-HEPTADIENE-3,5-DIONE, tech-90
959053-85-1	SIA0115.0	11-ACETOXYUNDECYLTRIETHOXYSILANE
1015787-64-0	SID2671.0	n-DECYLTRIS(DIMETHYLAMINO)SILANE
1041420-54-5	SIT8186.3	TRIETHOXYSILYLPROPOXY(POLYETHYLENEOXY)DODECANOATE, tech-95
1049679-56-2	SIC2439.0	(3-CYANOBUTYL)TRIETHOXYSILANE
1184179-50-7	SIT8187.2	(1-(3-TRIETHOXYSILYL)PROPYL)-2,2-DIETHOXY-1-AZA-2-SILACYCLOPENTANE, tech-90
1191036-21-1	SIC2335.0	(3-CHLOROPROPOXY)ISOPROPYLDIMETHYLSILANE
1196453-35-6	SIA0482.0	11-ALLYLOXYUNDECYLTRIMETHOXYSILANE
1211488-83-3	SIC2067.0	10-(CARBOMETHOXY)DECYLDIMETHYLMETHOXYSILANE
1220126-66-8	SIP6716.3	PENTAFLUOROPHENYLPROPYLMETHYLDICHLOROSILANE
1223044-18-5	SIP6736.32	6-PHENYLHEXYLDIMETHYL(DIMETHYLAMINO)SILANE
1233513-31-9	SIP6744.2	3-PHENYLPROPYLMETHYLDIMETHOXYSILANE
1245946-78-4	SIA0770.0	(AZIDOMETHYL)PHENETHYLTRIMETHOXYSILANE, tech-90
1250435-76-7	SIT8716.2	TRIS(TRIETHOXYSILYLMETHYL)AMINE, tech-90
1263043-99-7	SIH6168.7	4-R-8-HYDRO-9-[BIS(TRIMETHYLSILOXY)METHYLSILYL]LIMONENE
1263044-00-3	SIH6168.7	4-R-8-HYDRO-9-[BIS(TRIMETHYLSILOXY)METHYLSILYL]LIMONENE
1263429-91-9	SIO6660.0	OCTAETHOXY-1,3,5-TRISILAPENTANE
1274903-53-5	SIA0120.2	N-(ACETYLGLYCYL)-3-AMINOPROPYLTRIMETHOXYSILANE, 5% in methanol
1300591-79-0	SIA0126.0	3-(N-ACETYL-4-HYDROXYPROLYLOXY)PROPYLTRIETHOXYSILANE, 25% in ethanol
1314639-85-4	SID3224.0	DI-t-BUTYLISOBUTYLSILANE
1314639-86-5	SID3226.0	DI-t-BUTYLISOBUTYLSILYL TRIFLUOROMETHANESULFONATE
1314981-48-0	SIV9064.0	VINYL(CHLOROMETHYL)DIMETHOXYSILANE
1356113-09-1	SIA0035.0	ACETOXYETHYLTRIS(DIMETHYLAMINO)SILANE
1356114-66-3	SIT8721.2	TRIS(TRIMETHYLSILOXY)SILYLETHYLTRIETHOXYSILANE
1361237-41-3	SIT7122.4	3-(TETRAHYDROFURFURYLOXYPROPYL)HEPTAMETHYLTRISILOXANE
1364140-50-0	SIT8411.0	2-(3-TRIMETHOXYSILYLPROPYLTHIO)THIOPHENE
1364487-19-3	SIT7580.0	2,2,3,3-TETRAMETHYLTETRASILANE, 95%
1367348-25-1	SIA0127.0	N-(N-ACETYLLEUCYL)-3-AMINOPROPYLTRIETHOXYSILANE, 12-15% in ethanol
1385027-19-9	SIT8715.9	TRIS(SILYLMETHYL)SILANE
1385031-14-0	SIO6715.2	OCTYLTRIETHOXYSILANE, oligomeric hydrolysate

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Silicones

Section 3-Silicone Articles

Section 4-Silicone Polymers: Registry of Products and Properties

Section 5-Performance Products

Enabling Your Technology

RING-OPENING POLYMERIZATION OF CYCLOSILOXANES

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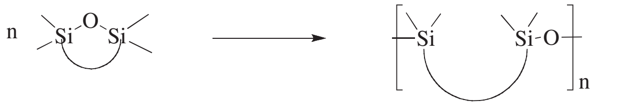
Introduction

Ring-opening polymerization (ROP) of cyclic siloxanes is a process of the transformation of a cyclic siloxane into a linear siloxane polymer as a result of the cleavage of the SiOSi bond in the siloxane ring and the subsequent reformation of this bond in the polymer chain. (Eq. 1)



(1)

For over 60 years this reaction has been extensively used in industry and in chemical laboratories as the basic method for the generation of high molecular weight linear polysiloxanes. It gives advantages over the polycondensation of difunctional silanes, as it allows for better control of the size and structure of the desired siloxanes. In contrast with the polycondensation route, less low molecular weight side products are formed during the ROP process and the concentration of the reactive end groups remains at a low stationary level during chain growth. Reviews on this subject are available.[1-7]

A suitable monomer for the ROP of siloxanes may be any cyclic compound containing a reactive SiOSi group in its ring skeleton, which is thermodynamically less stable compared to its linear counterpart. Many cyclic oligosiloxanes of the general formula $(R_1R_2SiO)_n$ having various substituents at silicon and various ring sizes fulfill this condition. Thus, the family of monomers of the ROP process is broad. In addition to the siloxane moiety, other atoms or groups of atoms in the monomer rings can also be employed in this process. Examples of some typical ROP monomers of cyclic siloxanes are shown in Figure 1.

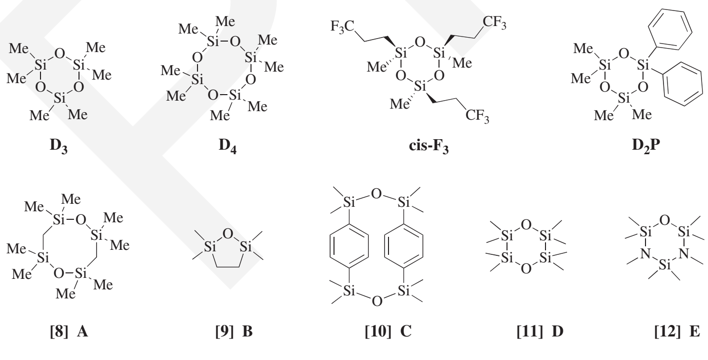


Figure 1. Examples of monomers for ROP of cyclosiloxanes[8-12]

The most important monomers are: octamethylcyclotetrasiloxane, abbreviated as D_4 (D marks the Me_2SiO unit) and hexamethylcyclotrisiloxane, abbreviated as D_3. D_4 monomer is by far the most common as it is the most thermodynamically stable cyclic siloxane.[1] While D_4 is the monomer most often used in the equilibrium polymerization of cyclosiloxanes (section 3.1), D_3 is a common monomer in the kinetically controlled synthesis of polysiloxanes (section 3.2).[2-7] Cyclosiloxane cis-F_3 is an example of the monomer having configurational units. The ROP of this type of monomers may lead to polymers of various tacticities, i.e., stereochemical structures.[13] The polymerization of monomer D_2P, and other cyclosiloxanes with mixed units, may lead to various sequences of siloxane units in the polymer chain.[14] Structures in the lower row of Figure 1 represent examples of monomers with other atoms in the ring skeleton capable of forming linear polymers or copolymers by siloxane bond breaking and making mechanisms.

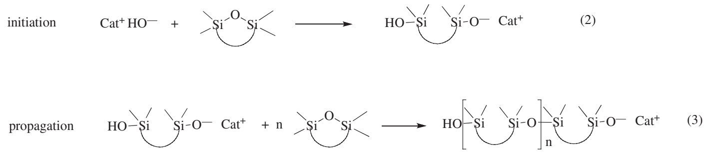
The ROP of cyclosiloxanes is classified as anionic (AROP) or cationic (CROP) according to the charge of their reactive intermediates (active propagation centers). The other ROP classification depends on the way polymer chain growth is controlled. Equilibrium ROP, with thermodynamic control of products, can be distinguished from non-equilibrium ROP, with kinetic control of products. ROP of cyclosiloxanes may be performed in different conditions: in bulk, in solution, as an emulsion or miniemulsion, and in the solid state.

Anionic and Cationic Routes of ROP of Cyclosiloxanes

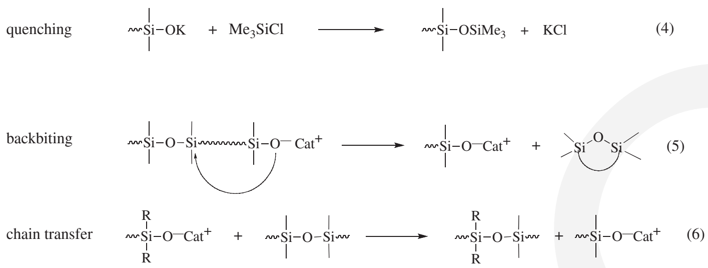
Anionic Ring-Opening Polymerization (AROP) of Cyclosiloxanes

The AROP of cyclosiloxanes is initiated by strong inorganic or organic bases. Alkali metal hydroxides, such as KOH, and silanolates derived from them are common catalysts.[1-7] Hydroxides and silanolates with quarternary ammonium or phosphonium counter-ions, such as Me_4NOH and Bu_4POH, are very effective AROP catalysts. Their additional benefit is connected to thermolability, which permits stabilization of the polymer by the thermal decomposition of the active propagation centers.[15] Organic bases, such as organolithium reagents, are very reactive and important initiators, often used for precision synthesis of polysiloxanes with narrow polydispersivities. Another class of AROP initiators are organic superbases, such as peraminooligophosphazenium hydroxides or alkoxides and thermolabile phosphorus ylides.[16-19] These are able to initiate very fast polymerizations under relatively mild conditions.

AROP of cyclosiloxanes is initiated by ring opening of the monomeric cyclic producing a silanolate ion, which then propagates the polymer chain *via* subsequent ring opening of monomer.[20] (Eq. 2-3)

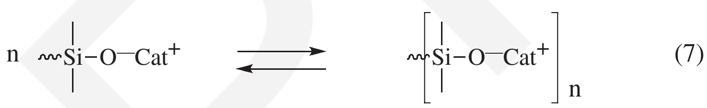


In the absence of water and CO_2 from atmosphere or other acidic contamination, the active propagating species is stable. Thus, there is no termination and the reaction must be quenched. Trimethylchlorosilane is a commonly used quench, which introduces an inert trimethylsilyl unit at the polymer chain end. (Eq. 4) Propagation of the polymer chain is accompanied by backbiting, which leads to cyclic oligomers and macrocycles, and chain transfer, which results in randomization of the polymer chain. (Eq. 5-6)



Oligosiloxane-α,ω-disilanolates, such as $KO(SiMe_2O)_nOK$, may be used as the initiator, eliminating silanol end-groups from the polymerization system. These groups strongly influence the control of the polymer structure.[21] In addition, oligosiloxanediolates having sufficiently long chain are soluble in the polymerization system.

AROP of cyclosiloxanes is strongly affected by the interaction of the ionic propagation centers.[21] The typical active form of a siloxane propagation center is an ion pair. The silanolate ion pair exhibits a strong tendency for aggregation.[22] (Eq. 7)



The aggregates are not able to propagate, thus they form dormant propagation centers. The polymerization kinetics are greatly affected by this phenomenon. Since the equilibrium of aggregation is shifted towards the side of the complex, polymerization is strongly inhibited and exhibits fractional order in initiator. Without addition of a promoter, rate is dependent on the counter-ion: $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+ \sim R_4N^+ \sim R_4P^+$.

Addition of promoter, a strong uncharged nucleophilic species such as dimethylsulfoxide (DMSO), hexamethyltriamide of orthophosphoric acid (HMPA), or dimethylformamide (DMF) effectively increases the rate of polymerization by forming more reactive ion pairs and increasing the concentration of non-aggregated silanolate.[21,23] The same effect is attained when the reaction is performed in a solvent interacting with countercation. This is the reason why the polymerization of D_3 with lithium silanolate initiator is complete within several hours in THF solvent at room temperature, but no polymerization occurs in bulk or hydrocarbon solvent at temperatures as high as 100 °C.

Crown ethers and cryptands accelerate the reaction efficiently as they multidentally coordinate the counter-ion.[24,25] Bases containing cations with highly delocalized charge, such as peraminooligophosphazenium ions, induce very fast polymerization. D_4 has been reported to be polymerized in 1-5 min at room temperature with such bases.[16-18]

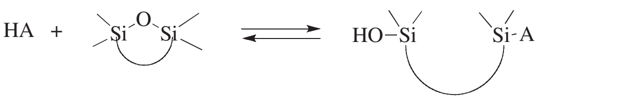
Rate of AROP is influence by the monomer structure of the cyclic siloxane —the ring size and substituents.[2-7,21,23-26] Within the same cyclic homologue series, the most reactive are small strained rings, such as six-membered cyclotrisiloxane rings and five-membered cyclo-1-oxa-2,5-disilacyclopentane rings. (Figure 1, structure B) Thus, D_3 is opened faster than D_4 by a factor of about 10^2-10^3. With further increase of the ring size the reactivity may change in different ways depending on the initiator.[21,23,26] Electronegative substituents at silicon increase the reactivity, while steric effects decrease the rate.[21,23]

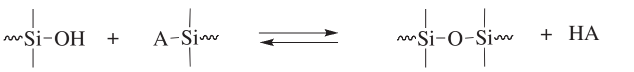
AROP of cyclosiloxanes is commonly used for the synthesis of polysiloxanes in industry and in research laboratories. It is the preferred route to polymers of high molar mass, such as used in the production of HTV (high temperature vulcanized) silicone rubber.[1] AROP techniques also allow for the kinetically controlled precision synthesis of functionalized polysiloxanes (see section 3.2).[2-7]

Cationic Ring Opening Polymerization (CROP) of Cyclosiloxanes

The most common initiators for the CROP of cyclosiloxanes are strong protic acids. Commonly used initiators include: H_2SO_4, CF_3SO_3H, $HClO_4$, CH_3SO_3H.[1-3,21] CF_3SO_3H is very effective and preferred for synthetic use in laboratories, while H_2SO_4 is primarily used in industry due to cost and safety concerns. Dodecylbenzenesulfonic acid is used as an initiator and surfactant in emulsion polymerizations. Initiators composed of a protic acid and a Lewis acid, such as $HCl/FeCl_3$ or $HCl/SbCl_6$, are reported to be effective for CROP.[27-29] Bis(trifluoromethane)sulfonimide and tetrakis(pentafluorophenyl)borate protic complex were also reported as very active initiators.[30-31] Heterogenic systems, acid-activated minerals or cation exchange resins, are readily used as they can be easily separated from the polymer product.[32-36] Some non-protic initiators, such as $SbCl_5/CH_3C(O)Cl$, $(C_6H_5)_3C^+B(C_6F_5)_4^-/R_3SiH$, and bismuth triflate, were demonstrated to initiate the CROP, but they are of minor importance in synthesis of polysiloxanes.[37-39] The high initiating activity of Lewis acids can be attributed to the products of their interaction with protic contaminants.

The mechanism of CROP is complex and comprised of many component reactions. Relative reaction rates differ considerably depending on monomer, initiator and reaction conditions. The acid (HA) initiates the opening of the monomer ring.[2-5,21] (Eq. 8) The reverse condensation processes occur inter- and intramolecularly with stationary concentrations of the acid water and reactive terminal groups. (Eq. 9-10) The acid activates end-groups for monomer addition and catalyzes reactions 8-10. Water forms strong hydrogen bond complexes with the acid, affecting the acid activity.[40,41] (Eq. 11)


(8)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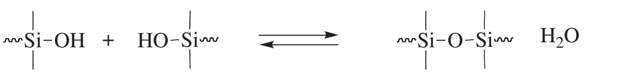
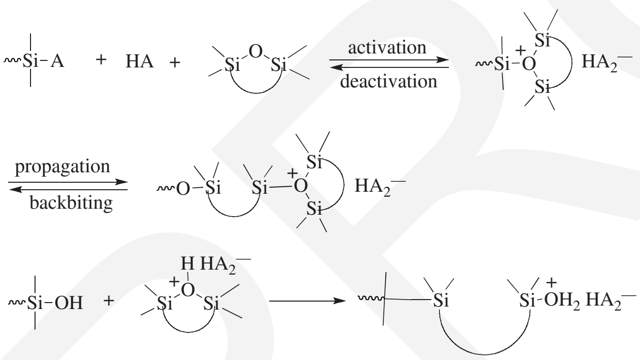

(10)

$$n\,HA + m\,H_2O \rightleftharpoons [(HA)n\bullet(H_2O)m] \qquad (11)$$

There are at least three pathways of siloxane macromolecule growth in CROP. Contribution of condensation processes to the chain formation may be considerable.[40] (Eq. 9-10) However, it is generally accepted that the polymer is formed primarily from the addition of monomer to the end group. This requires acid activation of either the end group or the monomer, forming a tertiary or secondary silyloxonium ion.[38,40-43] (Eq. 12-13)


(12)
(13)

Tertiary silyloxonium ions are very unstable and detected only at very low temperatures or for monomers of special design.[38,44] Deactivation processes dominate over propagation, so the polymer chain grows stepwise and the molecular weight of the polymer increases with monomer conversion.

Since a stationary concentration of acid is maintained throughout the process, the initiation mechanism presented in equation 8 occurs continuously throughout the polymer growth, leading to a broadening of the molecular weight distribution. Another feature of this polymerization is the formation of considerable amounts of cyclic products. They are formed by intramolecular reactions of end groups and by ring-expansion isomerization of the tertiary oxonium ion.[21,41,43,45,46] Backbiting and chain transfer contribute to the polymerization of unstrained cyclics but are of minor importance in the CROP of cyclotrisiloxanes.[47]

Strained ring monomers (e.g. D_3) polymerize faster than the unstrained ones (e.g. D_4). Polar and steric effects of substituents are reported to play an important role in affecting the monomer reactivity.[3] In contrast to anionic polymerization, the rate is decreased by electron withdrawing polar substituents. The rate of the polymerization depends largely upon the acid strength, thus CF_3SO_3H is a much more active initiator than CH_3SO_3H.

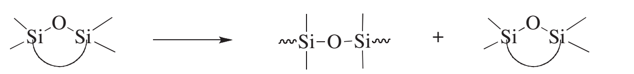
The cationic route is extensively exploited in equilibrium ROP of siloxanes (section 3.1), but is rarely used in processes performed with kinetic control (Section 3.2). Some initiation systems allow for good control of the polymer structure.[29] CROP of D_3 initiated by $SbCl_5/HCl/Me_2SiCl_2$ leads to polymers of controlled molecular weight and low cyclic content. Addition of an excess of a triorganosilyl ester to the polymerization system initiated by CF_3SO_3H considerably reduces cyclic content and permits good molecular weight control.[48] Cationic polymerization is practiced in emulsion, miniemulsion and heterogenized polymerization systems. In these cases, the CROP mechanism is different from that in homogeneous media.[27,32-36]

Equilibrium and Kinetic Control of The Product in The ROP of Cyclosiloxanes

Equilibrium Polymerization (Equilibration)

Basic knowledge

Equilibrium ROP is carried out until the process achieves the equilibrium state. Since equilibrium is independent of the reaction mechanism, virtually the same polymer yield and structure is obtained from both anionic and cationic routes. Knowledge of the equilibrium state is the most important issue in understanding this process. The equilibrium state is complex, as two series of homologues (linear and cyclic) are formed.[3,5] (Eq. 14)


(14)

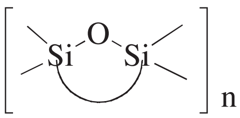
cyclic monomer — linear polymer — cyclic mixture

The equilibrium established between all cyclic and linear homologues may be characterized by three dependencies: 1) equilibrium distribution of linear homologues, 2) equilibrium distribution of cyclic homologues and 3) equilibrium between linear and cyclic fractions.

The size distribution of open chains is largely controlled by chain transfer, which occurs randomly, leading to a distribution often referred to as the Flory distribution.[49] The polydispersity factor ($PDI = M_w/M_n$) for this distribution equals 2.

In general, with the exception of strained cyclotrisiloxane rings, the equilibrium concentrations of cyclics decrease in a homologous series with the increase of the ring size. For example, the equilibrium concentration of D_3 is negligible at room temperature, although it becomes significant at high temperatures. The most abundant is D_4, 6.3 wt% of total undiluted equilibrated PDMS, then D_5, 3.7%, and D_6, 1.5%.[50]

Since the cyclic fraction contains mostly oligomers, the equilibrium between cyclic and open chain fractions gives us direct information about the yield of polymer. This equilibrium, as well as the equilibrium distribution of cyclics are controlled by the elementary ring-closure/ring-opening equilibrium. These equilibria are approximated by equation 15, in which the equilibrium concentration of a cyclic $[(SiO)_n]_e$ is equal to the equilibrium constant of the cyclic formation.[50] (Eq. 15)

K_{cn} =  (15)

Since equation 15 holds for all cyclic homologues in the series, the total weight concentration of cyclics in a system coexisting in equilibrium with linear polymer, $\sum_{n=3} n M_0 K_{cn}$, is also constant independent of the total weight concentration of cyclic and linear polysiloxanes. Consequently, the dilution of the system at equilibrium with a solvent must convert some amount of linear polymer to cyclics to fulfill equation 15. The yield of polymer decreases with dilution of the polymerization system, which is illustrated in Figure 2. For each polysiloxane there exists a critical concentration below which linear polymer is not formed.

Another feature of this equilibrium is its independence of temperature.[52] The cyclics that appear in equilibrium at significant concentrations are virtually strain-free, and the number and character of chemical bonds is not changed in the ROP process. The enthalpy of ring opening is effectively equal to zero. Conformational entropy controls the position of the ring-chain equilibria. The entropy gain in ring opening, the driving force for the polymerization, is due to high flexibility, i.e., conformational freedom, of the siloxane chain. All modifications of the monomer structure decreasing the conformational freedom of the siloxane chain shift the equilibrium towards cyclics. Thus, the increasing size or polar character of substituents on the silicon atom reduces the yield of polymer at equilibrium, which is well illustrated by low yields and high critical concentrations of poly-3,3,3-trifluoropropylmethylsiloxane in the equilibrium ROP (Figure 2) Linear polydiphenyl-siloxane cannot be obtained by this method.

Practical Use

Equilibrium polymerization of cyclosiloxanes is often used in the synthesis of polysiloxanes both in industrial processes and in research laboratories. Advantages of this approach include:

1. This method does not impose any restriction on initiator. Anionic and cationic initiators may be used, provided they are tolerated by functional groups in the polymer,. Thus, it is easy to find an initiator, which drives the system to the equilibrium state relatively fast under mild conditions and can be easily removed from the polymer.
2. There are no stringent requirements of quenching the reaction in a narrow range of time.
3. There are no requirements for the size of the monomer ring. The same results are obtained using various monomers of the same homologue series. A mixture of cyclics or a mixture of cyclic and linear polysiloxanes is often equilibrated.
4. Molecular weight is readily controlled by using chain blockers which are disiloxanes or short chain oligosiloxanes introducing end groups.[1] (Eq. 16) The initial concentration of initiator, which is the other source of end-groups, must be much lower than that of the blocker.

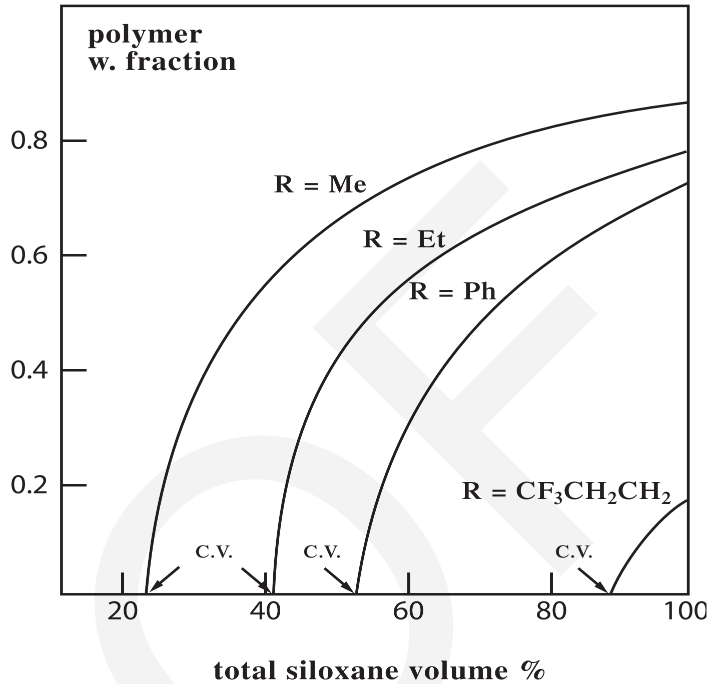


Figure 2

Weight fraction of polymer in total siloxane vs volume percent of total siloxane in toluene at 100°C at equilibrium in the polymerization of (RMeSiO)n, R=Me, Et, Ph, $(CH_2)_2CF_3$, c.v. marks – critical siloxane volume below which no polymer exists at equilibrium state. (Adapted from Ref. [50] with kind permission of Kluwer Academic Press).

$$Me_3Si\text{-}O\text{-}SiMe_3 + n\,(Me_2SiO)_4 \longrightarrow$$

$$Me_3Si\text{-}O\text{-}(Me_2SiO)_{4n-mp}SiMe_3 + m\,(Me_2SiO)_p \qquad (16)$$

5. The blockers may contain a functional group. Telechelic polysiloxanes, including macroinitiators or macromonomers, may be obtained by this method.[53] (Eq. 17) This opens the route to various organosilicon block copolymers.[54,55] ROP of cyclosiloxanes may also serve to extend siloxane sequences built into a chain of an organic polymer.[56]

$$H_2NCH_2CH_2CH_2Me_2Si\text{-}O\text{-}SiMe_2CH_2CH_2CH_2NH_2 + n\,D_4 \xrightarrow{\text{equilibrium ROP}}$$

$$H_2NCH_2CH_2CH_2Me_2Si\text{-}[OSiMe_2]_n\text{-}O\text{-}SiMe_2CH_2CH_2CH_2NH_2 + \text{cyclics} \quad (17)$$

6. Equilibrium ROP of cyclosiloxane is a convenient route to statistical copolymers of various siloxanes.[57-61] (Eq. 18)

$$Me_3Si\text{-}O\text{-}SiMe_3 + n\,(Me_2SiO)_4 + m\,(ViMeSiO)_4 \xrightarrow{\text{equilibrium ROP}}$$

$$Me_3Si\text{-}[OSiMe_2]_n\text{-}[ViMeSiO]_m\text{-}SiMe_3 + \text{cyclics} \quad (18)$$

Macromolecules of these copolymers have a uniform composition and random distribution of units.[57-59] Thus, it is possible to introduce functional groups pendant to the polysiloxane chain which are statistically spread along the polymer backbone.[57-61]

There are also some limitations of using the equilibrium ROP of cyclosiloxanes in synthesis.[3] The main drawback concerns the formation of cyclic oligomers, reducing the yield of polymer. Since the yield decreases significantly with the increase of size and polar character of substituents, the process is primarily used in the synthesis of dimethylsiloxane and hydridomethylsiloxane homopolymers and copolymers. The equilibrium ROP is carried out in bulk, as any dilution of the polymerization system leads to a decrease in the polymer yield. Equilibrium ROP cannot be used for the synthesis of polysiloxanes with a narrow molecular weight distribution or a precisely functionalized single end-group on the polymer chain. It is not suitable for the synthesis of copolymers with specific distribution of siloxane units, such as alternate or gradient copolymers.

The important application of the equilibrium ROP of cyclosiloxanes is the industrial synthesis of high temperature vulcanized (HTV) silicone rubber.[1] Most of these technologies are based on the AROP of D_4. Addition of vinyl-substituted cyclosiloxanes is often practiced to introduce pendant vinyl groups used for cross-linking in the vulcanization process. Monomer purity requirements are very stringent, because molecular weights of these polymers are very high, up to 10^6 $g{\cdot}mol^{-1}$, meaning that a linear macromolecule having 10^4 siloxane units must be formed. Any small contamination may considerably change the rheological properties of the material.

Equilibration of siloxanes is also a fundamental method of the industrial syntheses of various silicone liquids.[1] In these cases the molecular weight of the target polymer is much lower and the purity of the monomer does not need to be as high, so a mixture of siloxane oligomers is often used as the substrate.

Kinetically Controlled ROP of Cyclosiloxanes

Basic Knowledge

The fundamental principle of the kinetic controlled ROP of cyclosiloxanes is explained in Figure 3. ROP of a strained ring cyclotrisiloxane and its strain-free homologue, e.g., cyclotetrasiloxane, both lead to the same equilibrium state by different routes. The strainless cyclosiloxane produces polymer and cyclic oligomers in parallel; the latter being formed by back-biting. The polymer concentration steadily increases to eventually achieve its equilibrium value. By contrast, the strained cyclotrisiloxane is initially transformed into linear polymer, which in the second step is randomized and partly decomposed to cyclics, eventually reaching an equilibrium mixture. (Eq. 19)

$$\text{monomer} \xrightarrow{\text{polymerization}} \text{linear polymer}$$

$$\xrightarrow[\text{(backbiting chain scrambling)}]{\text{equilibration}} \text{equilibrium mixture of linear polymer and cyclics} \quad (19)$$

This is because the propagation of the strained ring monomers is much faster than back-biting and chain transfer. In contrast to the entropy-driven polymerization of strain-free cyclosiloxanes, the driving force for the polymerization of cyclotrisiloxane is the enthalpy decrease related to the release of the ring strain. If the polymerization is quenched at a suitable moment, a high yield of polymer may be obtained even in the case when the linear polysiloxane does not reach the equilibrium state. A good example is the polymerization of $(Ar_2SiO)_3$.[62]

The AROP of cyclotrisiloxanes may gain the features of living polymerization under two conditions. First, the initiation must be fast and quantitative. Second, the difference in rates of propagation and the undesired back-biting and chain randomization processes should be high enough to eliminate the influence of these undesirable processes on the polymer structure. When both of these conditions are fulfilled all macromolecules are growing in parallel without chain breaking. If the polymerization is quenched in due time, polymer with a narrow molecular weight distribution (PDI) below 1.1 may be obtained.[63-66] The kinetically controlled AROP of cyclotrisiloxane using the selective polymerization system is a good method for the precision synthesis of functionalized polysiloxanes. In contrast, the kinetically controlled CROP is rarely used for this purpose as it is difficult to eliminate cyclics formation, chain scrambling and terminal group exchange. (section 2.2).

The AROP of cyclotrisiloxanes, when used for the precision synthesis, requires selective polymerization systems. The most often used initiators for the selective AROP of cyclotrisiloxane are numerous organolithium compounds in combination with various promoters such as THF, DMSO, HMPA, DMF and cryptand {211}.[3-6,21] Recently, ethyl acetate was proposed as a very effective promoter for the AROP of $[(CF_3CH_2CH_2)MeSiO]_3$.[67]

In a hydrocarbon solvent the transformation of the RLi initiator into the silanolate propagation center occurs quantitatively.[68] (Eq. 20)

$$D_3 \quad + \quad 3\ RLi \longrightarrow 3\ RMe_2Si\text{-}O\text{-}Li \qquad (20)$$

This reaction proceeds rapidly under mild conditions, and no propagation on the lithium silanolate takes place without a promoter. A two-step initiation is often practiced. First, the organolithium is quantitatively transformed into the silanolate and then the propagation is induced by introduction of a promoter. This procedure gives better precision in the synthesis as some possible side reactions of RLi are avoided.[63] PDMS of narrow molecular weight distribution, PDI < 1.1, may be obtained even in a one-step process with high conversion of D_3 (>90%).[66] However, for the synthesis of polymer with higher molar mass (Mn > 10^5), the polymerization must be quenched at lower monomer conversions.

Practical Use

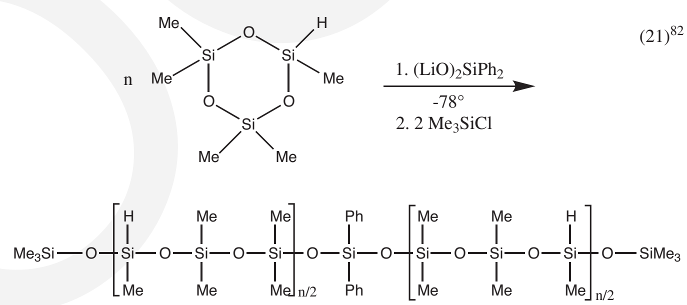
The kinetically controlled ROP of cyclotrisiloxanes is more difficult to perform than the equilibrium process. It requires more expensive monomers and initiators with more stringent conditions. This method is used in silicones technology for the fabrication of polysiloxanes which cannot be obtained in reasonable yield by the equilibrium polymerization, such as poly-($CF_3CH_2CH_2MeSiO$).[1,67] The AROP of cyclotrisiloxanes is also extensively used in research laboratories in cases where the polymerization of unstrained cyclosiloxanes proceeds very slowly or leads to low yields of polymer because of unfavorable thermodynamics.[62,67,69] However, the most important use of kinetically controlled AROP in research laboratories is the precision synthesis of functionalized polysiloxanes with well-defined structure for numerous applications described below.[21]

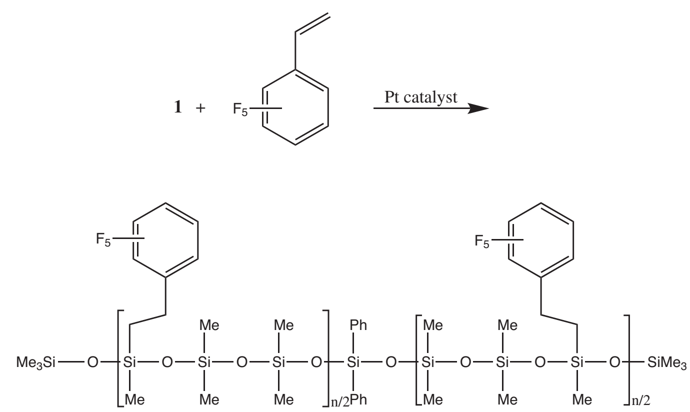
Polysiloxane with functional end groups - polysiloxane macroinitiators and macromonomers. The precise functionalization of polysiloxanes at a single chain end is possible. A precursor or target functional group may be introduced either by a functionalized initiator or by using a terminator bearing additional functionality.[70-72,74] (Eq. 21-22) This is a common route for the synthesis of macroinitiators for polymerization of various organic monomers.[69-72] Polysiloxane macromonomers may be generated as well.[72] Polymers functionalized at both chain ends may be obtained by using difunctional initiator, such as $LiPh_2SiLi$.[75,76,81]

All-siloxane copolymers of regular structures – gradient, block and alternating. If a mixture of two cyclotrisiloxanes is subjected to the kinetically controlled AROP with a selective initiator, all macromolecules are growing in parallel without backbiting and chain transfer. This propagation leads to a copolymer that consists of macromolecules with similar structure, i.e. size, composition of units and distribution along the polymer chain. This reaction is called gradient copolymerization since all growing macromolecules, initially rich in the units originating from more reactive monomer, become gradually enriched in the units from the less reactive cyclotrisiloxane.[77] Gradient copolymers may be also generated by a semibatch process, adding one comonomer gradually to the polymerization system of the other one.[78] On the other hand, one-pot sequential copolymerization of two siloxane monomers is the route to block copolymer.[75,79,80] The second monomer is introduced when the polymerization of the first one achieves the quenching window of the kinetically controlled process so the second block is contaminated with units originating from the first monomer. A better block purity is obtained if the slower propagating monomer is polymerized first.[79] Another method of the synthesis of block siloxane copolymers is the coupling of two ends of functionalized polysiloxanes.[75] All-siloxane copolymers are also synthesized using a homopolymerization of cyclosiloxanes with mixed siloxane units.[81-85] The controlled AROP of cyclotrisiloxanes bearing different units leads to alternating copolymers. In some cases the polymerization shows a high regioselectivity thus leading to a copolymer with highly regular structures.[81,82]

Polysiloxanes with functional groups pendant to siloxane chain are readily obtained by controlled AROP. Precursor groups such as $SiCH{=}CH_2$, SiH and $Si(CH_2)_3Cl$ can be introduced to cyclotrisiloxane.[67,82-86] The AROP of these monomers leads to the controlled synthesis of polysiloxanes bearing the precursor which is subsequently transformed to a variety of functionalities. (Eq. 21)

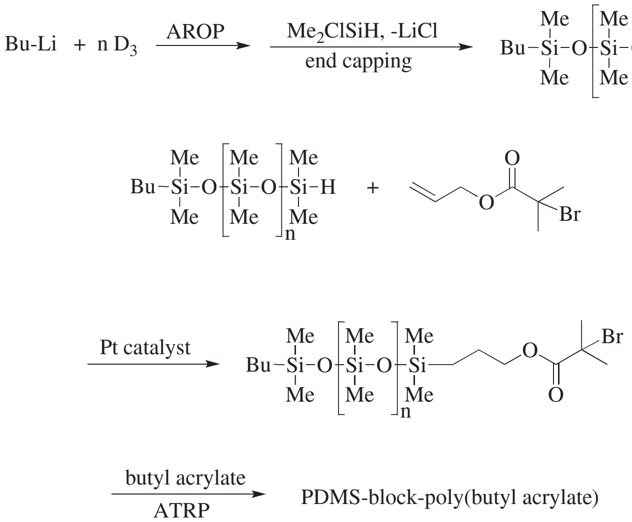
(21)[82]





Siloxane-organic diblock, triblock and graft copolymers are obtained by three techniques exploiting the AROP of cyclotrisiloxanes: 1) macroinitiator, 2) sequential polymerization and 3) end functional group coupling.[64,69,71-74,87-90]

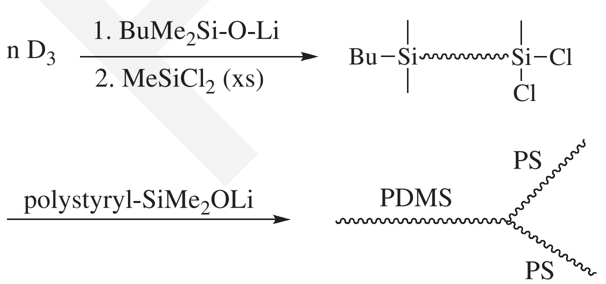
Equation 22 exemplifies the synthesis of a siloxane-organic block copolymer using the monofunctional polysiloxane atom transfer radical polymerization (ARTP) macrointiator, which is obtained by a functionalized terminator approach.[72]



(22)[72]

Conversely, block copolymers can be generated when organic macroinitiators or living polymers are used to initiate the controlled AROP of cyclotrisiloxane.[87,88,90] Graft copolymers are formed using an organic macroinitiator which contains initiating side groups.[91] Another method used for the synthesis of polysiloxanes grafted on organic polymers is the copolymerization of polysiloxane macromonomers with organic monomers.[72] Block and graft copolymers are also generated by coupling of end functionalized polysiloxanes with organic polymers.[74]

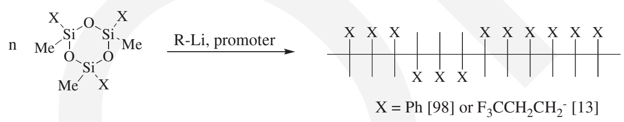
More complex polymer architectures including star-branched, miktoarm star, star on dendrimer, block star, brush branched, block-brush branched, dendritic branched and hyper branched structures were generated using functionalized polysiloxanes obtained by AROP.[64,65,73,90,92-94] Star-branched polysiloxanes were obtained by using polyfunctional quenchers, or polyfunctional initiators.[64,65,92] The precision two-step synthesis of a branched miktoarms organic-siloxane copolymer using AROP of D_3 with trifunctional quencher is shown in equation 23. Dendritic branched polysiloxanes may be obtained by graft on graft or graft on star techniques.[92]



(23)[64]

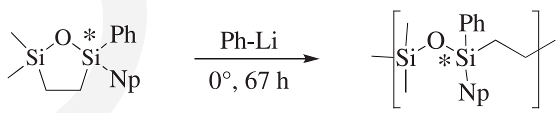
A variety of all-siloxane and siloxane-organic cross-linked materials was prepared using the AROP of cyclotrisiloxanes for the synthesis of precursor functionalized polysiloxanes.[95,96] Besides conventional networks, various kinds of interpenetrating networks were obtained.[96,97]

The stereocontrolled synthesis of polysiloxane was performed by the AROP of cyclotrisiloxanes having different geminal substituents at silicon, such as monomer F_3 presented in Figure 1. In some cases, cis isomer can be isolated and subsequent ROP gives a partially stereoregular polymer.[13,98] (Eq. 24) Such polymers show a crystalline phase, while the polymers obtained from the mixtures of cis and trans isomers are completely amorphous.[13] The mechanical strength of silicone elastomers may be improved by using a stereoregular polysiloxane.



(24)

Optically active all-siloxane polymers may be obtained by AROP only if monomer bears an optically active substituent.[99] On the other hand, the controlled AROP of a cyclocarbosiloxane with a chiral center in the ring skeleton may lead to an optically active polymer. An example of a highly stereospecific polymerization of an optically active enantiomer of oxy-2,5-disilacyclopentane is shown in equation 25.[100]



(25)

Special Methods of the ROP of Cyclosiloxanes

Polymerization in the Solid State

High molecular weight materials may be synthesized by solid state ROP of cyclic siloxanes.[101,102] This may be a convenient mode of polymerization for monomers with high meltings points that are difficult to dissolve in commonly used solvents, such as $(Ph_2SiO)_3$. The AROP of this monomer was initiated by KOH spread on the monomer crystal surface. The propagation proceeds inward from the surface of the monomer crystals and leads to a crystalline polymer. Polymerization and polymer crystallization proceed successively. An interplay between the rates of polymer chain growth and the polymer crystallization is suggested to control the polymer yield, molecular weight, polydispersity and crystallinity. The rate is sensitive to structural defects in monomer crystals.

Polymerization in emulsion

The ROP of cyclosiloxanes in emulsion and miniemulsion, both anionic and cationic, attracted the attention of chemists as it gives many advantages over the classical ROP process.[27,103-106] The emulsion AROP is particularly useful for synthesis of α,ω-hydroxy-polysiloxane latexes with relatively low molecular weights (10^3-$3{\cdot}10^4$ g/mol), but miniemulsion AROP may also lead to polysiloxanes of high molecular mass.[105,106] These polymers may be obtained under mild conditions using cheap unstrained monomers such as D_4. The polymerization gives a high yield of the polymer with a controlled molecular weight and a relatively narrow molecular weight distribution (PDI 1.1-1.5, unless the conversion is higher than 70%).[103-106] The yield of cyclics is lower than in classical AROP, because the polymerization mechanism is different. Latexes are obtained with polysiloxane particles of diameter ranging 0.01-0.5 μm. The process occurs at the interface of siloxane particles. Each particle acts as an independent minireactor of polymerization. A considerable role is played by the emulsifier, usually a tetraorganoammonium bromide with at least one longer chain alkyl substituent, such as didodecyldimethylammonium bromide. The emulsifier stabilizes the surface of the particle. Sodium hydroxide initiator exchanges anions partly with the emulsifier. Thus OH^- is present at the interface, initiating the polymer chain. The propagation and termination takes place at the interface too. Larger macromolecules may penetrate inside the particle, where their further growth may occur by the polycondensation of silanol end-groups. Steric hindrance of the surfactant suppresses backbiting leading to low content of cyclics in polymer.

Kinetic controlled emulsion AROP of $[CF_3(CH_2)_2MeSiO]_3$ gives polymer at almost theoretical yield, as the selectivity of the process is very high.[103] Recent studies of the semibatch emulsion AROP showed that the polymerization rate is constant and controlled by the monomer feed rate.[105]

The emulsion CROP uses dodecylbenzenesulfonic acid as both initiator and emulsifier. The CROP of unstrained D_4 occurs rapdily and leads to high molecular weight polymer with M_n reported up to $2{\cdot}10^5$ g/mol.[27]

Seeded emulsion ROP of cyclosiloxanes is used for the formation of a polysiloxane shell on another polymer core, or for encapsulation of inorganic particles.[107-109]

Radiation Polymerization

The ROP of cyclic trisiloxane may be initiated by γ-radiation.[110,111] The bulk polymerization is performed in the solid or liquid state. It requires an extremely high system purity, as traces of nucleophiles arrest the reaction. The interesting feature of this reaction is that D_3, D_4 and D_5 react at the same rate.[91,110] The polymerization is cationic in nature. It is suggested that the silylenium ion, the analogue of carbenium ion, is formed on the monomer as result of CH_3^- cleavage. Microwave irradiation initiated ROP of D_4 in the presence of water is a route to α,ω-hydroxyl functionalized PDMS.[112]

References

1. Hardman, B; Torkelson, A. in *Encyclopedia of Polymer Science and Engineering*, Second Edition, Eds. Mark, H. F.; Bikales, N. M.; Overberger, C. G.; Menges, G. J. Wiley and Sons, New York, 1989, Vol. **15**, page 204; Moretto, H. H.; Schulze, M.; Wagner, G. in *Ullman's Encyclopedia of Industrial Chemistry*, 5th Ed., VCH, Weinheim 1993, vol. **A24**, page 57.
2. Kendrick, T. C.; Parbhoo, B. M.; White, J. M. in *Comprehensive Polymer Science*, Allen, G.; Bevington, J. C.; Eastmond, G. C.; Ledwith, A.; Russo, S. Eds., Pergamon Press, Oxford 1989, vol. **7** page 459.
3. Chojnowski, J.; Cypryk, M. in *Encyclopedia of Polymeric Materials*, Salamone, J. C. Ed., CRC Press, Boca Raton 1996, vol. **2**, page 1682.
4. Drake, R.; MacKinnon, I.; Taylor, R. in *The Chemistry of Organic Silicon Compounds*, Rappaport, Z.; Apeloig, Y. Eds., Wiley, New York 1998, vol. **2**, chapture 38, page 2217.
5. Chojnowski, J.; Cypryk, M. in *Silicon Containing Polymers*, Jones, R.; Ando, W.; Chojnowski, J.; Kluwer Acad. Publ., Dordrecht 2000, chapter 1, page 3.
6. Mazurek, M. in *Comprehensive Organometallic Chemistry III*, Eds. R.H. Crabtree, R. H.; Mingos, D. M. P.; Housecroft, C. E. Elsevier, 2007, vol. 3, chapter 3.12, page 651.
7. Ganachaud, F.; Boileau, S. in *Handbook of Ring-Opening Polymerization*, Eds. Dubois, P.; Coulembier, O.; Raquez, J.-M. Eds., Wiley-VCH, Weinheim 2009 page 65.
8. Interrante, L. V.; Shen, Q.; Li, J. *Macromolecules* **2001**, *34*, 1545.
9. Piccoli, W. A.; Haberland, G. G.; Merker, R. L. *J. Am. Chem. Soc.* **1960** , *82*, 1883.
10. Dvornic, P. R.; Lenz, R. W. *High Temperature Siloxane Elastomers*, Huthig and Wepf, Basel 1990.
11. Kurjata, J.; Chojnowski, J. *Makromol. Chem.* **1993**, *193*, 3271.
12. Lasocki, Z.; Witekowa, M. *J. Macromol. Sci. Chem. A* **1977**, *11*, 457. Bouquey, M.; Brochon, C.; Bruzaud, S.; Mingotaud, A.-F.; Schappacher, M.; Soum, A. *J. Organomet. Chem.* **1996**, *521*, 21.
13. Saam, J. C. *J. Inorg. Organometal. Polym.* **1999**, 9, 3; Kuo, C. M.; Saam, J. C.; Taylor, R. B. *Polymer Int.* **1994**, *33,* 187.
14. Cypryk, M.; Kaźmierski, K.; Fortuniak, W.; Chojnowski, J. *Macromolecules* **2000**, *33*, 1536.
15. Gilbert, A. R.; Kantor, S. W. *J. Polym. Sci.* **1959**, *40*, 35.
16. Boileau, S.; Illy, N. *Prog. Polym. Sci.* **2011**, *36*, 1132.
17. Pibre, G.; Chaumont, P. G.; Fleury, E.; Cassagnau, P. *Polymer* **2008**, *49*, 234.
18. Teng, C. J.; Weber, W. P.; Cai, G. *Macromolecules* **2003**, *36*, 5126.

19. Bessmertnykh, A.; Ben, F.; Baceiredo, A.; Mignani, G. *J. Organometal, Chem.* **2003**, *686*, 281.

20. Hurd, D. T.; Osthoff, R. C.; Corrin, M. L. *J. Am. Chem. Soc.* **1954**, *76*, 249; Grubb, W. T.; Osthoff, R. C. *J. Am. Chem. Soc.* **1955**, *77*, 1405.

21. Chojnowski, J. in *Siloxane Polymers*, Clarson, S. J.; Semlyen, J. A.; Horwood, E. Eds., New Jersey 1993, chapture 1, page 1; Chojnowski, J. *J. Inorg. Organometal. Polym.* **1991**, *1*, 229.

22. Wilczek, L.; Kennedy, J. P. *Polymer J.* **1987**, *19*, 531.

23. Voronkov, M. G.; Mileshkevitch, V. P.; Yuzhelevskii, Y. A. "The Siloxane Bond" Consultant Bureau, New York, 1978.

24. Mazurek, M.; Chojnowski, J. *Makromol. Chem.* **1977**, *178*, 1005.

25. Boileau, S. *Makromol. Chem. Macromol. Symp.* **1993**, *73*, 177.

26. Laita, Z.; Jelinek, M. *Vysokomol. Soedin.* **1962**, *4*, 1739.

27. Jiang, S. J.; Qiu, T.; Li, X. Y. *Polymer* **2010**, *51*, 4087.

28. Kendrick, T. C. *J. Chem. Soc.* **1965**, 2027.

29. Toskas, G.; Moreau, M.; Masure, M.; Sigwalt, P. *Macromolecules* **2001**, *34*, 4730.

30. Desmurs, J. R.; Ghosez, L.; Martins, J.; Deforth, T.; Mignani, G. *J. Organometal. Chem*. **2002**, *646*, 171.

31. Grzelka, A.; Chojnowski, J.; Fortuniak, W.; Taylor, R. G. P.H. Hupfield *J. Inorg. Organometal. Polym.* **2004**, *14*, 101.

32. Braun, R.; Hager, L.; Steiner, J.; Muller, H. (Wacker-Chemie GMBH) Ger.Pat 538885 (March 3, 1998).

33. Chen, B.; Zhan, X. L.; Yi, L. M.; Chen, F. Q. *Chin. J. Chem. Eng*. **2007**, *15*, 661.

34. Yactine, B.; Ratsimihety, A.; Ganachaud, F. *Polym. Adv. Technol*. **2010**, *21*, 139.

35. Miller, U.; Jockusch, S.; Timpe, H.-J. *J. Polym. Sci. A* **1992**, *30*, 2755.

36. Tapsak, M. A.; Grailer, T.; Miller, D.; Benz, M. E.; DiDomenico, E. *J. Inorg. Organometal. Polym*. **1999**, *9*, 35.

37. Sigwalt, P.; Nicol, P.; Masure, M. *Makromol. Chem. Suppl.* **1989**, *15*, 15.

38. Olah, G. A.; Li, X.-Y.; Wang, Q.; Rasul, G.; Prakash, G. K. S. *J. Am. Chem. Soc.* **1995**, *117*, 8962.

39. Yashiro, T.; Kricheldorf, H. R.; Schwarz, G. *Macromol. Chem. Phys*. **2010**, *211*, 1311.

40. Wilczek, L.; Rubinsztajn, S.; Chojnowski, J. *Makromol. Chem.* **1986**, *187*, 39. *Makromol. Chem.* **1979**, *180*, 117.

41. Toskas, G.; Moreau, M.; Sigwalt, P. *Macromol. Symp.* **2006**, *240*, 68.

42. Bischoff, R.; Sigwalt, P. *Polymer Inter.* **1999**, *48*, 217.

43. Chojnowski, J.; Kurjata, J. *Macromolecules* **1994**, *27*, 2302.

44. Cypryk, M.; Kurjata, J.; Chojnowski, J. *J. Organometal. Chem*. **2003**, *686*, 373.

45. Chojnowski, J.; Ścibiorek, M.; Kowalski, J. *Makromol. Chem.* **1977**, *178*, 1351.

46. P. Nicol, P.; Masure, M.; Sigwalt, P. *Makromol. Chem. Phys.* **1994**, *195*, 2327.

47. Chojnowski, J.; Cypryk, M.; Kaźmierski, K. *Macromolecules* **2002**, *35*, 9904.

48. Toskas, G.; Besztercey, G.; Moreau, M.; Masure, M.; Sigwalt, P. *Macromol. Chem. Phys.* **1995**, *196*, 2715.

49. Flory, P. J. *Principles of Polymer Chemistry*, Cornell University Press, Ithaca, New York 1953; Scott, D. W. *J. Am. Chem. Soc.* **1946**, *68*, 2294.

50. Wright, P. V. Beevers, M. S. in *Cyclic Polymers*, Semlyen, J. A. Ed., Elsevier Applied Science, London, New York 1986, page 85.

51. Buese, M. A. *Macromolecules* **1987**, *20*, 694.

52. Carmichael, Winger, R. *J. Polym. Sci. A* **1965**, *3*, 971.

53. Yilgor, I.; McGrath, J. E. *Adv. Polym. Sci* **1988**, 86, 1.

54. Zhang, Y.; Zhang, Z. J.; Wang, Q.; Xie, Z. M. *J. Appl. Polym. Sci.* **2007**, *103*, 153.

55. Sauvet, G.; Fortuniak, W.; Kazmierski, K.; Chojnowski, J. *J. Polym. Sci. A* **41**, 2939 (2003).

56. Aydogan, B.; Sureka, D.; Kiskan, B.; Yagci, Y. *J. Polym. Sci. A* **48**, 5156 (2010).

57. Ziemelis, M. J.; Saam, J. C. *Macromolecules* **1989**, *22*, 2111.

58. Kaźmierski, K.; Hurduc, N.; Sauvet, G.; Chojnowski, J. *J. Polym. Sci. A* **2004**, *42*, 1682.

59. Sauvet, G.; Fortuniak, W.; Kaźmierski, K.; Chojnowski, J. *J. Appl. Polym. Sci.* **2000**, *75*, 1005.

60. Spinu, M.; McGrath, J. E. *J. Polym. Sci A* **1991**, *29*, 657.

61. Liu, L. H.; Yang, S. Y.; Zhang, Z. J.; Wang, Q.; Xie, Z. M. *J. Polym. Sci. A* **2003**, *41*, 2722.

62. Lee, M. K.; Meier, D. J. *Polymer* **1993** , *34*, 4882.

63. Maschke, U.; Wagner, Th.; Coqueret, X. *Makromol. Chem.* **1992**, *193*, 2453.

64. Bellas, V.; Iatrou, H.; Hadjichristidis, N. *Macromolecules* **2000**, *33*, 6993.

65. Miura, Y.; Yamaoka, K.; Mannan, M. A. *Polymer* **2006**, *47*, 510.

66. Ninago, M. D.; Satti, A. J.; Ressia, J. A.; Ciolino, A. E.; Villar, M. A.; Vallés, E. M. *J. Polym. Sci A* **2009**, *47*, 4774.

67. Gao, Y. J.; Jiang, W.; Guan, Y.; Yang, P.; Zheng, A. N. *Polym. Eng. Sci.* **2010**, *50*, 2440.

68. Frye, C. L.; Salinger, R. M.; Fearon, F. W. G.; Klosowski, J. M.; DeYoung, T. *J. Org. Chem.* **1970**, *35*, 1308.

69. Molenberg, A.; Klok, H.-A.; Möller, M.; Boileau, S.; Teyssié, D. *Macromolecules* **1997**, *30*, 792.
70. Elkins, C. L.; Long, T. E. *Macromolecules* **2004,** *37*, 6657.
71. Miura, Y.; Miyake, K. *J. Polym. Sci. A* **2005**, *43*, 6153.
72. Shinoda, H.; Miller, P. J.; Matyjaszewski, K. *Macromolecules* **2001**, *34*, 3186.
73. Kurjata, J.; Chojnowski, J.; Yeoh, C. T.; Rossi, N. S. S.; Holder, S. J. *Polymer* **2004**, *45*, 6111.
74. Fragouli, P. G.; Iatrou, H.; Hadjichristidis, N. *J. Polym. Sci. A* **2004**, *42*, 514.
75. Gadda T. M.; Weber, W. P. *J. Polym. Sci. A* **2006**, *44*, 3629.
76. Saxena, A.; Rajaraman, S.; Leatherman, M. *Macromolecules* **2007**, *40*, 752.
77. J. Chojnowski. J.; Cypryk, M.; Fortuniak, W.; Rózga-Wijas, K.; Ścibiorek, M. *Polymer* **2002**, *43*, 1993.
78. Cypryk, M.; Delczyk, B.; Juhari, A.; Koynov, K. *J. Polym. Sci. A* **2009**, *47*, 1204.
79. Bauer, J.; Hüsing, N.; Kickelbick, G. *J. Polym. Sci. A* **2002**, *40*, 1539.
80. Fortuniak, W.; Chojnowski, J. *Polym. Bull.* **1997**, *38*, 371.
81. Gadda, T. M.; Nelson, A. K.; Weber, W. P. *J. Polym. Sci. A* **2004**, *42*, 5235.
82. Paulasaari, J. K.; Weber, W. P. *Macromolecules* **1999**, *32*, 6574.
83. Ścibiorek, M.; Gladkova, N.; Chojnowski, J. *Polymer Bull.* **2000**, *44*, 377.
84. Hempenius, M. A.; Lammertink, R. G. H.; Vancso, G. J. *Macromolecules* **1997**, *30*, 266.
85. Cai, G. P.; Weber, W. P. *Macromolecules* **2000**, *33*, 8976 (2000).
86. Fortuniak, W.; Chojnowski, J.; Sauvet, G. *Macromol. Chem. Phys.* **202**, 2306 (2001).
87. Lee, J.; Hogen-Esch, Th. E. *Macromolecules* **2001**, *34*, 2805.
88. Belorgey, G.; Sauvet, G. in *Silicon Containing Polymers*, Jones, R.G.; Ando, w.; Chojnowski, J. Eds. Kluwer, Dordrecht 2000, chapter 2, page 43.
89. Yi, L. M.; Zhan, X. L.; Chen, F. Q.; Du, F.; Huang, L. B. *J. Polym. Sci. A* **2005**, *43*, 4431.
90. Huang, T. Z.; Knauss, D. M. *Polym. Bull.* **2002**, *49*, 143.
91. Rahmani, S.; Entezami, A. A. *Macromol. Res.* **2011**, *19*, 221.
92. Chojnowski, J.; Cypryk, M.; Fortuniak, M.; Scibiorek, M.; Rózga-Wijas, K. *Macromolecules* **2003**, *36*, 3890.
93. Paulasaari, J. K.; Weber, W. P. *Macromolecules* **2000**, *33*, 2005.
94. Novozhilov, O. V.; Pavlichenko, I. V.; Demchenko, N. V.; Buzin, A. I.; Vasilenko, N. G.; Muzafarov, A. M. *Russ. Chem. Bull.* **2010**, *59*, 1909.
95. Out, G. J. J.; Turetskii, A. A.; Snijder, M.; Möller, M.; Papkov, V. S. *Polymer* **1995**, *36*, 3213.
96. Mazurek, M. in *Silicon Containing Polymers*, Jones, R. G.; Ando, W.; Chojnowski, J. Eds., Kluwer, Dordrecht 2000, chapter 4, page 113.
97. Caille, J.-R.; Teyssié, D.; Bouteiller, L.; Bischoff, R.; Boileau, S. *Macromol. Symp.* **2000**, *153*, 161.
98. Ahn, H. W.; Clarson, S. J. *ACS Symposium Series* **2003**, *838*, 40.
99. Rózga-Wijas, K.; Chojnowski, J.; Boileau, S. *J. Polym. Sci. A* **1997**, *35*, 879.
100. Li, Y.; Kawakami. Y. *Macromolecules* **32**, 548 (1999); **2000**, *33*, 1560.
101. Buzin, M.I.; Gerasimov, M. V.; Obolonkova, E. S.; Papkov, V. S. *J. Polym. Sci A* **1997**, *35*, 1973.
102. Andrianov, K. A.; Khanashvili, L. M.; Zavin, B. G.; Kuznetsova, A. G.; Golubkov, S. A.; Ivanov, V. I. *Vysokomol. Soedin* Part B **1969**, *11*, 637.
103. M. Barrère, C. Maitre, M.A. Dourges, P. Hémery *Macromolecules* **2001**, *34*, 7276.
104. Mohoric, I.; Sebenik, U. *Polymer* **2011**, *52*, 1234, 4423.
105. Barrère, M.; Ganachaud, F.; Bendejacq, D.; Dourges, M.-A.; Maitre, C.; Hémery, P. *Polymer* **2001**, *42*, 7239.
106. De Gunzbourg, A.; Maisonnier, S.; Favier, J.-C.; Maitre, C.; Masure, M.; Hémery, P. *Macromol. Symp.* **1998**, *135*, 359.
107. Bouanani, R.; Bendedouch, D.; Hémery, P.; Bounaceur, B. *Colloids Surf. A-Physicochem. Eng. Aspects* **2008**, *317*, 751.
108. Junyan, L.; Ling, H.; Weidong, L.; Hongjie, L. *Polym. Int.* **2009**, *58*, 1283.
109. Kan, C. Y.; Kong, X. Z.; Yuan, Q.; Liu, D. S. *J. Appl. Polym. Sci.* **2001**, *80*, 2251.
110. Naylor, D. M.; Stannett, V. T.; Deffieux, A.; Sigwalt, P. *Polymer* **1991**, *32*, 1084; **1994**, *35*, 1764.
111. Palsule, A. S.; Clarson, S. J.; Widenhouse, C. W. *J. Inorg. Organometal. Polym. Mater.* **2008**, *18*, 207.
112. Yang, B.; He, H.; Chen, R. P.; Ma, L.; Jia, D. M. *Int. J. Polymeric Mater.* **2008**, *57*, 717.

TELECHELIC SILOXANE OLIGOMERS: VERSATILE STARTING MATERIALS FOR NOVEL POLYMERS AND APPLICATIONS

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Introduction

Polyorganosiloxanes, commonly referred to as silicone or siloxane polymers, form one of the most interesting classes of macromolecular systems [1-4]. The repeating unit of polyorganosiloxanes consists of alternating silicon-oxygen atoms, in which two monovalent organic radicals (substituents) are attached to each of the silicone atom. Since the siloxane (Si–O) backbone is considered to be inorganic in nature, silicone polymers display both organic and inorganic character. As a result they form an important bridge between inorganic and organic polymers. The type and nature of the organic substituents on the silicon atom play very critical roles in determining the physical and chemical properties of the resulting polymer.

The most popular silicone polymer, polydimethylsiloxane (PDMS), has only methyl groups as the substituents on the silicon atom. A wide variety of other groups, such as phenyl, vinyl, 1,1,1-trifluoropropyl, hydrogen, glycidoxypropyl among others are also frequently used for tailoring the physicochemical properties of silicone polymers [1,5,6]. The variations in the backbone composition have critical effects on the glass transition temperature (Tg), solubility parameter, thermal stability, reactivity and surface behavior of the resulting system. This flexibility in backbone modification of silicone polymers provides almost unlimited possibilities for their use as specialty polymers or as modifiers for common organic polymers [1-7]. Unique properties of polyorganosiloxanes include excellent low temperature flexibility (Tg as low as −120°C), good thermal and oxidative stability, ozone and UV resistance, high gas permeability, excellent electrical properties and physiological inertness or biocompatibility. In addition, polydimethylsiloxanes also display very low surface tension values (18-22 mN/m), which is comparable to highly fluorinated polymers.

This unique combination of properties displayed by silicone polymers is a result of the unusual molecular structure of the siloxane bond. Si–O bond length is 1.64±0.03Å [3,6], substantially shorter than the bond length calculated from the additivity of the ionic radii (1.83 Å). This shorter than expected Si–O bond length can be explained by the substantial ionic character (about 40-50%) of the siloxane bond. The Si–O bond has a dissociation energy of 460 kJ/mol, which makes it considerably more thermally stable than C–O (357 kJ/mole), C–C (345kJ/mole) and Si–C (318 kJ/mol) bonds(3,6). There is also a substantial difference between the Si–O–Si and C–O–C bond angles, which are 140 and 111 degrees, respectively, as determined by quantum mechanical calculations and spectroscopic studies. As a result, the methyl groups in polydimethylsiloxanes rotate with unusual ease around the (Si–O) bonds.

Despite their many outstanding properties, a major drawback for linear high molecular weight polyorganosiloxanes (especially PDMS) is their very poor mechanical properties. Modification of the PDMS backbone by the incorporation of various substituents on silicon does not help to improve the mechanical properties to useful levels. As a result, for practical applications such as high strength elastomers, PDMS is always crosslinked and highly filled with high surface area silica(8). As expected, cross-linking limits the techniques used for the processing of these PDMS elastomers and also their fields of applications. It has been demonstrated that high-strength, high-performance, linear, thermoplastic silicone elastomers can effectively be prepared by the controlled synthesis of block and segmented copolymers [7,9]. These copolymers usually contain PDMS as the soft segments. On the other hand there is a very wide choice of organic backbones as the hard segments [7,9,10]. The resulting copolymers can range from thermoplastic elastomers to rigid, high-strength thermoplastics depending on the type and nature of blocks, block lengths and backbone composition. These block copolymer systems usually show phase-separated morphologies. In elastomeric systems the organic hard segment domains serve as physical crosslinks in a continuous rubbery siloxane matrix. In thermosetting systems PDMS usually serves as an impact modifier in the rigid organic matrix.

The controlled synthesis of block copolymers has been a very active field of polymer research since the 1960s. The techniques used include living anionic, cationic and free radical polymerizations, ring-opening polymerization, group-transfer polymerization and various others, all of which are well—described in the literature [10-12]. For the preparation of siloxane-containing copolymers the most widely used techniques include anionic polymerization [7,10,13], ring-opening polymerization [7,14] and condensation polymerization reactions [7,9,10]. In anionic polymerizations siloxane block polymers are obtained by the sequential polymerization of a vinyl monomer and hexamethylcyclotrisiloxane (D_3). Hexaphenylcyclotrisiloxane (D_3') can also be used as a siloxane monomer in anionic polymerization [3,10]. For the preparation of siloxane copolymers by ring-opening or condensation polymerizations the most suitable starting materials are α,ω-organofunctionally terminated siloxane oligomers, which are also called as telechelic siloxane oligomers [7,10,15,16]. In this chapter our discussions will focus on the preparation, properties and reactivities of telechelic siloxane oligomers and their use in the preparation of well-defined siloxane copolymers.

Telechelic Siloxane Oligomers

As shown in Figure 1, in terms of their chemical structures, telechelic siloxane oligomers can be divided into two groups. The first group consists of oligomers where the reactive functional group (X) is directly linked to the terminal silicon atoms. In the second group there is a short hydrocarbon bridge (R) between the terminal silicon atoms and the reactive functional groups. Although (Si–X)-terminated siloxane oligomers have higher reactivities towards nucleophilic reagents than their (Si–R–X) counterparts, when copolymerized with conventional organic monomers they usually lead to the formation of (Si–O–C) linkages. These linkages are thermally stable, however they are quite susceptible to hydrolysis under acidic or basic conditions. In this review we will only discuss telechelic siloxane oligomers with (Si–R–X) type functionalities.

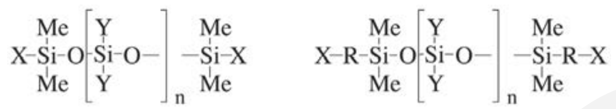


Figure 1. General structures of telechelic siloxane oligomers

As can be seen in Figure 1, there are four important variables in (Si–R–X)-terminated siloxane oligomers. These are (i) type and structure of the reactive end group (X), (ii) structure of the hydrocarbon bridge (R), (iii) type and nature of the substituents (Y) on siloxane backbone, and (iv) average degree of polymerization of the siloxane backbone (n). A representation of possible variations in the structure and composition of siloxane oligomers are summarized in Figure 2.

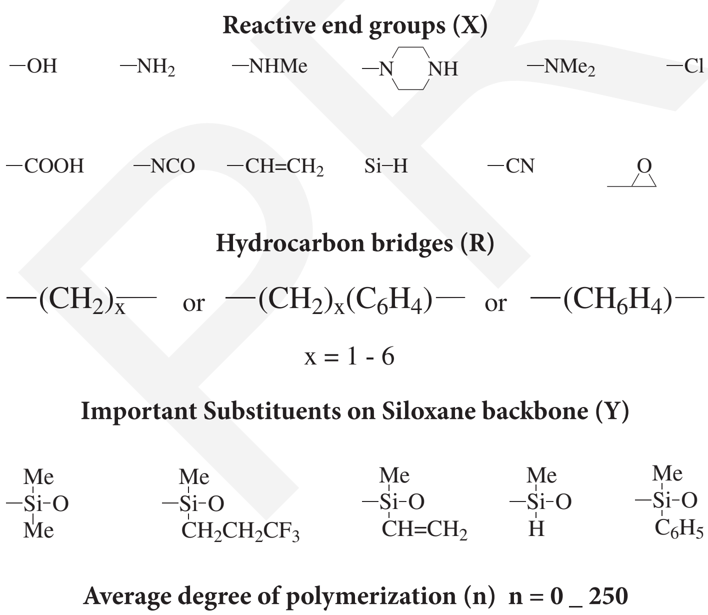


Figure 2. Possible variations in the structure and composition of telechelic siloxane oligomers

Such flexibility in the backbone modification of oligomers together with the ease of preparation of perfectly α,ω-terminated reactive molecules via equilibration reactions [1,7,17,18] make telechelic siloxane oligomers very versatile and highly-useful. As expected, the terminal functional groups mainly determine the reactivity of these siloxane oligomers towards other reactants. Variations in the backbone composition have critical effects on the glass transition temperature (Tg), solubility parameter, thermal stability and the surface energy of the resulting oligomers [1,6,7,15,19]. In addition (Si-H) and (Si-CH=CH_2) substituents are reactive and can be used in the preparation of graft copolymers or network systems. The average degree of polymerization (n) has critical effects on the microphase morphologies and the surface energies of the copolymers produced. This in turn controls the thermal and mechanical properties, solution behavior, surface activity and processibility of the resulting multiphase copolymeric materials. It has been shown that in order to obtain copolymers with silicone-like surface properties the number average molecular weight of PDMS oligomers must be above a critical molecular weight [7,20].

Preparation of Telechelic Siloxane Oligomers

As discussed before, the (Si-O) bond is quite strongly ionic and therefore can be cleaved by strong acids or bases. This is the main rationale behind the "equilibration" or "redistribution" reactions used in the preparation of organofunctionally-terminated telechelic siloxane oligomers from cyclic siloxanes and siloxane "end-blockers", which is described in Figure 3. Strong acids such as, sulfuric acid, trichloroacetic acid, trifluoromethanesulfonic acid and toluenesulfonic acid and strong bases, such as sodium and potassium hydroxide and quaternary ammonium hydroxides can be used as catalysts. Reaction temperatures between 50 to 100°C usually provide reasonable rates for these equilibration reactions. Selection of a specific catalyst is mainly determined by the nature and the reactivity of the organofunctional end group. In general strong acids are used for the preparation of oligomers with acidic end groups, such as –COOH and strong bases are used for basic end groups, such as amines. Special care must be taken in catalyst selection for end groups which are reactive, such as epoxy groups, which may react with strong acids and bases at elevated temperatures. During the preparation of hydroxypropyl or hydroxybutyl terminated siloxane oligomers, backbiting reactions may lead to destruction of the end groups [21].

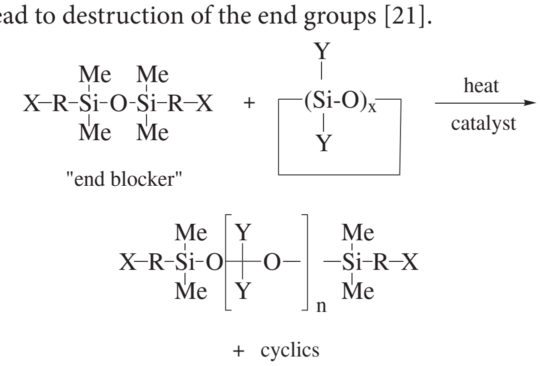


Figure 3. Preparation of telechelic siloxane oligomers by equilibration reactions

In equilibration reactions catalysts can only cleave the (Si–O) bonds in the cyclic and linear species including that of the end blocker and growing chains. However, (Si–R) or (R–X) bonds are stable. Therefore, at the end of the reactions linear oligomers are functionally-terminated and cyclic side products, which are around 10-15% by weight depending on the number average molecular weight of the oligomer prepared, are non-functional [10, 15, 16]. After elimination of the catalyst cyclic side products can be removed from the mixture by vacuum distillation or supercritical fluid extraction [22, 23]. The number average molecular weight of the final product is determined by the initial ratio of the cyclic monomers to the end blocker.

As can be seen in Figure 3, a key starting material for the preparation of telechelic siloxane oligomers is the “end blocker”. Several methods are available for the preparation of the end blockers. The most widely used method is the reaction of (Si–H) terminated siloxanes with unsaturated organic compounds, which also contain reactive end groups, such as allylic compounds (CH_2=CH–CH_2–X) or others with a general structure of CH_2=CH–R–X, where (R) represents an alkyl, aryl or aralkyl moiety and (X) represents the reactive end group. Hydroxybutyl terminated silicone end blockers can be prepared by the reaction of tetrahydrofuran and dimethyldichlorosilane in the presence of magnesium metal [24]. A new method for the preparation of aminopropyl terminated end blockers, which eliminates the use of highly toxic allylamine, has been developed by Schaefer and co-workers [25]. In this method, first the 3-chloropropyldimethylsiloxane is reacted with ammonia to form 3-chloropropyl-terminated tetramethyldisilazane, which is further reacted with excess ammonia to form a cyclic precursor as shown in Figure 4. Aminopropyl terminated telechelic siloxane oligomers can then be obtained by the reaction of silanol-terminated silicone fluids with this precursor.

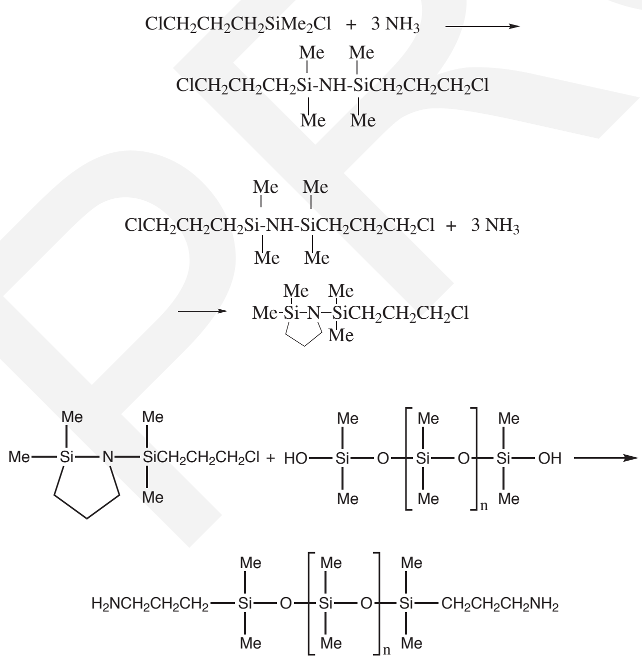


Figure 4. Preparation of aminopropyl-terminated telechelic silicone oligomers by cyclic disilazane route [25]

Siloxane Containing Copolymers

Organofunctionally-terminated, telechelic siloxane oligomers are versatile starting materials for the preparation of a wide variety of block and segmented copolymers through reactions with a large selection of commercially available organic monomers. Resulting polymers, which show microphase separated morphologies, display properties of both the siloxane and organic segments. This unique combination of properties include silicone-like properties, such as, extremely low temperature flexibility, good gas permeability, biocompatibility and depending on the type and nature of the organic blocks, other properties such as excellent mechanical strength, elastomeric properties and thermal and oxidative stability.

Silicone-containing copolymers can be prepared by a large number of well-documented techniques, well documented in the literature [2-4, 7, 9, 10]. Copolymerization of telechelic siloxane oligomers with conventional telechelic organic monomers are usually carried out through step-growth addition or condensation reactions or ring-opening polymerizations. Synthetic schemes for the preparation of a segmented siloxane-urea copolymer [26, 27] (step-growth addition reaction) and a triblock polycaprolactone-b-PDMS copolymer [14] (ring-opening polymerization) with very interesting properties and interesting applications are given in Figures 5 and 6.

A detailed list of recent articles on the preparation and characterization of a large number of siloxane-containing copolymers through the use of organofunctionally-terminated telechelic siloxane oligomers is provided in Table 1. In addition to these, telechelic siloxane oligomers are also used in the chemical modification of various thermosetting systems and in the preparation of interpenetrating network (IPN) type structures [56-60].

Table 1. Literature survey on siloxane containing copolymers

Copolymer system	References
Siloxane-urethane	28, 31, 45-47
Siloxane-urea	26, 27, 36
Siloxane-carbonate	7, 10, 29, 30
Siloxane-ester	10, 30, 35
Siloxane-amide	37, 38
Siloxane-imide	9, 40-42, 78
Siloxane-alkylene oxide	9, 43, 44
Siloxane-sulfone	10, 48
Siloxane-polyether	84, 85
Siloxane-liquid crystalline	9, 50
Others	49,51-55

Applications of Siloxane-Copolymers

Telechelic siloxane oligomers and siloxane-containing copolymers, which show a very unique combination of properties, unmatched by other polymeric systems, have already found numerous interesting applications in many diversified fields [61]. As discussed in detail below, these applications include biomaterials with improved blood and tissue compatibilities, contact lenses with excellent oxygen permeabilities, high performance gas separation membranes, atomic oxygen resistant coatings for space and electronic applications, radiation curable release coatings for paper and plastic films, protective textile coatings, processing aids for polyolefins, surface modifying additives for textile and industrial fibers and impact modifiers for rigid thermoplastic and thermosetting resins.

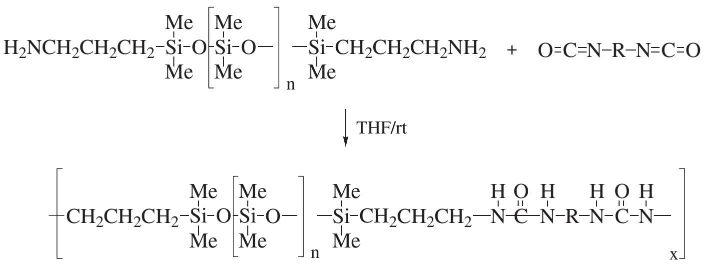


Figure 5. Preparation of siloxane-urea segmented copolymers through the stoichiometric reaction between an aminopropyl-terminated telechelic PDMS oligomer and a diisocyanate

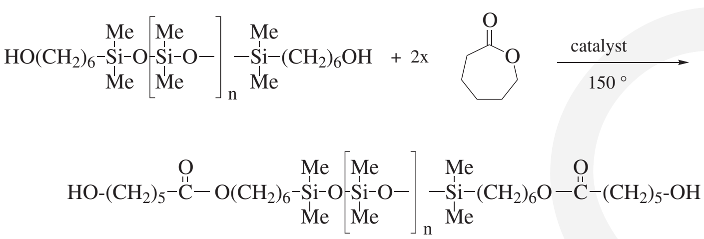


Figure 6. Preparation of polycaprolactone-b-PDMS triblock copolymers by ring-opening polymerization

Due to their physiological inertness, one of the most important applications of siloxane copolymers is in the production of biomaterials [61, 62], especially blood-contacting devices, such as blood pumps, vascular grafts and catheters [63, 64]. For this purpose siloxane copolymers can either be used directly or as a surface modifying additive for a base polymer, such as polyurethanes, poly(vinyl chloride), polyolefins, among others. [37, 53, 65-68]. In addition to its biocompatibility, the PDMS backbone also has very high oxygen permeability [1], therefore siloxane copolymers find applications in the production of contact lenses [61, 69, 70]. Due to their high gas permeabilities, siloxane containing copolymers, especially siloxane-imides and siloxane-carbonates, also find applications as gas separation membranes and sensors [71, 72, 78, 79]. An important, high volume industrial application for organoepoxy- or organoacrylate-terminated telechelic siloxane oligomers is in the production of paper or polymer based (PP, PET or polyamide) release films [73, 74]. In these applications, the reactive end groups of the siloxane oligomers are usually cured by electron beam or UV radiation, leading to the formation of network structures. The backbone composition and average molecular weight of the siloxane oligomers and the crosslink density of the resulting network serve to control the release properties of the films formed. Siloxane-containing copolymers, such as siloxane-imides also find applications as atomic oxygen-resistant high-performance coatings for space and electronic applications [75, 76, 78]. It is well known that surfaces of siloxane copolymers are mainly covered by the low surface energy PDMS [51, 77]. Upon reaction with atomic oxygen, the methyl groups on PDMS chains are replaced by oxygen. This leads to the formation of a protective, silicone dioxide network at the surface of the film [76, 78].

In addition to these applications, telechelic organosiloxane oligomers and siloxane-containing copolymers also find uses in many other fields. These include uses such as; processing aids in improving the extrusion output of polyolefins [80, 81], biofouling release coatings or marine paints [82], protective coatings with improved flame resistance [83] and surfactants and wetting agents [84, 85], which is most probably the largest field of commercial application for siloxane-polyether and siloxane-alkyl type copolymers.

Conclusions

Siloxane polymers and especially polydimethylsiloxanes are very interesting materials which display a unique combination of properties. Organofunctionally-terminated, telechelic siloxane oligomers enable us to combine these interesting properties of siloxanes with those of organic polymers. Therefore, they form a very important bridge between organic and inorganic polymer chemistry. Some of the most attractive features of telechelic siloxane oligomers include (i) the ease of preparation of perfectly difunctional oligomers with desired number average molecular weights, (ii) flexibility in the modification of the silicone backbone and as a result the physical properties of the oligomers produced and (iii) availability of a wide range of reactive end groups and reaction techniques.

Through the chemical combination of telechelic siloxane oligomers with conventional organic monomers/oligomers it is possible to prepare a wide range of tailor-made, thermoplastic block, segmented and graft copolymer systems. It is also possible to use these oligomers in the modification of network systems, such as epoxy or cyanate ester resins, or in the preparation of interpenetrating networks (IPN). Inorganic-organic hybrid polymer systems thus produced find many applications in very diversified fields.

References

1. Noll, W. *Chemistry and Technology of Silicones*, Academic Press, New York, **1968**.
2. *Siloxane Polymers*, Clarson, S. J.; Semlyen, S. A. Eds. Prentice Hall, Englewood Cliffs, NJ, **1993**.
3. Brook, M. A. *Silicon in Organic, Organometallic and Polymer Chemistry*, John Wiley, New York, **2000**.
4. *Silicones and Silicone-Modified Materials*, Clarson, S. J.; Fitzgerald, J. J.; Owen, M. J.; Smith, S. D. Eds., ACS Symp. Ser. 729, ACS, Washington D. C., **2000**.
5. Kennan, J. J. in *Siloxane Polymers*, Clarson, S. J.; Semlyen, S. A. Eds., Prentice Hall, **1993**, Ch. 2.
6. Voronkov, M. G.; Mileshkevich, V. P.; Yuzhelevskii, Yu. A. *The Siloxane Bond*, Consultants Bureau, New York, **1968**.
7. Yilgor, I.;McGrath, J. E. *Adv. Polymer Sci*., **1988**, *86*, 1,.
8. Rich, J.; Cella, J.; Lewis, L.; Stein, J.; Singh, N.; Rubinsztajn, S.; Wengrovius, J. "Silicon Compounds, Silicones", in *Kirk-Othmer Encyclopedia of Chemical Technology*, Online Edition, DOI: 10.1002/0471238961.1909120918090308.a01, John Wiley, **2000**.
9. Burger, C.; Kreuzer, F.-H. in *Silicon in Polymer Synthesis*, Kricheldorf, H. R. Ed., Springer Verlag, Berlin Heidelberg, Germany **1996**, Ch 3.
10. Noshay, A.; McGrath, J. E. *Block Copolymers: Overview and Critical Survey*, Academic Press, New York, **1977**.
11. Quirk, R. P.; Kinning, D. J.; Fetters, L. J. *Block Copolymers*, in *Comprehensive Polymer Science: The Synthesis, Characterization, Reactions and Applications of Polymers*, Allen, G. Ed., Vol. 7, Pergamon Press, New York, **1989**.
12. *Block Copolymers*, Calleja, F. B.; Rosaniec, Z. Eds., Marcel Dekker, New York, 2000.
13. *Ring-opening Polymerization: Kinetics, Mechanisms and Synthesis*, McGrath, J. E. Ed., ACS Symp. Ser., 286, ACS Washington, D. C. **1985**.
14. Yilgor, I.; Steckle, Jr., W. P.; Yilgor, E.; Freelin, R. G.; Riffle,J. S. *J. Polym. Sci., Part-A: Polym. Chem*., **1989**, *27*, 3673.
15. Yilgor, I.; Riffle, J. S.; McGrath, J. E. in *Reactive Oligomers*, Harris, F. W.; Spinelli, H. J. Eds., ACS Symp. Ser., 282, ACS, Washington, D. C. **1985**, Ch. 14.
16. White, J. W.; Treadgold, R. C. Ch. 4 in Ref. 2.
17. Chojnowski, J. Ch. 1 in Ref. 2.
18. McGrath, J. E.; Riffle, J. S.; Banthia, A. K.; Yilgor, I.; Wilkes, G.L. in *Initiation of Polymerization*, Bailey, Jr., R. E. Ed., ACS Symp. Ser., 212, ACS Washington, D. C., **1983**, Ch. 13.
19. Kennan, J.J. Ch. 2 in Ref 2.
20. Ho, T.; Wynne, K.J. *Macromolecules*, **1996**, *29*, 3991.
21. Yilgor. I.; Yilgor, E. *Polym. Bull*., **1998**, *40*, 525.
22. Yilgor, I.; McGrath, J. E.; Krukonis, V. *Polym. Bull*., **1984**, *12*, 491.
23. Yilgor, I.; McGrath, J. E.; Krukonis, V. *Polym. Bull*., **1984**, *12*, 499.
24. Smetankina, N. P.; Karbovskaya, L. E. in *Synthesis and Physical Chemistry of Polyurethanes*, Schiller, A. M. Ed., Technomic, Westport, Conn, USA, **1975**, Ch. 7.
25. Schaefer, O. Private Communication, Munich, Germany, **2001**.
26. Yilgor, I.; Sha'aban, A. K.; Steckle, Jr., W. P.; Tyagi, D.; Wilkes, G. L.; McGrath, J. E. *Polymer*, **1984**, *25*, 1800.
27. Yilgor, E.; Yilgor, I. *Polymer*, **2001**, *42*, 7953.
28. Yılgör, E.; A. Tulpar, A.; Kara, A.; Yılgör, I. Ch. 26 in Ref 4.
29. Noshay, A.; Matzner, M.; Williams, T. C. *Ind. Eng. Chem. Prod. Res. Dev*., **1973**, *12*, 268.
30. Riffle, J. S.; McGrath, J. E.; Freelin, R. G.; Banthia, A. K. J. *Macromol. Sci., Chem*., **1981**, *15*, 967.
31. Benrashid, R.; Nelson, G. L. *J. Polym. Sci., Part-A, Polym. Chem*., **1994**, *32*, 1874.
32. Kozakiewicz, J. *Prog. Org. Coat*., **1996**, *27*, 123.
33. Yilgor, E.; Yilgor, I. *Polymer*, **2001**, *42*, 7953.
34. Stanciu, A.; Airineri, A.; Oprea, S. *Polymer*, **2001**, *42*, 6081.
35. Shinoda, H.; Ohthaguro, M.; Imuro, S. EP 399827 (24.05.**1990**).
36. Kinning, D. J. *J. Adhesion*, **2001**, *75*, 1.
37. Furuzono, T.; Yashima, E.; Kishida, A.; Maruyama, I.; Matsumoto, T.; Akashi, M. J. *Biomater. Sci., Polymer Edition*, **1993**, *5*, 89.
38. Seong, Y. H.; Boo-Keun, O.; Young, M. L. *Polymer*, **1995**, ***36***, 3549.
39. Yilgor, I. in *Adhesives, Sealents and Coatings for Harsh Environments*, Lee, L.-H. Ed., Plenum Press, NY **1988**, pp. 249-264.
40. Simionescu, M.; Marcu,, M.; Cazacu, M.; Racle, C. *Eur. Polym. J*., **2002**, *38*, 229.
41. Summers, J. D.; Erlsbend, C. S.; Sormani, P. M.; Brandt, P. J. A.; Arnold, C. A>; Yilgor, I.; Riffle, J. S.; Kilic, S.; McGrath, J. E. in *Inorganic and Organometallic Polymers*, Zeldin, M.; Wynne, K. J.; Allcock, H. R. Eds., ACS Symp. Ser. 360, ACS, Washington, D. C., **1988**, Ch. 14.
42. Keohan, F. L.; Swint, S. A>; Buese, M. A. *J. Polym. Sci., Part-A, Polym. Chem*., **1991**, *29*, 303.
43. Plueddeman, E. P. EP, DE, 1,445,347 (16.09.**1971**).

44. Riess, G.; Hurtvez, G.; Bahadur, P. in, *Encyclopedia of Polymer Science and Engineering*, 2nd Ed. John Wiley, NY, **1985**, Vol. 2, p.324.

45. Wang, L. F.; Li, Q.; Glass, T. E.; Ward, T. C.; McGrath, J. E.; Muggli, M.; Burns, G. Sorathia, U. *Polymer*, **2000**, *41*, 5058.

46. Stanciu, A.; Airinei, A.; Timpu, D.; Ioanid, A.; Ioan, C.; Bulacovschi, V. *Eur. Polym. J.*, **1999**, *35*, 1959.

47. Wynne, K. J.; Ho, T.; Nissan, R.A.; Chen, X.; Gardella, J. A. in *Inorgamic and Organometallic Polymers II*, Zeldin, M.; Wynne, K. J.; Allcock, H. R. Eds., ACS Symp. Ser. 572, ACS, Washington, D. C., 1994, pp.64-80.

48. Webster, D. C.; Hedrick, J. L; McGrath, J. E. *Natl. Sampe Symp., Proc.*, **1984**, *29*, 1085.

49. Riffle, J. S.; Yilgor, I. US Patent 4,659,777 (April 21, **1987**)

50. White, M. S. Ch. 6 in Ref. 2.

51. Dwight, D.; McGrath, J. E.; Lawson, G.; Patel, N.; York, G. in *Contemporary Topics in Polymer Science. Multiphase Macromolecular Systems*, Vol. 6, Culbertson, B. M. Ed., Plenum Press, NY, **1989**, pp. 265-288.

52. Kumpf, R. J.; Gordon III, B. in *Contemporary Topics in Polymer Science. Multiphase Macromolecular Systems*, Vol. 6, Culbertson, B. M. Ed., Plenum Press, NY, **1989**, pp. 301-313.

53. Martin, D.J.; Warren, L. A. P.; Gunatillake, P. A.; McCarthy, S. J.; Meijs, G. F.; Schindhelm, K. *Biomaterials*, **2000**, *21*, 1021.

54. Allcock, H. R.; Prange, R. *Macromolecules*, **2001**, *20*, 6858.

55. B. G.. Risch, D. E. Rodrigues, G. L. Wilkes, K. L. and J. E. McGrath, *Polymer*, **37**, 1229, 1996.

56. Yilgor, E.; Yilgor, I. *Polymer*, **1998,** *39*, 1691.

57. Sysel, P.; Hobzova, R.; Sindelar, V.; Brus, J. *Polymer*, **2001**, ***42***, 10079.

58. Arkles, B. US Patent, 4,714,739, **1987**.

59. Arkles, B. US Patent, 4,970,263, **1990**.

60. Takeichi, T.; Agag, T.; Zeidam, R. *J. Polym. Sci., Polym. Chem.*, **2001,** ***39***, 2633.

61. Arkles, B. *Chemtech*, **1999**, *29*, 7.

62. Abbasi, F.; Mirzadeh, H.; Kattab, A. A. *Polym. Int.*, **2001**, ***50***, 1279.

63. Farrar et, D. J.; al., *J. Thor. Cardiov. Surgery*, **1988**, *95*, 191.

64. Product information and technical reports at http://www.thoratec.com

65. White, K. A.; Ward, R. S.; Gill, R. S.; Lim, F.; Coviello, S. K. in *Surface Modification of Polymeric Biomaterials*, Ratner, B. D.; Castner, D. G. Eds., Plenum, NY, **1997**, pp. 27-33.

66. Childs, M. A.; Matlock, D. D.; Dorgan, J. R. *Biomacromolecules*, **2001**, *2*, 526.

67. Tang, L.; Sheu, M. S.; Chu, T.; Huang, H. Y. *Biomaterials*, **1999**, *20***,** 1365.

68. Okkema, A. Z.; Fabrizius, D. J.; Grasel, T. G.; Cooper, S. L.; Zdrahala, R. J. *Biomaterials*, **1989**, *10*, 23.

69. Migonney, V.; Lacroix, M. D.; Ratner, B. D.; Jozefowicz, M. *Biomaterials Science. Polymer Edition*, **1995**, *7,* 265.

70. Kok, J. H.; Hilbrink, H. J.; Rosenbrand, R. M.; Visser, *International Ophthalmology*, **1992**, *16*, 123.

71. Smaihi, M.; Schrotter, J. C.; Lesimple, C.; Prevost, I.; Guizard, C. *J. Memb. Sci.*, **1999,** *161*, 157.

72. Scheerder, J.; Walton, D. J.; Peterson, I. R.; Miller, L. S. *Adv. Mater. Opt. Electr*., **1998**, *8*, 309.

73. Wewers, D.; Weitemeyer, C.; Jachmann, J. US Patent, 5,034,491 (07.23.**1991**).

74. Crivello, J. V.; Lee, J. L. in *Radiation curing of Polymeric Materials,* Hoyle, C. E.; Kinstle, J. F., Eds., ACS Symp. Ser., 417, ACS, Washington, D. C., **1990**, Ch. 28.

75. Cella, J. US Patent, 4,808,686, **1989**.

76. Yilgor, I. in *Adhesives, Sealants and Coatings for Harsh Environments*, Lee, L. H., Ed., Plenum Press, NY **1988**, pp. 249-264.

77. Zhao, J.; Rojstaczer, S. R.; Chen, J.; Xu, M.; Gardella, J. A. *Macromolecules*, **1999**, *32*, 455.

78. McGrath, J. E.; Dunson, D. L.; Mecham, S. J.; Hedrick, J. L. *Adv. Polym. Sci.*, **1999**, *140*, 61.

79. Chen, S. H.; Lee, M. H.; Lai J. Y. *Eur. Polym. J.*, **1996**, ***32***, 1403.

80. Yilgor, I.; Yilgor, E.; Suzer, S. *J. Appl. Polym. Sci.,***2002***,* ***83***, 1625.

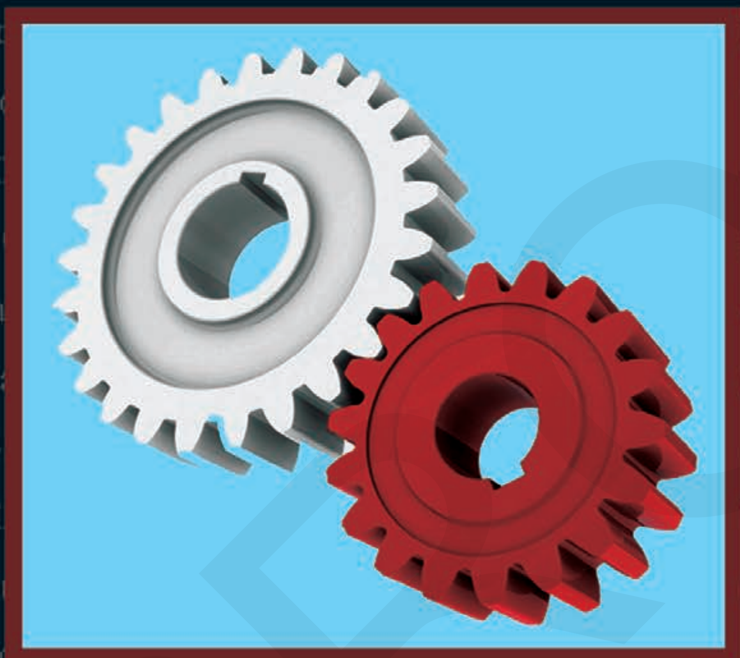
81. Yilgor, E.; Sinmazcelik, T.; Yilgor, I. *J. Appl. Polym. Sci.,* **2002**, *84*, 535.

82. Burnell, T.; Carpenter, J.; Truby, K.; Serth-Guzzo, J.; Stein, J.; Wiebe, D. Ref. 4. Ch. 11., 599.

83. Benrashid, R.; Nelson, G. L. in *Fire and Polymers II,* Nelson, G. L. Ed., ACS Symp. Ser., 599, ACS, Washington, D. C., **1995**, pp. 217-235.

84. Gruning, B. in *Silicones. Chemistry and Technology*, Koerner, G.; Schulze, M.; Weis, Eds., J. Vulkan-Verlag, Essen, Germany, **1991**, pp. 111-122.

85. Silicone Surfactants, Hill, R. M. Ed., Marcel Dekker, NY, **1999**.



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SILICONE FLUIDS Property Profile Guide

page 466

		Comment	Conventional Silicone Fluids
Thermal Properties	High Temp °C	1,000 hours in air, max.	175°
	High Temp °C	indefinite O_2 free, max.	200°
	Low Temp °C	pour point, low value	-70°
Rheological Properties	Viscosity, cSt.	range	3 - $2x10^7$
	Visc.-temp. coeff.	low value	0.51
Electrical Properties	Dielectric Strength volts/mil	range	360-400
	Dielectric Constant	range, 100Hz	2.50-2.77
Mechanical Properties	Compressibility, %	@ 20,000 psi	9.1
	Density, g/cc		0.90-0.98
Compatibility Properties	Water solubility		insoluble
	Hydrocarbon solubility	aromatic/ aliphatic	soluble/ partial
Optical Properties	Refractive Index n_D^{25}	range	1.393-1.403
Release & Wettability Properties	Surface Tension, dynes/cm	range	19.2-21.6
Wear/Lubricity Properties	Four ball wear, mm at 75°C, 40 kg. load steel on steel, one hr.		2-3

Notes:

All data on this table are for comparative purposes.The classes of fluids have a range of properties that do not represent the performance of an actual fluid.

Values reported for fluids including the paraffin hydrocarbon oil are without additives such as EP agents or stabilizers.

	page 474 Thermal Silicone Fluids	page 476 Organic Compatible Silicone Fluids	page 478 Fluorosilicone Fluids	page 479 Hydrophilic and Polar Silicone Fluids	page 481 Low Temperature Silicone Fluids	Typical Hydrocarbon (Paraffin) Fluids
	260°	150°	190°	135°	235°	130°
	280°	—	230°	—	260°	—
	-73°	-50°	-47°	-50°	-100°	-30°
	50 - $3.0x10^5$	500 - $1x10^4$	80 - $1x10^4$	20-5,000	4-400	—
	0.61	0.75	0.84	—	0.5	—
	400-420	—	175-200	—	300-400	—
	2.78-2.95	2.5-3.0	6.95-7.35	—	—	—
	5.5	approx. 5-8	7.5	approx. 7	11.9	4.4-4.9
	0.98-1.15	0.88-1.04	1.25-1.30	1.00-1.07	0.76-1.09	0.8-0.9
	insoluble	insoluble-partial	insoluble	insoluble-soluble	insoluble	insoluble
	soluble/ soluble	soluble/ soluble	insoluble/ insoluble	partial/ insoluble	soluble/ soluble	soluble/ soluble
	1.428-1.582	1.443-1.493	1.336-1.387	1.441-1.454	1.335-1.588	1.410-1.430
	20.5-28.5	22.0-39.5	25.7-28.7	23.6-27.0	15.9-26.7	21-28
	1.8-2.5	0.7	0.8	2-6	0.9-2.5	0.7

TABLE OF CONTENTS

SILICONE FLUIDS
Stable Inert Media

An introduction to silicone fluids and their uses

Silicone fluids have unique properties because they are not products of petroleum or organic chemistry. They were the first, and are still the only, major class of polymers that are products of inorganic chemistry. Silicone fluids consist of a broad range of different materials with the following characteristics:

- Wide Service Temperature Range
- Low Viscosity Changes vs. Temperature
- Thermal Stability
- Low Flammability
- Shear Stability
- Dielectric Stability
- High Compressibility
- Chemical Inertness
- Low Surface Tension
- Low Toxicity

These features have facilitated the adoption of silicones as dielectric, hydraulic, heat transfer, power transmission and damping fluids. They have found applications when incorporated as additives into plastics and rubbers as process and release aids, into coatings for flow and level control and into process streams as antifoams. Other unique properties have led to their introduction in acoustical applications such as ultrasonic sensor and sonar buoys. Light refractive and index matching properties have allowed the use of silicones in fiberoptics and optoelectronics. This proliferation of applications has engendered many improvements and refinements of silicone fluids.

Silicone Fluids can be divided into six general classes:

The conventional fluids, also referred to as polydimethylsiloxanes, exhibit all the properties of the silicone family. The other classes of fluids can be considered modifications of the conventional fluids in which one set of properties has been enhanced, but generally other properties are altered or sacrificed.

DEFINITIONS AND TERMS

Centistoke — A unit of kinematic viscosity, equaling 1 mm^2/sec.

Consistency — The resistance offered by a real fluid to deformation.

Fluid — A substance which undergoes continuous deformation when subjected to sheer stress.

Glass Transition Temperature — The temperature associated with a change from a glass state to a plastic state. For silicones the Tg is usually substantially below room temperature.

Kinematic Viscosity — Differs from viscosity in that it is the measure of volume flow of a liquid, defined as a stoke (St.) A stoke equals 1 cm.^{2}/sec. or 10^{-4}m^2/sec. A centistoke, cSt. = .01 St. = 1 mm.^{2}/sec. Kinematic viscosity of a liquid (stokes) can be converted to viscosity (poise) by multiplying by the density of the fluid.

Non-Newtonian Fluid — A fluid with consistency which varies as a function of shear stress as well as temperature and pressure.

Pascal-Second — Pa·s, the SI unit for viscosity, equalling 1 kg(m·s) or 10 Poise.

Saybolt Viscosity — A measure of kinematic viscosity. To convert from SSU to St., apply the following formula for SSU > 100: St. = .00220(SSU) – 1.35/t.

Relative Viscosity — For a fluid polymer solution, the ratio of solution viscosity to solvent viscosity at the same temperature; $\mu_r=\mu/\mu_o$.

Viscosity — Constant consistency under fixed pressure and temperature of simple liquids or gases. Perfect or ideal fluids offer no resistance to shear and have zero consistency. Viscosity dimensions are force per area x time. The unit of viscosity is the poise (p.) = 1g/(cm.)(sec.) and is a measure of mass flow of a liquid. One poise is equal to 0.1Pa•s in SI units.

Viscosity-Temperature Coefficient — A measure of the change of fluid viscosity over the temperature range 38°C to 99°C; V.T.C. = 1-(viscosity @99°C/viscosity @ 38°C). Thus, the lower the V.T.C. the less the change in viscosity over the temperature range.

NOTES AND SPECIFICATIONS

Molecular Weights — Reported values are derived from kinematic viscosity measurements and correlate to number average molecular weight. GPC Number average molecular weights for dimethylsiloxanes have been related to polystyrene standards according to Pekala (American Laboratory 15, 4 1983): log Mw PDMS/MwPST = 1.1813 + 0.0769V, where V is retention volume.

Compositional Percentages — All copolymer percentages are mole %; graft and block polymer percentages are weight %.

Viscosities — Reported values for kinematic viscosities for homopolymer fluids are ± 10% for fluids ≤100,000 cSt and ± 15% for fluids>100,000 cSt. Reported viscosities for copolymer fluids are ±20%.

Temperature — When not indicated, reported properties for silicone fluids are at 25°C (298.15°K).

R&D only — Indicates that the product is not registered with the EPA for commercial or industrial use. Products not listed as R&D only are registered for industrial use - TSCA listed.

Silicone Fluid Selection Guide

Selecting A Silicone Fluid

There are two approaches to selecting the proper silicone fluid for an application. The fluid class can be chosen by comparing specific physical property requirements in the property profile by class chart located inside the front cover or by comparing function and application requirements in the following table. Once the fluid class is selected, a specific grade can be determined on the next few pages by following the color key.

Function	Application	Fluid Class
Dielectric Coolant/Fluid	Transformers, Rectifiers Capacitors	Conventional
	Magnetron	Conventional Thermal
	Dielectric Impregnation of Porous Substrate	Conventional
Lubrication	Mold Release	Conventional Organic Compatible Emulsion
	Aluminum Machining and Extruding	Organic Compatible
	Die Casting	Organic Compatible
	Ball Bearing and Gear Lubrication	Organic Compatible Thermal Fluorosilicone
	Airborne Radar	Low Temperature
	Rubber/Plastic Contact	Conventional Organic Compatible
	Fiber/Plastic Contact	Hydrophilic
	Metal/Plastic Contact	Organic Compatible Thermal Fluorosilicone
	Metal/Metal Contact	Organic Compatible Thermal (Chlorophenyl)
	Grease	Conventional, Thermal or Fluorosilicone

Function	Application	Fluid Class
Working Media	Fluid Clutch	Conventional Thermal
	Smart Fluids	Conventional Organic Compatible
	Hydraulic Fluid	Low Temperature, Conventional Thermal
	Brake Fluid	Conventional (Intermediate Viscosity)
	Shock Absorber	Conventional Thermal or
	General Damping	Conventional Thermal Fluorosilicone
	Meter Damping	Conventional
	Timing Devices	Conventional Thermal
	Magnetic Amplifier	Thermal
	Diffusion Pump	Thermal (Oligomeric)
Performance Additive	Surfactant/Antifoam	Conventional (Low Viscosity), Hydrophilic Fluorosilicone
	Hydrocarbon Compatibility	Organic Compatible
	Flow Control	Conventional (Low Viscosity)
	Wetting	Hydrophilic
	Radiation Resistance	Thermal
Acoustical	Sonobuoy	Conventional (Reduced Volatility)
	Sound Coupling/Lensing	Fluorosilicone
Optical	Optical Coupling Fluid	Thermal
	Anti-fog Agent	Hydrophilic
	Gloss Enhancement	Conventional (Low-Intermediate Viscosity)
Heat Transfer	Heat Treatment Bath	Thermal
	Constant Temperature Bath	Conventional (Intermediate Viscosity) Thermal
	Temperature Measurement Device	Conventional, (Intermediate Viscosity), Thermal Fluorosilicone
	Closed Loop Heating	Thermal
	Refrigerated Systems	Low Temperature

Conventional Silicone Fluids

Conventional fluids are the well-known general purpose silicones described in chemical notation as polydimethylsiloxanes. They are commercially produced in viscosities ranging from 0.65 to 20,000,000 cSt.

Conventional silicone fluids are composed of polymer chains with unique flexibility. Polydimethylsiloxane has virtually no energy barrier for rotation. This results in one of the lowest glass-transition temperatures of any polymer. The liquid surface tension of polydimethylsiloxane is lower than the critical surface tension of wetting (24 dynes/cm). This causes polymers to spread over their own adsorbed films. An important consequence of the low intermolecular forces in polysiloxanes is the highest permeability coefficients of any polymer for oxygen and nitrogen.

The fluids are thermally stable indefinately at 150°C in air. Fluids with viscosities of 50 cSt. or greater have negligible vapor pressure.

At viscosities greater than 1,000 cSt. correlating to molecular weights greater than 30,000, polymer chain entanglement occurs, resulting in leveling of physical property change vs. viscosity. Refractive index, surface tension, density and viscosity-temperature coefficients are strikingly flat.

*Product code Definition

Prefix:
DMS=DiMethylSiloxane

Suffix:
1st character=Trimethylsiloxy terminated

2nd character=viscosity in decades, i.e. 10^x

3rd character=viscosity to 1 significant figure

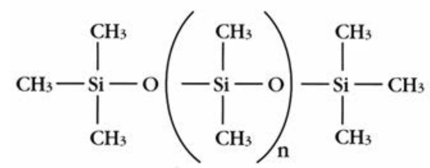
Polydimethylsiloxanes, Trimethylsiloxy Terminated

Properties

Product Code*	Viscosity cSt.	Viscosity Temp. Coefficient	Pourpoint °C	Specific Gravity	Coeff. of Refractive Index
DMS-T00	.65	.32	-68	.761	1.3750
DMS-T01	1.0	.37	-85	.818	1.3825
DMS-T01.5	1.5	.46	-75	.853	1.3880
DMS-T02	2.0	.48	-80	.873	1.3900
DMS-T03	3.0	.51	-70	.898	1.3935
DMS-T05	5.0	.54	-65	.918	1.3970
DMS-T07	7.0	.55	-65	.930	1.3980
DMS-T11	10	.56	-65	.935	1.3990
DMS-T12	20	.59	-65	.950	1.4000
DMS-T15	50	.59	-65	.960	1.4015
DMS-T21	100	.60	-65	.966	1.4025
DMS-T22	200	.60	-60	.968	1.4030
DMS-T23	350	.60	-60	.970	1.4031
DMS-T25	500	.60	-55	.971	1.4033
DMS-T31	1,000	.61	-50	.971	1.4034
DMS-T35	5,000	.61	-48	.973	1.4035
DMS-T41	10,000	.61	-48	.974	1.4035
DMS-T41.2	12,500	.61	-46	.974	1.4035
DMS-T43	30,000	.61	-43	.976	1.4035
DMS-T46	60,000	.61	-42	.976	1.4035
DMS-T51	100,000	.61	-41	.977	1.4035
DMS-T53	300,000	.61	-41	.977	1.4035
DMS-T56	600,000	.61	-41	.978	1.4035
DMS-T61	1,000,000	.62	-39	.978	1.4035
DMS-T63	2,500,000	.62	-38	.978	1.4035
DMS-T72	20,000,000	.62	-35	.979	1.4035

Viscosity specifications for polydimethylsiloxanes: ± 10% for fluids 100,000 cSt. and less; ± 15% for fluids >100,000 cSt.

Data in the above table provide properties that vary significantly with viscosity and molecular weight. Many of the properties of polydimethylsiloxanes do not vary significantly when viscosity is greater than 10 cSt. Tables and graphs on the next pages provide information on the following properties: ACCOUSTICAL, DENSITY, ELECTRICAL, MECHANICAL, MOLECULAR WEIGHT, OPTICAL, RADIATION RESISTANCE, REACTIVITY, RHEOLOGY, SOLUBILITY, THERMAL PERMEABILITY.



CAS: [9016-00-6] and [63148-62-9]

Thermal Expansion x10^{-4}	Thermal Conductivity cal/cm. sec. x10^{-4}°C	Surface Tension	Dielectric Constant	Dielectric Strength volts/mil	Flashpoint C°	Molecular Weight	PRICE 100g	PRICE 1 gallon container	PRICE 5 gallon container
13.4	2.4	15.9	2.20	300	-1	162	¥6,900	2.5kg / ¥38,200	14kg /
13.4	2.4	17.4	2.30	350	39	237	¥11,400	2.5kg / ¥75,000	14kg /
13.4	2.5	18.0	2.39	350	63	340	¥12,200	2.5kg / ¥82,700	15kg /
11.7	2.6	18.7	2.45	350	79	410	¥13,800	2.5kg / ¥82,700	15kg /
11.4	2.7	19.2	2.50	350	100	550	¥12,200	2.5kg / ¥82,700	15kg /
11.2	2.8	19.7	2.60	375	135	770	¥6,900	3kg / ¥72,700	15kg /
11.0	3.0	19.9	2.65	375	150	950	¥6,900	3kg / ¥46,400	15kg /
10.8	3.2	20.1	2.68	375	163	1,250	¥6,400	3kg / ¥39,300	16kg /
10.7	3.4	20.6	2.72	375	232	2,000	¥6,400	3kg / ¥39,300	16kg /
10.6	3.6	20.8	2.75	400	285	3,780	¥6,400	3kg / ¥39,300	16kg /
9.3	3.7	20.9	2.75	400	315	5,970	¥6,400	3kg / ¥35,800	16kg /
9.3	3.7	21.0	2.75	400	315	9,430	¥6,400	3kg / ¥39,300	16kg /
9.3	3.8	21.1	2.75	400	315	13,650	¥6,400	3kg / ¥39,300	16kg /
9.3	3.8	21.1	2.75	400	315	17,250	¥6,400	3kg / ¥39,300	16kg /
9.3	3.8	21.2	2.75	400	315	28,000	¥6,400	3kg / ¥39,300	17kg /
9.3	3.8	21.3	2.75	400	315	49,350	¥7,400	3.5kg / ¥44,900	17kg /
9.3	3.8	21.5	2.75	400	315	62,700	¥7,400	3.5kg / ¥44,900	17kg /
9.3	3.8	21.5	2.75	400	315	67,700	¥9,000	3.5kg / ¥48,600	17kg /
9.3	3.8	21.5	2.75	400	315	91,700	¥9,000	3.5kg / ¥48,600	17kg /
9.2	3.8	21.5	2.75	400	315	116,500	¥9,000	3.5kg / ¥48,600	17kg /
9.2	3.8	21.5	2.75	400	321	139,000	¥11,900	3.5kg / ¥69,800	17kg /
9.2	3.8	21.5	2.75	400	321	204,000	¥11,900	3.5kg / ¥69,800	17kg /
9.2	3.8	21.6	2.75	400	321	260,000	¥11,900	3.5kg / ¥69,800	17kg /
9.2	3.8	21.6	2.75	400	321	308,000	¥14,900	3.5kg / ¥89,700	17kg /
9.2	3.8	21.6	2.75	400	321	423,000	¥17,500	3.5kg / ¥117,800	—
9.2	3.8	21.6	2.75	400	321	>500,000	¥14,900	3.5kg / ¥112,200	—

*Available in drop-wise dispenser bottle

Drum pricing available upon request.

Low Volatility Grades page 472
Volatile Cyclic Silicones page 472
Emulsions page 473
Colored Silicone Fluids page 473
Branched Methyl Fluids page 482

Properties of Conventional Silicone Fluids (Polydimethylsiloxanes) – continued

Polydimethylsiloxane properties that do not vary significantly for fluids with viscosities greater than 10 cSt. are listed below.

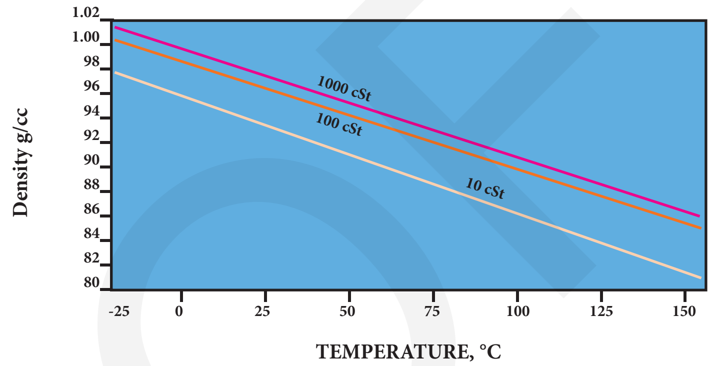
Acoustical*

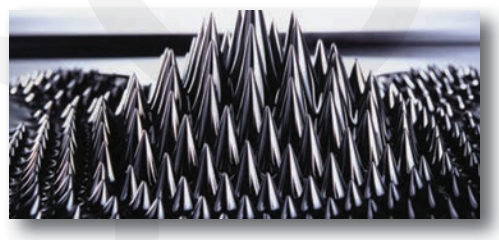
Fluid Viscosity (cSt.)	Velocity of sound, m/s	
	30°C	50.7°C
0.65	873	795
2.0	931	863
20	975	918
100	985	930
1,000	987	933

* for additional information see: Pouey, M. et al, Phys. Chem. Chem Phys., **2003**, *5*, 73

Density

Density vs. Temperature of Dimethylsiloxane Fluids



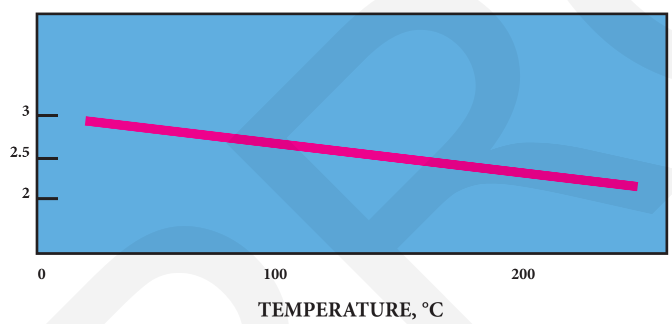


Dimethylsiloxane used in smart magnetic & electrorheological fluids.

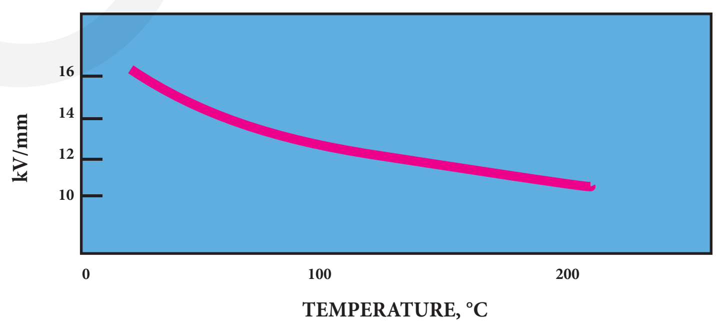
Electrical

Dielectric Strength	350-400V/mil
Dielectric Constant 10^2-10^6Hz, 20°C	2.44-2-2.76
Dissipation Factor	0.0001
Volume Resistivity	$1x10^{15}$ohm-cm at 20°C

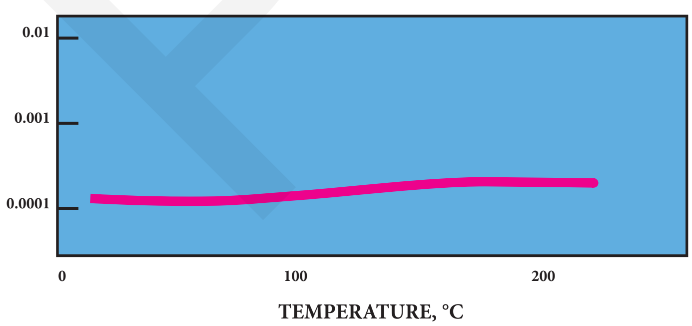
Dielectric Constant



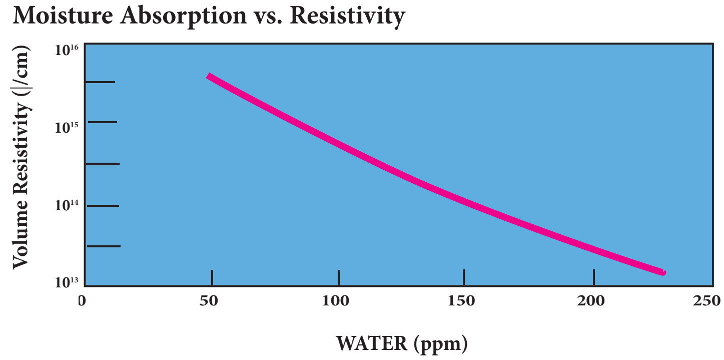
Dielectric Strength in kV/mm



Power Factor

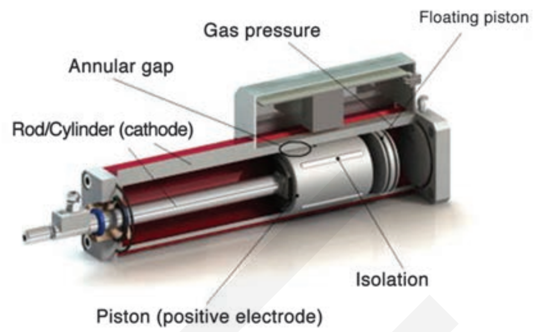


Moisture Absorption vs. Resistivity



Mechanical

Coefficient of adiabatic compressibility	$1.10 \times 10^{-10} cm^2/dyne$
Volume reduction of 100 cSt. fluid	
at 1,000 psi	0.70-0.75%
at 10,000 psi	5.50-5.90%
at 20,000 psi	9.00-9.20%
at 40,000 psi	13.30-13.80%



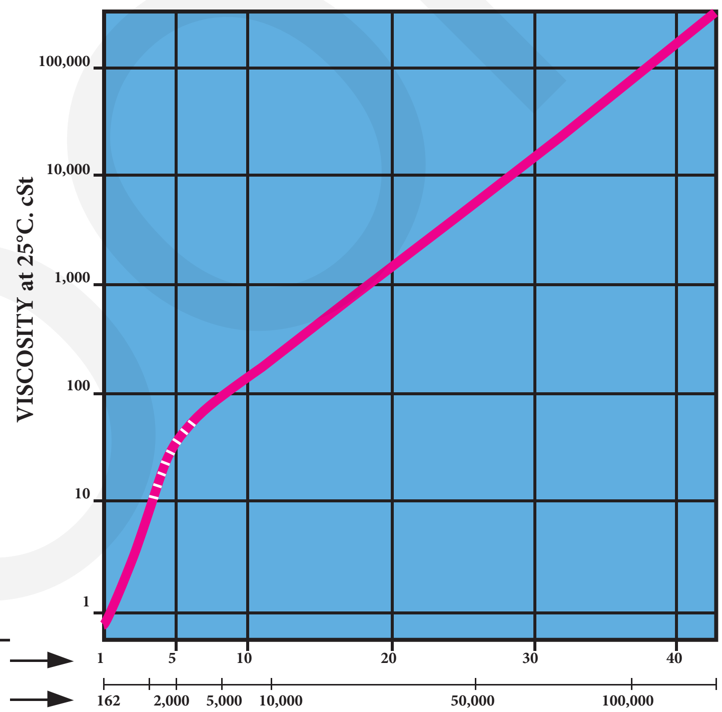
Fluid dampeners utilize electrorheological fluids that contain polydimethylsiloxane

Molecular Weight

Viscosity, μ, of Polydimethylsiloxanes as a function of a degree of polymerization "n".

Note: The straight portion of the slope corresponds to A.J. Barry's relationship on molecular weights>2,500:

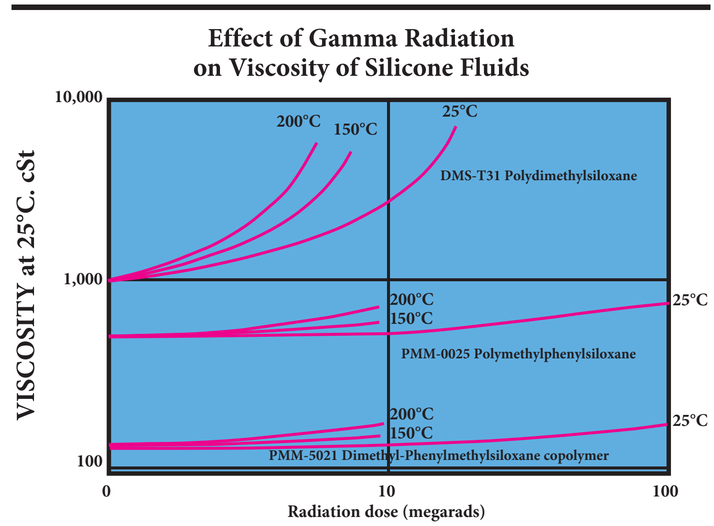
$\log \mu_{cSt} = 1.00 + 0.0123M^{0.5}$



Optical

Refractive index, 25°C	1.397-1.404
Verdet constant of magnetic rotary power	$16.2\text{-}16.9 \times 10^{-3}$ mm/gm/cm

Radiation Resistance



Properties of Conventional Silicone Fluids (Polydimethylsiloxanes) – continued

Polydimethylsiloxane properties that do not vary significantly for fluids with viscosities greater than 10cSt. are listed below

Reactivity

While they exhibit low reactivity under many conditions, certain environments are destructive to silicone fluids. Hydrogen fluoride, for example, attacks the silicon-oxygen bond to produce dimethylsilyl fluorides and water, which generate corrosive gases. Strong bases such as methanolic potassium hydroxide destroy silicone fluids and create resinous byproducts.

Thermal degradation at elevated temperatures causes rearrangement of the silicon-oxygen bonds to product volatile byproducts. Free-radical reaction of the methyl groups to form cross-linked materials by oxidation with peroxy compounds increases fluid viscosity and causes the fluid to gel.

Solubility of Fluids

Methylene chloride, chlorofluorocarbons, ethyl ether, xylene and methylethyl ketone are typical solvents for dimethylsiloxanes. Low viscosity polymers are also soluble in acetone, ethanol, dioxane and dihexyladipate. They are insoluble in methanol, cyclohexanol and ethylene glycol. The solubility parameter for 100 cSt. fluid is 7.4.

Solubility of Water

The equilibrium water absorption of silicones is 100-200ppm at 50-85% relative humidity. Drying of fluids is recommended for maximum performance in electrical applications. A typical drying protocol is to apply 1mm vacuum for 1 hour, which typically reduces water levels below 25ppm.

Solubility of Gases

Gas	ml gas/ml liquid @25°C
Nitrogen	0.16-0.17
Carbon Dioxide	1.00
Air	0.16-0.19
Hydrogen	0.11-0.12

Gaseous Permeability of Polydimethylsiloxane

Gas	P* x 10^9	Gas	P* x 10^9	Gas	P* x 10^9
H_2	97	N_2O	650	n-C_6H_{14}	1410
He	52	NO_2	1140	n-C_8H_{18}	1290
NH_3	885	SO_2	2250	n-$C_{10}H_{22}$	645
H_2O	5400	CS_2	1350	HCHO	1665
CO	51	CH_4	142	CH_3OH	2085
N_2	42	C_2H_6	375	$COCI_2$	2250
NO	90	C_2H_4	200	Acetone	835
O_2	90	C_2H_2	3960	Pyridine	2865
H_2S	1500	C_3H_8	615	Benzene	1620
Ar	90	n-C_4H_{10}	1350	Phenol	3150
CO_2	410	n-C_5H_{12}	3000	Toluene	1370

*$cm^3/s \bullet cm^2 \bullet$ cm Hg

values adjusted from filled silicone membranes

Thermal

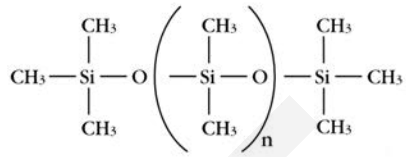
Specific heat	0.35-0.37 cal/gm/°C
Heat of formation	-2.41 kcal/gm
Heat of combustion (>50 cSt.)	6.13 kcal/gm
Glass transition temperature	-128°C
Gel time, 150°C	indefinite
Gel time for intermediate viscosity fluids, 200°C	200 hours
Gel time for high viscosity fluids, 200°C	100 hours
Autoignition temperature for fluids >10 cSt.	greater than 460°C

Rheological Behavior Under Shear

At shear rates commonly encountered ($\leq 10^4 s^{-1}$) polydimethylsiloxanes behave, at viscosities up to 1,000 cSt., like Newtonian fluids. Viscosity is constant and independent of the velocity gradient. Apparent viscosity is identical with viscosity extrapolated to zero velocity gradient.

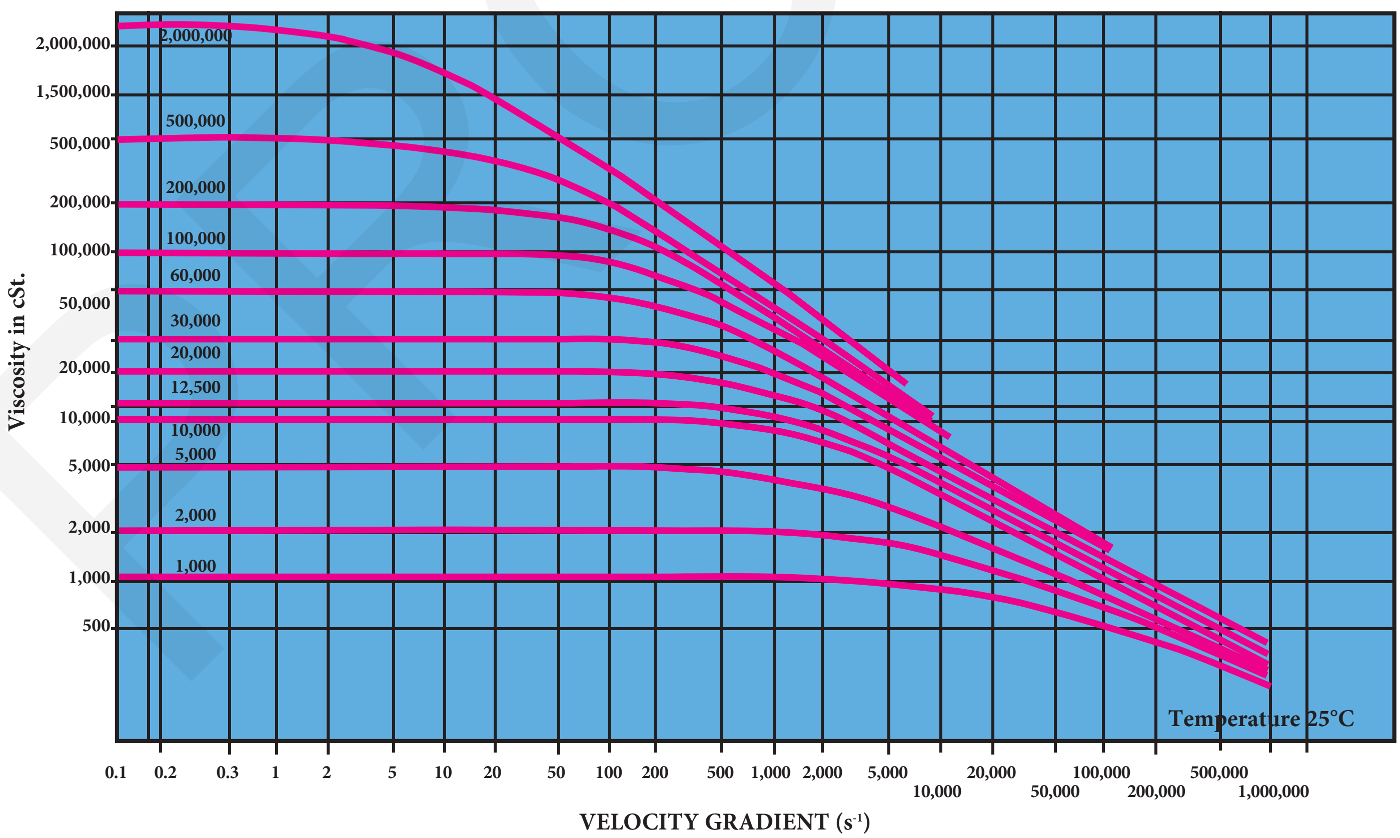
For oils of a higher viscosity than 1,000 cSt., this ratio is only constant for velocity gradients below a certain value. Beyond this value, becoming lower as the product becomes more viscous—the ratio is no longer constant: apparent viscosity falls below real viscosity (extrapolated for a zero velocity gradient) and the behavior is then known as "pseudoplastic." This change is perfectly reversible, and behavior again becomes Newtonian when the velocity gradient falls once more below the critical value. Viscosity returns to its initial level even after intense shearing of long duration.

As a guide, the table indicates the "critical" velocity gradients for polydimethylsiloxanes (where change of rheological behavior occurs) as well as apparent viscosity measured at velocity gradient equal to 10,000 s^{-1}.



	Critical velocity gradient (s^{-1})	Apparent viscosity for a velocity gradient of 10,000 s^{-1} (in cSt.)
1,000	2,500	850
12,500	200	4,700
30,000	150	6,000
100,000	30	8,200

Apparent Viscosity as a Function of Velocity Gradient



Low Volatility PolyDimethylsiloxanes

Volatile, low molecular weight components are present in polydimethylsiloxanes as a consequence of the equilibrium polymerization utilized in their manufacture. Typically, silicones with viscosities below 50 cSt. have >10% volatiles, while those with viscosities greater than 50 cSt. have 0.5-4.0% volatiles. Low molecular weight components can impart undesirable effects in certain critical applications. These can cause outgassing, migration, bleed, plasticization, and stress-cracking in contact with certain plastics and rubbers. Devolatilized silicones are offered in two classes. Reduced Volatility Silicones have >90% low-molecular weight components removed and are generally acceptable for polymer contacting applications. Extreme Low Volatility Silicones have virtually zero volatiles and are suitable for extreme vacuum applications including systems deployed in space exploration and communication. An example of a space application is as a damping fluid for solar panels.

Reduced Volatility PolyDimethylsiloxanes

wt% volatiles measured after 4 hours at 150°C in air

Product Code	Viscosity	wt % Volatiles	Price/1kg
DMS-T07R	7	10	¥45,700
DMS-T12R	20	3.0	¥59,000
DMS-T21R	100	0.5	¥43,100
DMS-T31R	1,000	0.1	¥65,600

see also FMS-222R in Fluorosilicone section (7)-476

Extreme Low Volatility PolyDimethylsiloxanes

<0.01 wt% volatiles measured after 24 hours at 125°C 10^{-5} torr vacuum, according to ASTM-E595-85 and NASA SP-R0022A

Product Code	Viscosity	Price/100g
DMS-T23E	350	¥80,400
DMS-T31E	1,000	¥80,400
DMS-T41.2E	12,500	¥80,400

Volatile Cyclic PolyDimethylsiloxanes - Cyclomethicones

Low molecular weight silicone that possess a cyclic structure rather than a chain structure serve as volatile carriers for a variety of formulations. Low heats of vaporization and the ability to select a desired vapor pressure has led to their use as cosmetic vehicles. While most display a broad range of liquid behavior, the most volatile cyclic dimethylsiloxane, D3, is a solid at room temperature.

Volatile Cyclic Dimethylsiloxanes (Cyclomethicones)

Product Code	Name	Viscosity, cSt.	Boiling Point, °C	Vapor Pressure, 25°C, mm	Heat of Vaporization Kcal/mole	Specific Gravity	Refractive Index	Molecular Weight	Price/ 100g	Price/ 2kg
SIH6105.0	D3	solid, 65° m.p.	134°	10	9.5	1.02	-	222.46	¥8,200	-
SIO6700.0	D4	2.3	175-176°	1.3	10.9	0.96	1.397	296.61	¥4,500	¥24,000
SID2650.0	D5	3.9	210°	0.4	12.0	0.96	1.398	370.77	¥4,500	¥33,600
SID4625.0	D6	6.6	245°	0.02	-	0.97	1.402	445.93	¥58,300	¥345,800
SID4075.0	D3-6(blend)	2.4	134-245°	1.5	-	0.96	-	222-445	-	¥18,800

Silicone Emulsions

Silicone emulsions are easy-to-use, water-dilutable, fine particle dispersions of conventional polydimethylsiloxane fluids. They are employed as release agents and lubricants in a variety of rubber and plastic applications including molding of mechanical rubber parts such as O-rings and footwear, producing shell molds and cores for metal casting, wire and cable extrusion and conveyance devices in high-speed printing. They are usually diluted with water to a final solids concentration of 0.1-3.5% at the point of application.

PolyDimethylsiloxane Silicone Emulsions

emulsifier content: 3-6 wt %

Product Code	Viscosity	wt % Solids	Base fluid Emulsion Type	Price/100g	Price/3kg	Price/18kg
DMS-T21M50	100	53-56	Non-ionic	¥7,400	¥31,300	¥118,000
DMS-T31M50	1,000	54-58	Non-ionic	¥6,600	¥28,700	¥103,000
DMS-T41M50	10,000	51-55	Non-ionic	¥6,600	¥28,700	¥103,000
DMS-T51M35	>100,000	33-36	Anionic	¥7,400	¥32,100	¥121,000

Silicone Fluid Blends

Very high viscosity silicone fluids are difficult to apply as thin films. Solutions in volatile low viscosity silicones are easy to handle and facilitate film spread.

PolyDimethylsiloxane Fluid Blends

Product Code	High Viscosity, Component, cSt	wt % Solids	Blend Viscosity, cSt	Price/100g	Price/3kg
DMS-T51B20	100,000	20	200-500	¥11,900	¥67,100
DMS-T72B15	15-20x10^6	15	4,000-8,000	¥14,600	¥85,700

Colored Silicone Fluids

Dyes in silicone fluids provide coloration without compromising transparency. The fluids may be used directly in applications such as gauge fluids or as tint additives for silicone fluids and elastomers.

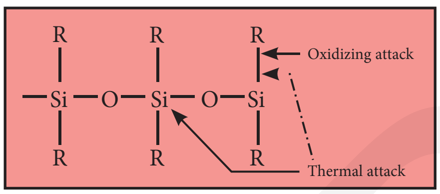
Product Code	Description	Price/100g	Price/1kg
DMS-T21BLU	Blue Dye in 100 cSt. fluid	¥8,800	¥25,800
DMS-T21RED	Red Dye in 100 cSt. fluid	¥8,800	¥25,800

Thermal Silicone Fluids

The thermal silicone fluids are described in chemical notation as aromatic siloxanes because of the presence of phenyl groups.

High phenyl content fluids are utilized as heat-exchange fluids, dielectric coolants, impregnants for sintered metal bearing, and base oils for high temperature fluids. Low phenyl content fluids are utilized at lower temperatures than high phenylsilicones and find extended temperature service applications as lubricating oils for critical devices such as timers and systems involving rubber, plastic and aluminum mating surfaces.

At elevated temperatures, and in the presence of oxygen, silicone polymers are subject to two types of degradation:



Phenyl groups provide enhanced thermal properties by two mechanisms:

1. Better protection of the chain Si—O—Si—O by steric hindrance.
2. The lower susceptibility of the phenyl group to oxidative attack.

As phenyl groups replace methyl groups in a polysiloxane, several changes occur. Oxidation resistance, thermal stability and shear resistance are enhanced. For polyphenylmethylsiloxane the service temperature is -55°C to 290°C. The gel time of several fluids is provided in the accompanying table. In closed oxygen-free systems the polyphenylmethyl-siloxanes are stable for thousands of hours at 250°C. The materials are used in heating baths.

The phenyl group also introduces rigidity in the silicone chain. When substitution exceeds 75 mole percent, the polymers are solid. Refractive index also increases with phenyl concentration. At 15-16 mole percent phenyl concentrations, the refractive index matches that of optical fibers and amorphous silica allowing "in-visible" connections and transparent blends.

Low viscosity phenyl fluids, PDM-7040 and PDM-7050, are used as diffusion pump fluids. Chlorinated aromated siloxanes provide superior lubrication for metal-metal contact. The polyphenylmethylsiloxanes also exhibit good radiation resistance, remaining serviceable up to 200 megarads exposure. (See page 469)

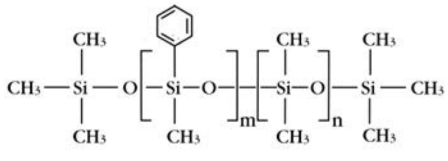
The compressibility of phenyl containing siloxanes is reduced in comparison to dimethyl fluids. The compressibility of selected thermal fluids at 20,000 psi are as shown in the accompanying table.

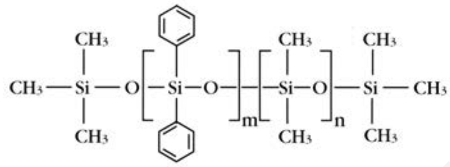
Thermal Silicone Fluids for Mechanical and Heat Transfer Applications (Aromatic siloxanes)

DiPhenylsiloxane-DiMethylsiloxane Copolymers CAS: [68083-14-7]

Product Code	Viscosity 25°C cSt.	Viscosity, 99°C cSt.	Viscosity Temp. Coeff.	Pour-Point, °C	Transition Temp.,Tg °C	Gel time, hours 250°C in air*
PDM-0421	100	29	0.62	-73	-	150-200
PDM-0821	100-125	30-32	0.63	-70	-	1200-1500
PDM-1922	150-250	26-28	0.78	-40	-	1500-2000
PhenylMethylsiloxane-DiMethylsiloxane Copolymers					CAS: [63148-52-7]	
PMM-1015	50	14	0.61	-70	-121	220-260
PMM-1021	100	35	0.62	-70	-121	210-230
PMM-1025	500	180	0.62	-70	-121	180-200
PMM-1043	30000	5500	0.63	-65	-121	<100
PMM-5021	125	20	0.78	-51	-100	1000-1400
PMM-6025	500	60	0.79	-34	-	1500-1900
PhenylMethylsiloxane Homopolymers					CAS: [9005-12-3]	
PMM-0011	10-20	<5	-	-55	-	>flashpoint**
PMM-0021	100-200	14-20	0.79	-	-	1600-2100
PMM-0025	500	35	0.88	-20	-86	1500-2000
PhenylMethylsiloxane-Diphenylsiloxane Copolymers					CAS: [308073-01-0]	
PMP-5025	300-600	-	-	-10	-	-
PhenylMethylsiloxane Oligomers - Diffusion Fluids						
1,1,5,5-Tetraphenyl-1,3,3,5-tetramethyltrisiloxane					CAS: [3982-82-9]	
PDM-7040	35-40	<5	-	-35	-	>flashpoint**
1,1,3,5,5-Pentaphenyl-1,3,5-trimethyltrisiloxane					CAS: [3390-61-2]	
PDM-7050	170-5	6	-	-15	-	>flashpoint**
Tetrachlorophenylsilsesquioxane-Dimethylsiloxane Copolymers					CAS: [68957-05-1]	
PTT-1117	70-5	18	0.68	-73	-	270-280

*The gel time for conventional fluids (DMS-T31) is <10 hours; coking time for mineral oil is <2 hours
**Unsafe operating temperature in air.





Specific Gravity	Refractive Index	Surface Tension	Dielectric Constant	Flashpoint °C	Ignition Temp., °C	Comonomer mole %	Molecular Weight	Price 100g	Price 1kg	Price 10kg
0.98	1.422	22.6	2.75	280	484	4-6*	3,500-4,000	¥7,400	¥34,600	¥244,000
0.99	1.436	22.8	2.78	280	484	7-10*	2,800-3,200	¥6,900	¥30,300	¥213,000
1.05	1.490	24.5	2.83	285	488	18-22*	1,600-2,400	¥9,800	¥52,600	¥339,000
						*Diphenylsiloxane				
1.00	1.425	25.0	2.77	275	482	8-12**	1,500-1,600	¥8,800	¥42,800	¥288,000
1.00	1.425	24.5	2.79	280	482	8-12**	3,000-4,000	¥10,900	¥57,100	¥330,000
1.00	1.425	24.4	2.80	285	482	8-12**	9,000-11,000	¥9,500	¥49,700	¥324,000
1.00	1.425	24.8	2.82	285	482	8-12**	40,000-50,000	¥20,400	¥125,500	-
1.07	1.500	24.5	2.87	296	482	45-50**	2,000-2,200	¥9,500	¥49,700	¥324,000
1.08	1.507		2.89	285	482	58-62**	3,500-4,000	¥9,300	¥42,800	¥288,000
						**Phenylmethylsiloxane				
1.01	1.470	-	-	220	420	-	350-450	¥29,700	¥182,800	-
1.09	1.520	-	2.93	280	484	-	700-1200	¥26,300	-	-
1.11	1.533	28.5	2.95	300	487	-	2,500-2,700	¥9,500	¥49,700	¥326,000
1.10	1.543	-	-	300	-	45-55**	600-800	¥326,000	-	-
						**Phenylmethylsiloxane				
1.07	1.556	37.3	-	221	425	-	485	¥14,600	¥82,800	¥532,000
1.09	1.588	36.5	-	245	440	-	547	¥18,600	¥112,000	¥652,000
1.05	1.428	21.0	2.90	300	480	-	1,600-3,000	¥12,700	¥70,100	¥410,000

Thermodynamic Properties*

Thermal Expansion, (25-150°C), cc/cc/°C:	$7.5\text{-}9.4 \times 10^{-4}$
Thermal Conductivity, cal/(sec.)(cm²)(°C/cm):	3×10^{-4}
Specific Heat, 38°C, cal/gm/°C:	0.34-0.39

Electrical Properties*

Volume Resistivity, Ω-cm:	25°C: $1\text{-}4 \times 10^{14}$ 50°C: $1\text{-}5 \times 10^{12}$
Dielectric Strength, kV/mm:	14
Dissipation Factor:	at 10^2 Hz: $1.1\text{-}5.1 \times 10^{-4}$ at 10^6 Hz: $0.1\text{-}1.1 \times 10^{-4}$

*Properties do not apply to PTT-1117

Compressibility at 20,000 psi

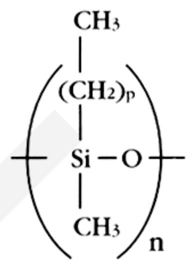
Product Code	Compressibility, %	Description
PTT-1117	8.3	(Tetrachlorophenyl)-Dimethylsiloxane Branch Copolymer
PMM-1025	7.9	Phenylmethylsiloxane Dimethylsiloxane Copolymer
PMM-1922	6.5	Diphenyldimethyl-siloxane Copolymer
PMM-0025	5.5	Polyphenylmethylsiloxane

Organic Compatible Silicone Fluids

Alkyl Silicones

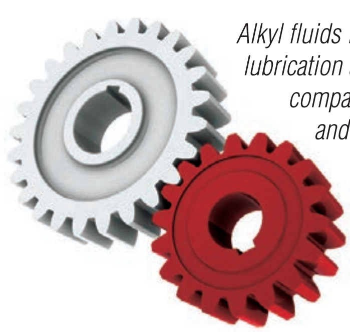
Silicones wth alkyl or aromatic substituted alkyl side chains can allow for many of the advantages of silcones to be formulated in organic based formulations. The alkyl modfied silicones offer greater organic compatibility with organic materials, improved lubricity, reduced tack, higher viscosity-temperature coefficients, lower compressibility and decreased oxidation stability when compared to polydimethylsiloxanes. Both ethylene-dimethylsiloxane and alkylsiloxane-dimethylsiloxane copolymers are readily miscible in many hydrocarbons allowing for the introduction of silicone properties.

Modification of the alkyl chain length allows for varying the organic characteristics of the siloxanes. A longer alkyl chain translates to higher compatibility with hydrocarbon oils and increases in pour point. The series moves from liquid at room temperature (octyl) to pour points just above room temperature (tetradecyl) to creamy solids at room temperature (octadecyl and higher).



AlkylMethylsiloxane Homopolymers

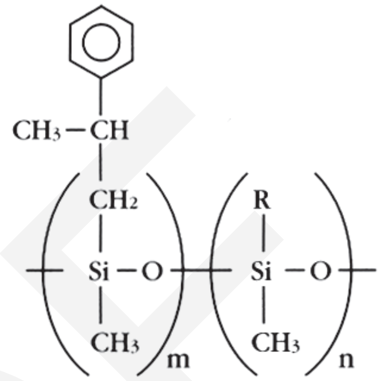
Product Code	Viscosity cSt.	Pour-Point, °C	Specific Gravity	Refractive Index	Surface Tension	Flashpoint °C	Price 100g	Price 1kg	Price 10kg
polyOctylMethylsiloxane								CAS: [68440-90-4]	
ALT-143	600-1000	-44	0.91	1.445	30.4	250	¥7,400	¥35,000	¥239,000
polyTetradecylMethylsiloxane								CAS: [76684-67-8]	
ALT-173	700-1200	30	0.89	1.455	35.0	-	¥9,000	¥44,000	¥258,000
polyOctadecylMethylsiloxane						(solid at room temperature)		CAS: [68607-75-0]	
ALT-192	250-500 (50°C)	50	0.89 (50°C)	1.443	39.5	-	¥9,000	¥50,000	¥289,000
AlkylMethylsiloxane DiMethylsiloxane Copolymers									
(45-55% HexadecylMethylsiloxane) - (DiMethylsiloxane) Copolymer								CAS: [191044-49-2]	
ALT-281	40-70	19	0.86	1.448	28.3	-	¥9,000	¥50,000	¥289,000
(27-33% OctadecylMethylsiloxane) - (DiMethylsiloxane) Copolymer						(solid at room temperature)		CAS: [67762-83-8]	
ALT-292	25-50 (40°C)	40	0.89	1.440	-	-	¥14,600	¥84,000	-
(1-2% TriacontylMethylsiloxane) - (DiMethylsiloxane) Copolymer								CAS: [17525-30-0]	
ALT-561	2000-4000 (100°C)	75	-	-	-	-	¥21,000	¥129,000	-
Alkyl Terminated PolyDiMethylsiloxanes									
Butyl Terminated PolyDiMethylsiloxane								[R&D Only]	
DMA-021	10-15	-40	0.92	1.413	-	>150	¥13,500	¥53,000	-
Octadecyl Terminated PolyDiMethylsiloxane								CAS: [128446-57-1]	
DMA-091	20-30 (35°C)	14	0.88	1.434	25.1	>150	¥14,600	¥84,000	-
Hexacosyl Terminated PolyDiMethylsiloxane								[R&D Only]	
DMA-131	65 (55°C)	44-5	0.87	1.415	-	>150	¥15,400	¥87,000	-
MonoHexacosyl Terminated Polydimethylsiloxane								CAS: [1283601-17-1]	
MMA-131	45	18-9	0.89	1.428	-	>150	¥14,600	¥45,200	-



Alkyl fluids improve plastic on plastic lubrication and have greater compatibility during processing and molding.

Aryl-Alkyl Silicones

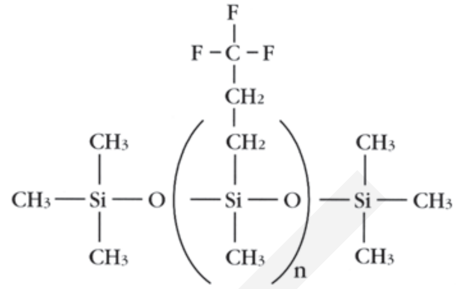
Aryl-alkyl silicones exhibit an extended range of organic compatibility and lubricity when compared to dimethyl silicones. They behave as broad spectrum compatibilizing agents for silicone/hydrocarbon/fatty acid formulations in the lubricant and cosmetic industries. Fluids with methyl and 2-phenylpropyl groups maintain excellent release properties without interfering with paintability, making them preferred in mold release agent formulations for rubber and plastics and die casting. Other uses for organic compatible silicone fluids include surfactants or de-airing molded urethane and epoxy parts during fabrication and die-cast metal lubrication.



AlkylMethylsiloxane-ArylalkylMethylsiloxane Copolymers

Product Code	Viscosity cSt.	Pour-Point, °C	Specific Gravity	Refractive Index	Surface Tension	Flashpoint °C	Price 100g	Price 1kg	Price 10kg
poly(2-Phenylpropyl)Methylsiloxane									CAS: [71329-48-1]
APT-133	1000	-	1.02	1.480	28.4	258	¥9,000	¥50,000	¥289,000
(75-85% EthylMethylsiloxane) - (15-25% 2-PhenylpropylMethylsiloxane) Copolymer									CAS: [68037-77-4]
APT-213	1200-1600	-	1.01	1.462	28.5	209	¥9,000	¥50,000	¥289,000
(45-55% HexylMethylsiloxane) - (45-55% 2-PhenylpropylMethylsiloxane) Copolymer									CAS: [68952-01-2]
APT-233	1500-2000	-	1.04	1.493	28.8	275	¥8,200	¥39,000	¥264,000
(60-70% DodecylMethylsiloxane) - (30-40% 2-PhenylpropylMethylsiloxane) Copolymer									CAS: [68037-76-3]
APT-263	1100-1300	-	0.91	1.464	32.3	277	¥9,000	¥50,000	¥289,000

Fluorosilicone Fluids



Many advantages of fluorocarbons and silicones are combined in fluorosilicones. The materials are useful from -40° to 230°C in a wide range of aggressive service environments. They have achieved a number of unique applications due to their chemical and solvent resistance to lubricity.

Fluorosilicones are not miscible with fuels or oils. They have a solubility parameter of 9.6. They have been employed in mechanical vacuum pumps where exposure to high temperature moisture and oxygen is encountered.

The fluids are excellent lubricants under extreme pressure applications. This characteristic, considered with resistance to fuels has led to many automotive and aerospace lubrication applications, since they are not easily leached by fuels from mechanical joints. In addition, fluorosilicones, particularly the copolymers, have been employed as lubricants for electrical contacts and precision timing devices. Greases formulated from fluorosilicones and solid fluoropolymer thickeners have been used in sealed transmission and other extreme pressure applications.

The high density of these fluids has led to their use as a flotation medium for inertial guidance systems. Acoustic velocities in fluorosilicones are lower than conventional silicones,allowing sonar lens development. Trifluoropropylmethylsiloxane homopolymers have a compressibility of 7.5% at 20,000 psi. Volume resistivity for fluids >500cSt: 10^{13} ohms-cm.

Fluorosilicones

Poly (3,3,3-Trifluoropropylmethylsiloxane) CAS: [63148-56-1]

Product Code	Viscosity, cSt.	Viscosity Temp. Coeff.	Pour-Point,°C	Transition Temp., Tg°C	Specific Gravity	Refractive Index	Surface Tension	Dielectric Constant	Dielectric Strength	Flashpoint Temp.,°C	Molecular Weight	Price 25g	Price 100g	Price 1kg
FMS-121	80-120	-	-47	-	1.24	1.382	23.7	-	-	-	900-1000	¥14,100	¥37,900	¥203,000
FMS-123	300-350	0.84	-47	-74	1.25	1.381	25.7	6.95	200	260	2400	¥10,100	¥25,200	¥157,000
FMS-125	400-500	0.84	-44	-74	1.26	1.381	25.7	6.95	200	270	3000	¥11,900	¥27,100	-
FMS-131	1000	0.85	-40	-74	1.28	1.382	26.1	7.35	200	290	4600	¥6,900	¥14,600	¥84,000
FMS-141	10,000	0.87	-30	-74	1.30	1.383	28.7	7.35	175	315	14,000	¥6,900	¥14,600	¥84,000

Specialty Fluorosilicones

Product Code	Viscosity, cSt.	Viscosity Temp. Coeff.	Pour-Point,°C	Transition Temp., Tg°C	Specific Gravity	Refractive Index	Surface Tension	Dielectric Constant	Dielectric Strength	Flashpoint Temp.,°C	Molecular Weight	Price 25g	Price 100g	Price 1kg
(48-52% 3,3,3-Trifluoropropylmethylsiloxane) - (48-52% Dimethylsiloxane) Copolymer CAS: [115361-68-7]														
FMS-221	80-120	-	-55	-103	1.16	1.387	21.4	-	-	-	1,800	¥7,200	¥14,900	¥86,000
(48-52% 3,3,3-Trifluoropropylmethylsiloxane) - (48-52% Dimethylsiloxane) Copolymer CAS: [115361-68-7]														
FMS-222R*	140-200	-	-55	-103	1.17	1.388	21.4	-	-	-	2,000	¥10,600	¥26,800	¥167,000
(25-35%-Nonafluorohexylmethylsiloxane) - (65-75% Dimethylsiloxane) Copolymer CAS: [882878-48-0]														
FMS-411	8-12cSt	-	-40	-	1.22	1.365	-	-	-	-	1,000	¥16,200	¥44,800	¥235,000
(15-20%-Tridecafluorooctylmethylsiloxane) - (80-85% Dimethylsiloxane) Copolymer CAS: [115340-95-9]														
FMS-736	4000-7000	-	-	-	1.21	1.375	21.1	-	-	315	40,000	¥18,600	¥52,500	¥264,000
1,3-Bis(Tridecafluorooctyl)Tetramethyldisiloxane [R&D only] CAS: [71363-70-7]														
SIB1816.0	6-7	-	-	-	1.46	1.337	-	-	-	-	826	¥30,800	¥92,600	–

*reduced volatility grade (<2% volatiles measured after 4 hours at 150°C)

Fluorocarbon - Fluorosilicone Light Grease

Product Code	Penetration 60 Stroke	Dropping-point, °C	4-ball wear-mm, 232°C	Price 100g	Price 1kg
PP1-LUB01	320-340	200-210	1.60-1.65*	¥44,600	¥231,000

*1200rpm, 40kg, 2hrs, M-10 steel

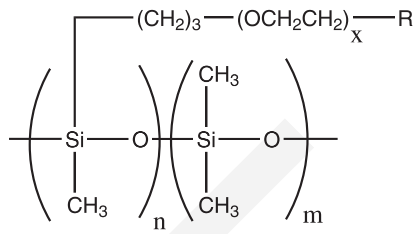
Hydrophilic Silicones

Polyalkylene Oxide Silicones

Hydrophilic silicones differ from conventional silicones by demonstrating a much greater compatibility with aqueous systems. They have slight to complete solubility in water. They are composed of dimethylsiloxane molecular backbones in which some of the methyl groups are replaced by polyalkylenoxy or pyrrolidone groups linked through a propyl group to the silicone atom.

They are widely used as surfactants and emulsifiers. By altering the amounts of hydrophile and lipophile, the desired surfactant properties may be balanced. The higher the alkylene oxide content the higher the hydrophilicity. Materials with ethylene oxide contents of 75% and higher are freely soluble in water.

DBE-712 is the lowest molecular weight material containing 6-8 EO units and is miscible with water in all concentrations. It is used as an anti-fog treatment for glass and optical surfaces. It is also used to facilitate wetting and spread of developers on lithographic plates.



At the other extreme, DBE-224 is a water-insoluble copolymer used as a lubricant in plastic on metal wear applications and as a lubricant for fibers. Anti-tack and mar resistance are imparted to urethane coatings. High molecular weight copolymers, such as DBE-224, are excellent emulsifiers. DBE-821 reduces static charge generation during fiber processing. It has also been incorporated into rolling oil formulations for metal drawing and stamping. DBE-712 and DBP-732 provide slip in flexographic and gravure inks.

CMS-832 is a high refractive index fluid that provides gloss and smooth touch in polishes.

Hydrophilic Silicones (R=OMe)

Dimethylsiloxane-Ethylene Oxide Block/Graft Copolymers

Product Code	Wt % Non-Siloxane	Glycol Capping	Viscosity cSt.	Molecular Weight	Specific Gravity	Refractive Index	Pour Point,°C	Water Solubility	Surface Tension	CAS#	Price 100g	Price 1kg	Price 10kg
DBE-224*	25	OMe	400	10,000	1.02	1.414	-29	-	23.8	68938-54-5	¥8,200	¥43,000	¥235,000
DBE-311* **	30-35	OMe	10	800-1,200	0.97	1.425	-	-	-	68938-54-5	¥10,100	¥50,000	-
DBE-411* **	45-50	OMe	5-10	400-500	0.94	1.425	-	-	-	68938-54-5	¥10,100	¥50,000	-
DBE-621**	50-55	OMe	100	2,500	1.03	1.434	-15	+/-	23.1	68938-54-5	¥8,200	¥34,000	¥235,000
DBE-712‡	60-70	OMe	20	600	1.01	1.442	0	+	23.6	27306-78-1	¥6,600	¥29,000	¥187,000
DBP-732◊	65-70	OMe	1800	20,000	1.02	1.446	-50	+	22.0	67762-85-0	¥6,600	¥29,000	¥187,000
DBE-713	75	OAc	30	600-750	1.03	1.446	-	+	-	125997-17-3	¥22,500	-	-
DBE-814‡	80	OMe	40-50	1000	1.04	1.452	-14	+	26	117272-76-1	¥10,100	¥50,000	¥340,000
DBE-821‡	80-85	OMe	100-120	4400	1.07	1.454	0	+	27	68938-54-5	¥6,600	¥29,000	¥187,000
DBE-921	85-90	OMe	100-120	5000	1.08	1.451	0	+	37.3	68938-54-5	¥16,200	¥83,000	¥471,000

*~10 mole% EO Substituted; DP~100 **~25% EO Substituted; DP~15 ***R&D only ‡ reduced volatility grades available ◊EO/PO (40/60)

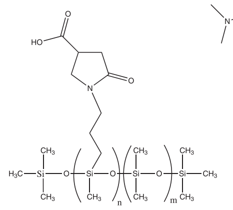
Hydroxylic Silicones (R=OH)

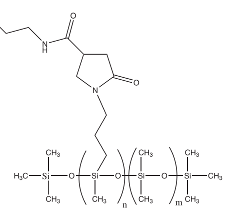
Product Code	Wt % Non-Siloxane	Glycol	Glycol Capping	Viscosity cSt.	Molecular Weight	Specific Gravity	Refractive Index	CAS#	Price 100g	Price 1kg	Price 10kg
CMS-221	20-25	EO	OH	125-150	4,000	1.00	1.419	68937-54-2	¥8,800	¥53,000	-
CMS-222	20	PO	OH	150-200	5500-6500	0.98	1.411	68957-00-6	¥14,100	¥69,000	¥400,000
DBP-C22	45-55	PO	OH	200-300	2500-3200	0.99	1.434	161755-53-9	¥15,600	¥80,000	
DBP-534	55	EO/PO (60/40)	OH	4,000	30,000	0.98	1.414	68937-55-3	¥8,200	¥34,000	¥235,000
CMS-832*	50-60	EO	OH	1000-2000	2000-5000	1.09	1.505	200443-93-2	¥16,200	¥95,000	-
DBE-C25	60	EO	OH	400-450	3500-4500	1.07	1.450	68937-54-2	¥11,100	¥53,000	
CMS-626	65	EO	OH	550-650	4500-5500	1.09	1.458	68937-54-2	¥13,800	¥68,000	¥354,000

*(Hydroxypolyethyleneoxypropyl)methylsiloxane-(3,4-Dimethoxyphenylpropyl)methylsiloxane-Dimethylsiloxane terpolymer

Polar Silicones

Polar silicones are utilized in specialty applications where readily swellable materials such as soft rubber have poor dimensional stability in contact with other lubricants. Pyrrolidone functional silicones are the most hydrophilic silicones that are not derived from polyethylene glycols (PEGs). Furan functional silicones are hydrophilic and have compatibility with most conventional silicones. Cyanoalkylsilicones have even less tendency to swell substrates than fluorosilicones and, in thin films, facilitate ion transport. Fluorosilicones are the most common polar silicones, but are usually considered as a class by themselves.

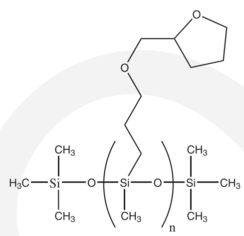




Polar Silicones

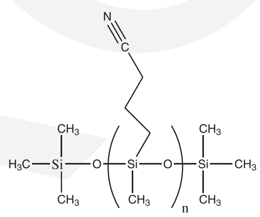
(N-Pyrrolidonepropyl)Methylsiloxane - Dimethylsiloxane Copolymers

Product Code	Pyrrolidone Substitution	Viscosity cSt.	Specific Gravity	Water Solubility	Refractive Index	CAS#	Price 100g	Price 1kg
YAD-122	dimethylaminopropylcarboxamide	150-300	0.96	-	1.406	179005-02-8	¥34,700	¥212,000
YBD-125	carboxylate	400-600	0.98	-	1.405	179005-03-9	¥19,900	¥121,000



Tetrahydrofurfuryloxypropylmethylsiloxane

Product Code	Mole % Tetrahydrofurfuryloxypropyl-methylsiloxane	Viscosity cSt.	Specific Gravity	Water Solubility	Refractive Index	Surface Tension	CAS#	Price 100g	Price 1kg
DCF-405	100	5	0.93	-	1.426	23.8	1361237-41-3	¥21,200	¥132,000



CyanopropylMethylsiloxane

Product Code	Mole % Cyanopropylmethylsiloxane	Viscosity cSt.	Specific Gravity	Water Solubility	Refractive Index	CAS#	Price 10g	Price 100g
YMS-T31	100	800-1400	1.07	-	1.459	67762-86-1	¥24,400	¥148,800

Amphiphilic Silicones

Silicone fluids which are both hydrophilic and olephilic are said to be amphiphilic. This is in distinction to the more general definition that considers an amphiphile to be a material which is both hydrophilic and hydrophobic. Amphiphilic silicones have the ability to form stable water-in-oil emulsions allowing formulation of a wide range of gels and creams. They are also useful as surface treatments for dispersion of polar particles in hydrocarbon media.

Amphiphilic Silicones

DodecylMethylsiloxane-HydroxypolyalkyleneoxypropylMethylsiloxane Copolymer CAS: [145686-74-4]

Product Code	Viscosity cSt.	Molecular Weight	Mole % Hydroxypolyalkyleneoxy-propylMethylsiloxane	Active %	Specific Gravity	Price 100g	Price 1kg
ABP-263	1000-4000	1800-2000	30-40	80-85	0.85	¥15,600	¥92,000
contains 15-20% isostearyl alcohol							

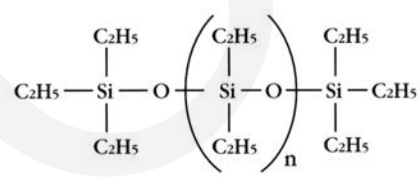
Low Temperature Fluids

Comparative Low Temperature Properties

Product Code	Description	Viscosity 25° C, cSt.	Viscosity 0° C, cSt.	Viscosity -20° C, cSt.	Viscosity -40° C, cSt.	Viscosity -80° C, cSt.
DMS-T15	PolyDiMethylsiloxane	50	60	108	205	frozen
DES-T11	PolyDiEthylsiloxane	10	17	30	70	fluid
DES-T15	PolyDiEthylsiloxane	50	69	143	340	fluid
FMS-123	Fluorosilicone	300	5,500	10,500	20,000	frozen
MTT-1015	Methyl-T-Branched PDMS	50	90	180	380	fluid
SIM6559.0	MethylTriHexylSilane	6	19	48	150	fluid
SIM6577.0	MethylTriOctylSilane	19	62	200	frozen	frozen
SIP6827.0	PhenylTris(trimethylsiloxy)silane	4	6.5	12	20	frozen
SAE10	Petroleum Oil	100	500	11,000	235,000	frozen

PolyDiEthylsiloxanes

Polydiethylsiloxanes offer improved metal-metal lubrication and low temperature properties when compared to polydimethylsiloxanes. They are oxidatively stable to 150°C and thermally stable under inert atmospheres to 225°C.



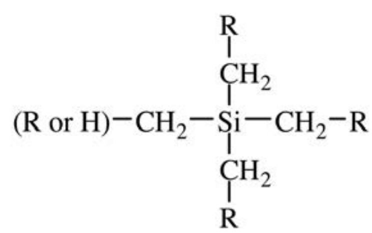
PolyDiethylsiloxanes, Triethylsiloxy terminated CAS:[63148-61-8]

Product Code	Viscosity cSt.	Pour Point,°C	Thermal Conductivity, W/m°C	Density	Refractive Index	Flashpoint °C	Molecular Weight	Price 100g	Price 1kg
DES-T02	2	-115	-	0.844	1.434	76	245	¥15,600	¥79,000
DES-T03	3-5	-115	-	0.844	1.436	80	275-325	¥16,200	¥83,000
DES-T11	7-12	-110	0.133	0.913	1.439	110	350-400	¥16,200	¥83,000
DES-T12	15-20	-110	0.138	0.93	1.439	125	400-500	¥22,000	¥118,000
DES-T15	40-50	-110	0.142	0.958	1.442	170	500-800	¥11,400	¥61,000
DES-T23	200-400	-96	0.157	0.991	1.447	256	1300-2000	¥13,500	¥66,000

Other Properties: Glass Transition Temperature: -139°C Specific Heat, 20-100°: 0.40-0.47 cal/mole°C
Surface Tension: 25-28 dynes/cm Viscosity Temperature Coefficient: 0.77 Volume Resistivity: 10^{13}-10^{14} ohm-cm@20°C

Silahydrocarbons

Silahydrocarbons are low molecular weight fluids that have a remarkable ability to provide excellent lubrication and liquid behavior at low temperatures. Low viscosity and hydrocarbon compatability allows use of these material as internal lubricants in ink-jet and microfluidic applications.



Silahydrocarbons

Product Code	Name	CAS	Viscocity, cSt.	Density	m.p.	b.p.	Refractive Index	flashpoint °C	Price/100g
SIM6559.0	Methyltri-n-Hexylsilane	[3429-60-5]	6	0.81	<-80°	255°	1.445	>110°	¥45,900
SIM6577.0	Methyltri-n-Octylsilane*	[3510-72-3]	19	0.81	<-31°	380°	1.452	>110°	¥35,300
SIT7082.0	Tetra-n-Butylsilane	[994-79-6]	10	0.80	-56°	230°	1.447	75°	¥72,400

*4-ball wear (440C SS), 23°: 0.03-0.04 x 10^{-9} x mm^3/mm @100 rpm, 200N in vacuum

Branched Fluids

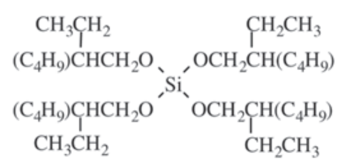
Branched and low viscosity silicone fluids offer properties that are significantly different than higher molecular weight versions since chain entanglements are limited and end-groups have influence on properties. Apart from the obvious mechanical advantage of the low viscosity in many applications, they offer higher purity levels, discrete vapor pressures and more linear rheology as a function of pressure and temperature.

Branched Fluids *T-structure Siloxanes* *Organosilsesquioxanes, Trimethylsilyl Terminated* *Tris(Trimethylsiloxy)Silanes*

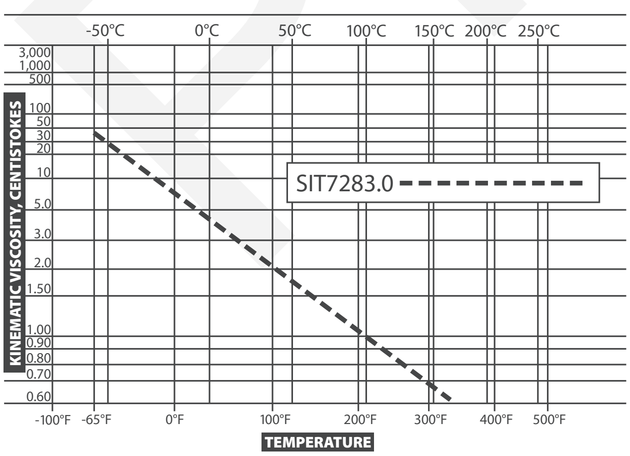
Product Code	Viscosity cSt.	Pour Point,°C	Viscosity Temp. Coefficient	Density	Refractive Index	Flashpoint °C	Molecular Weight	Price 100g	Price 1kg	Price 10kg
Methyltris(trimethylsiloxy)silane								CAS: [17928-28-8]		
SIM6592.0	1.6	-74	-	0.85	1.388	64	311	¥8,500	¥40,900	¥279,000
Methyl-T-Branched PolyDimethylsiloxane								CAS: [68037-74-1]		
MTT-1015	50-80	-85	0.57	0.97	1.403	285	1650	¥11,400	¥60,000	¥371,000
Octyltris(trimethylsiloxy)silane								[R&D only] CAS: [187592-85-4]		
SIO6715.7	4-5	<-76	-	0.86	1.411	106	409	¥11,100	¥37,000	¥353,000
Octyl-T-Branched Polysilsesquioxane, Trimethylsilyl terminated								[R&D only] CAS: [187593-69-7]		
OTT-1012	15-30	<-76	-	0.91	1.428	>110	1080	¥9,000	¥39,100	¥268,000
OTT-1023	200-400	<-40	-	0.95	1.444	>110	1000	¥11,400	¥60,000	-
Phenyltris(trimethylsiloxy)silane								CAS: [2116-84-9]		
SIP6827.0	4	<-60	0.55	0.92	1.437	127	373	¥8,800	¥38,800	¥265,000
Phenyl-T-Branched Polysilsequioxane, Trimethylsilyl terminated								CAS: [73559-47-4]		
PTT-1012	15-25	<-60	-	0.98	1.460	>125	500-700	¥8,800	¥37,500	¥257,000
PTT-1022	150-300	-	-	1.01	1.481	>125	700-900	¥9,000	¥39,100	-
PTT-1025	400-600	-	-	1.05	1.489	>125	900-1200	¥11,100	¥51,500	-
Phenethyltris(trimethylsiloxy)silane								[R&D only] CAS: [211935-21-6]		
SIP6722.8	4	-55	0.68	0.93	1.440	135	401	¥31,000	-	-
Tetrachlorophenyl-T-Branched PolyDimethylsiloxane								CAS: [68857-05-1]		
PTT-1117	70-75	-73	0.68	1.05	1.428	300	1600-3000	¥12,700	¥70,100	¥410,000

Low Temperature Silicate Ester Fluids

Silicate esters are dielectric fluids with thermal stability and low temperature properties that meet the requirements of airborne electronic equipment. These fluids are often used in low temperature aerospace hydraulics or as performance additive to synthetic hydrocarbons. Successful long term application of the fluids requires sealed systems to prevent moisture absorption.



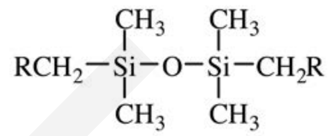
Product Code	Name	Viscosity, cSt.	Density	m.p.	b.p.	Refractive Index	flashpoint °C	CAS	Price/100g
SIT7283.0	Tetrakis(2-ethylhexoxy)silane	10	0.88	<-78°	198°/1mm	1.4388	188°	[115-82-2]	¥11,900



Other Properties:
viscosity, 38°: 6.89 cSt;
viscosity, -40°: 310 cSt;
vapor pressure, 25°: <0.1mm
ΔHvap: 169 kcal/mole
coefficient of thermal expansion: 0.8 x 10^{-3}
volume resistivity: $1x10^{11}$ ohm-cm
dielectric constant: 2.46
surface tension: 26.7 dynes/cm
specific heat: 0.48 cal/g/°
autoignition temp.: 304°

Volatile, Low Temperature Fluids

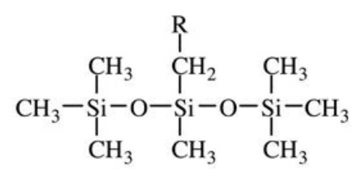
Disiloxanes



Disiloxane fluids are utilized as vehicles and solvents where purity, low temperature or dielectric properties are critical factors. Since they are pure chemicals, rather than polymers, viscosities and other properties have virtually no variation.

Product Code	Name	Viscosity, cSt.	Density	m.p.	b.p./mm	Refractive Index	flashpoint °C	CAS	Price/100g
SIH6115.0	Hexamethyldisiloxane	0.65	0.764	-67°	99-100°	1.377	-1°	107-46-0	¥4,400
SID3418.0	1,3-Diethyltetramethyldisiloxane	1	0.797	-120°	155-6°	1.401	30°	[R&D only]	¥61,800
SIH6070.0	Hexaethyldisiloxane	2.35	0.844	-115°	231°	1.434	76°	999-49-0	¥23,300
SID4406.0	1,3-Dioctyltetramethyldisiloxane	4.11	0.891	-36°	122-5°/0.2	1.474	>110°	[R&D only]	¥30,800
SID4588.0	1,3-Diphenyltetramethyldisiloxane	3.45	0.976	-89°	155-8°/13	1.518	156°	56-33-7	¥46,200
SIB1828.5	1,3-Bis(trifluoropropyl)tetramethyldisiloxane	2	1.085	-88 to -90	75°/10	1.363	-	[R&D only]	¥75,100
SIB1709.0	Bis(nonafluorohexyl)tetramethyldisiloxane	3.6	1.331	-89°	150°/45	1.340	156°	122179-35	25g/¥22,500
SIB1816.0	1,3-Bis(tridecafluorooctyl)tetramethyldisiloxane	6-7	1.460	-40 to -45	81-2°/11	1.337	>150°	[R&D only]	¥92,600
SIB1120.0	1,3-Bis(heptadecafluoro-1,1,2,2-tetrahydrodecyl)tetramethyldisiloxane	7-10	1.51	-5 to 0	>90°/5	1.335	>110°	[R&D only]	10g/¥53,800
SIB1055.0	1,3-Bis(chloromethyl)tetramethyldisiloxane	2	1.05	-90°	204-5°	1.440	73°	2362-10-9	¥31,000
SIB1735.0	Bis(pentamethyldisiloxanyl)ethane	2.7	0.82	-52°	254-5°	1.410	92°	[R&D only]	¥34,500

Trisiloxane Fluids



Trisiloxane fluids are low viscosity materials that have unique wetting, surfactant and solubility characteristics. Their unusual characteristics are derived from having a small "cloud" of silicone hydrophobic groups from which other functionalities extend. While they are considered polymeric fluids, their stuctures are extremely well-defined in chemical terms since they are low molecular weight species. This table identifies the common trisiloxane fluids. Further details are found in Gelest Silicon Compounds literature.

Trisiloxanes

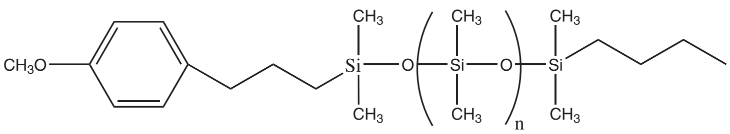
Product Code	Name	Viscosity, cSt.	Density	m.p.	b.p./mm	Refractive Index	flashpoint °C	CAS	Price/100g
SIE4895.0	3-Ethylheptamethyltrisiloxane	1	0.82	<-60°	172°	1.394	45°	[17861-60-8]	¥11,100
SID4627.6	3-Dodecylheptamethyltrisiloxane	5	0.83	-14°	180°/0.3	1.422	>120°	[R&D only]	¥24,700
SIO6622.0	3-Octadecylheptamethyltrisiloxane	13	0.82	-	-	1.433	>120°	[R&D only]	¥26,300
SIO6711.5	3-Octylheptamethyltrisiloxane	3	0.82	-62°	84°/0.3	1.413	69°	[17955-88-3]	¥21,500
SIP6736.2	3-Phenylheptamethyltrisiloxane	2	0.91	-56°	95°/5	1.447	64°	[R&D only]	¥43,200

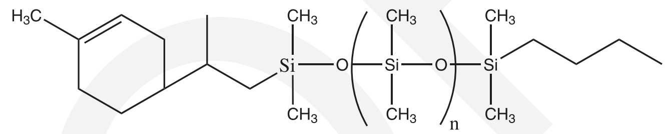
Substituted Trisiloxanes

SIT8365.0	(Trifluoropropyl)heptamethyltrisiloxane	2	0.93	<-78°	66-8°/10	1.375	69°	[R&D only]	¥50,900
SIA0075.0	2-(Acetoxypolyethyleneoxypropyl)-heptamethyltrisiloxane	30	1.03	-	-	1.446	79°	[12597-17-3]	¥22,500
SIC2289.5	(Chloromethyl)heptamethyltrisiloxane	1	0.92	-85°	185-6°	1.406	>65°	[R&D only]	¥50,100

SiBrid® Inert Silicones

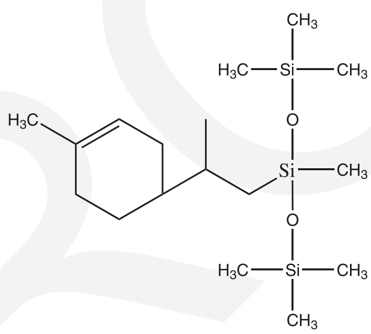
SiBrid® inert silicones are hybrid organic-inorganic liquid polymers that combine, on a molecular level, structural features associated with conventional organic polymers and silicones. SiBrid® silicones offer the wide range of thermal performance, surface properties associated with silicones, but with compatibility and solubility with organic systems, particularly organic polymers. They can introduce release properties into coating and cosmetic formulations. They behave as internal lubricants and impact modifiers for thermoplastics.





Naturally Derived Silicones

Product Code	Description	Viscosity	CAS	Specific Gravity	Refractive Index	Molecular Weight	Price/100g	Price/1kg
MCR-NA07	MonoAnisyl terminated Polydimethylsiloxane	7-8	1283601-14-8	0.940	1.430	650-850	¥39,300	¥199,000
MCR-NL07	MonoLimonenyl terminated Polydimethylsiloxane	7-8	1283601-16-0	0.920	1.424	650-850	¥36,900	¥196,400
DMS-NL04	Limonenyltrisiloxane	4-5	1263044-00-3	0.880	1.426	358	¥39,300	¥196,000



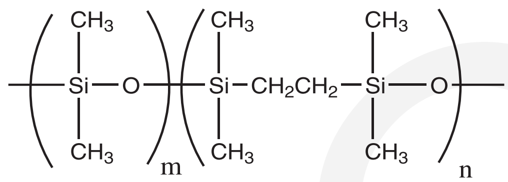
Solubility Panel

Product	DMA-131	DCE-7521	MCR-NA07	MCR-NL07	DMS-NL04	PDMS
D5	S (hot)	S	S	S	S	S
PDMS, 10cSt	S (hot)	S	S	S	S	S
Stearyl Methicone	S	S	S	S	S	S
Hydrogenated Polydecene	S	S	S	S	S	S
10% Microcrystalline wax	S	I	I	I	I	I
Ceresin	S	I	I	I	I	I
Octyldodecyl Stearate	S	S (hot)	S	S	S	I
Triisostearyl Citrate	S	S	S	S	S	I
Ethylhexyl Palmitate	S	S	S	S	S	S
Octyldodecanol	S	I	S	S	S	I
Castor Oil	I	I	I	S	I	I

S = Soluble I = Insoluble

SiBrid® Inert Silicones

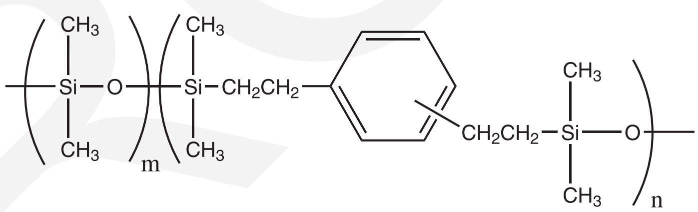
Ethylene Siloxane Copolymers are used as additives to compatibilize or stabilize mixed silicone organic formulations. Incorporation at low levels, typically 1-3%, helps stabilize silicone-organic mixtures that have a tendency to phase separate during storage. Silethylphenylene containing copolymers offer increased thermostability and higher refractive index.



Ethylene - Dimethylsiloxane copolymers

Product Code	Viscosity	Mole % Siloxane	Specific Gravity	Refractive Index	Molecular Weight	Price/100g	Price/1kg
DCE-7007*	7-10	66-70	0.87	1.426	450-650	¥16,200	¥83,000
DCE-7012*	25-25	66-70	0.89	1.433	750-1000	¥16,200	¥83,000
DCE-7521**	80-120	75-76	0.92	1.431	>2000	¥15,400	¥78,000

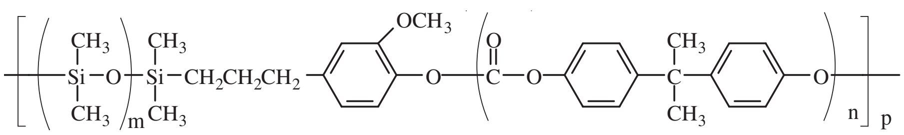
*[1035218-85-9]; **[26710-23-6]



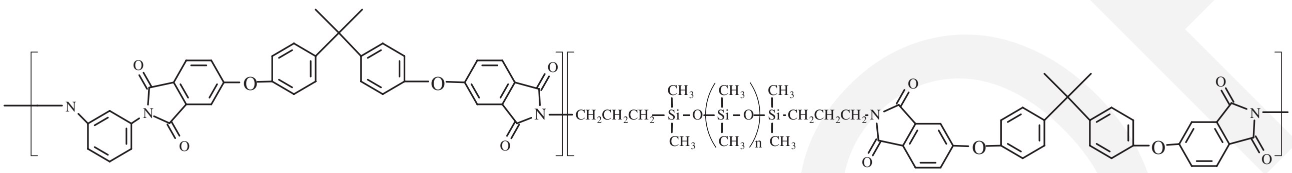
Silethylphenylene - Dimethylsiloxane copolymers

Product Code	Viscosity	Mole % Siloxane	Specific Gravity	Refractive Index	Molecular Weight	Price/100g	Price/1kg
DCS-8024	350-600	78-82	0.98	1.444	5000-6000	¥24,100	¥130,000

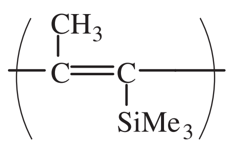
Thermoplastic Resins for Melt Processing or Solution Casting



SSP-080
(DIMETHYLSILOXANE)(BISPHENOL -A CARBONATE) copolymer
(15 - 20% polydimethylsiloxane)
thermoplastic; tensile strength: 50MPa   Vicat mp: 145°   density: 1.19
[202483-49-6] TSCA HMIS: 1-1-0-X   100g / ¥35,300

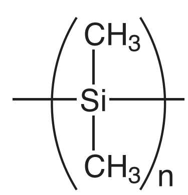


SSP-085
(DIMETHYLSILOXANE)(ETHERIMIDE) copolymer
(35-40% polydimethylsiloxane)phenylenediaminepolyetherimide
thermoplastic; tensile strength: 2800psi   Tg: 168°C   density: 1.18
[99904-16-2] TSCA HMIS: 1-1-0-X   100g / ¥35,300

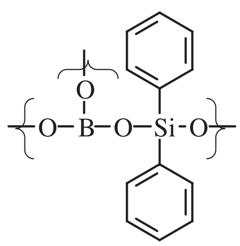


SSP-070
POLY(TRIMETHYLSILYL)PROPYNE
forms viscous 5% solutions in toluene/tetrahydrofuran
high oxygen permeability[1]; $PO_2/PN_2 = 1.7$
1. Masuda, T.; et al, J. Am. Chem. Soc., **1983**, *105*, 7473.
[87842-32-8]   HMIS: 1-1-0-X   10g / ¥53,800

Pre-Ceramic Polymers



PSS-1M01
Poly(DIMETHYLSILANE)
employed in CVD of SiC films.[1]
1. Scarlete, M., et al; US Patent 7,396,563; 2008 (Label Licensed Gelest Product)
[30107-46-8] / [28883-63-8] TSCA HMIS: 1-1-0-X   100g / ¥33,900



SSP-040
POLY(BORODIPHENYLSILOXANE) solid, Tg: 95-100°, Tm: 140-1°
employed in preparation of ceramic fibers.[1]
1. Yajima, S.; et al, Nature, **1977**, *266*, 521.
[70914-15-7] TSCA HMIS: 2-0-0-X   25g / ¥22,500   100g / ¥65,500

Gelest

Silicone Fluids for Optical Applications

Gelest offers pure silicone fluids (not blends) with a wide range of refractive indices. Listed below are fluids with refractive indices and viscosities. Fluids with the same product code prefix can be blended to exact refractive index requirements.

Product Code	Refractive Index@25° 589.3nm	Viscosity (cSt)@25°	Price/25g	Price/100g
SIB1120.0	1.335	7-10	10g ¥53,800	
SIB1816.0	1.336	6-7	¥30,800	
SIB1709.0	1.340	3.6	¥22,500	
FMS-736	1.375	6000	¥18,600	¥52,500
FMS-121	1.382	80-120	¥14,100	¥37,900
FMS-221	1.387	80-120	¥7,200	¥14,900
DMS-T12	1.400	20		¥6,400
DMS-T21	1.402	100		¥6,400
DMS-T22	1.403	200		¥6,400
SIO6711.5	1.413	3	¥9,000	¥21,500
DBE-224	1.414	400		¥8,200
PDM-0421	1.422	100		¥7,400
PTT-1117	1.428	70-5		¥12,700
PDM-0821	1.436	100-125		¥6,900
DES-T12	1.439	15-20		¥22,000
ALT-143	1.445	600-1000		¥7,400
DBE-814	1.452	40-50		¥10,100
APT-213	1.462	1200-1600		¥9,000
APT-133	1.480	1000		¥9,000
PDM-1922	1.490	150-250		¥9,800
APT-233	1.493	1500-2000		¥8,200
PMM-5021	1.500	125		¥9,500
SIT8662.0	1.501	15	¥25,200	
PMM-6025	1.507	500		¥9,300
PMM-0021	1.520	100-200		¥26,300
PMM-0025	1.533	500		¥9,500
PMP-5025	1.543	300-600		¥37,900
PDM-7040	1.556	35-40		¥14,600
PDM-7050	1.588	170-175		¥18,600

Appendix 1 – Viscosity Conversion Chart

Centistokes	Poise	SSU	Zahn #1	Zahn #2	Zahn #3	Zahn #4	Zahn #5	Ford #3	Ford #4	Krebs Units	SAE	Liquid Example
1	.01	.31										Water
10	.10	60	30	16				9	5			
20	.20	100	37	18				12	10			
40	.40	210	52	22				25	18			
60	.60	320	68	27				33	25	33	10	
80	.80	430	81	34				41	31	37		
100	1.0	530		41	12	10		50	34	40	20	olive oil
200	2.0	1,000		82	28	17	10	90	58	52		
300	3.0	1,475			34	24	15	130	74	60		
400	4.0	1,950			46	30	20	170	112`	64	30	glycerine
500	5.0	2,480			58	38	25	218	143	68	40	
1,000	10.0	4,600				69	49	390	264	85	90	castor oil
2,000	20.0	9,400						800	540	103		
3,000	30.0	14,500						1,230	833	121		
4,000	40.0	18,500						1,570	1,060	133		molasses
5,000	50.0	23,500							1,350			corn syrup
6,000	60.0	28,000							1,605			
7,000	70.0	32,500							1,870			
8,000	80.0	37,000							2,120			
9,000	90.0	41,000							2,360			
10,000	100	46,500							2,670			honey
15,000	150	69,400										
20,000	200	92,500										
30,000	300	138,600										
40,000	400	185,600										
50,000	500	231,000										
60,000	600	277,500										
70,000	700	323,500										
80,000	800	370,500										
90,000	900	415,500										
100,000	1,000	462,000										sour cream
125,000	1,250	578,000										molasses*
150,000	1,500	694,000										
175,000	1,750	810,000										
200,000	2,000	925,000										peanut butter

viscosities at 25°C unless otherwise stated *measured at 2°C (a cold winter day)

Note: The precision of conversion in this table is limited by two factors. It assumes that the density of liquids is 1 so that stokes and poises are the same and that viscosity is independent of shear rate, i.e., the fluid is Newtonian. To correct for density in converting from centistokes to centipoises, multiply specific gravity by centistokes.

Appendix 2 – Blending Silicone Fluids

Any standard viscosity grade of polydimethylsiloxane can be blended together with another viscosity grade of the same fluid to produce an intermediate viscosity. This chart provides a means for determining the proper blend ratio. The chart should be used as follows:

Decide upon the viscosity grades to be blended. For high accuracy, measure the actual viscosity of the blending fluids.

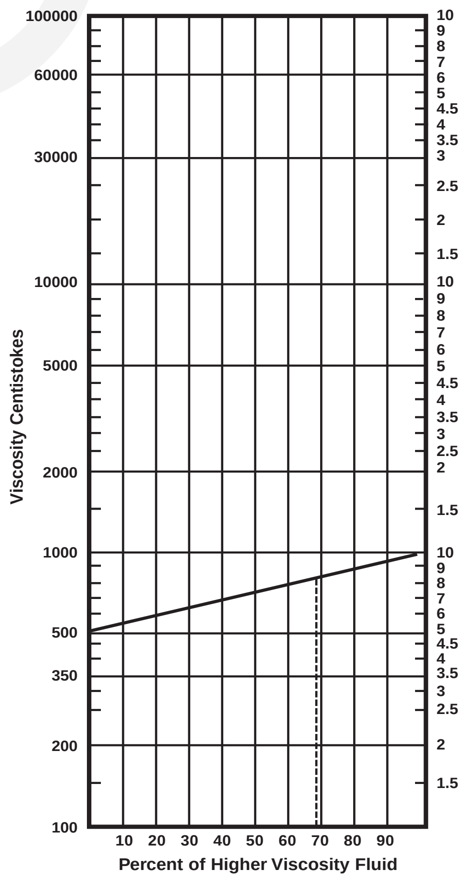
Locate the lower viscosity on the left hand scale.

Locate the higher viscosity on the right hand scale.

Connect these two points with a straight line.

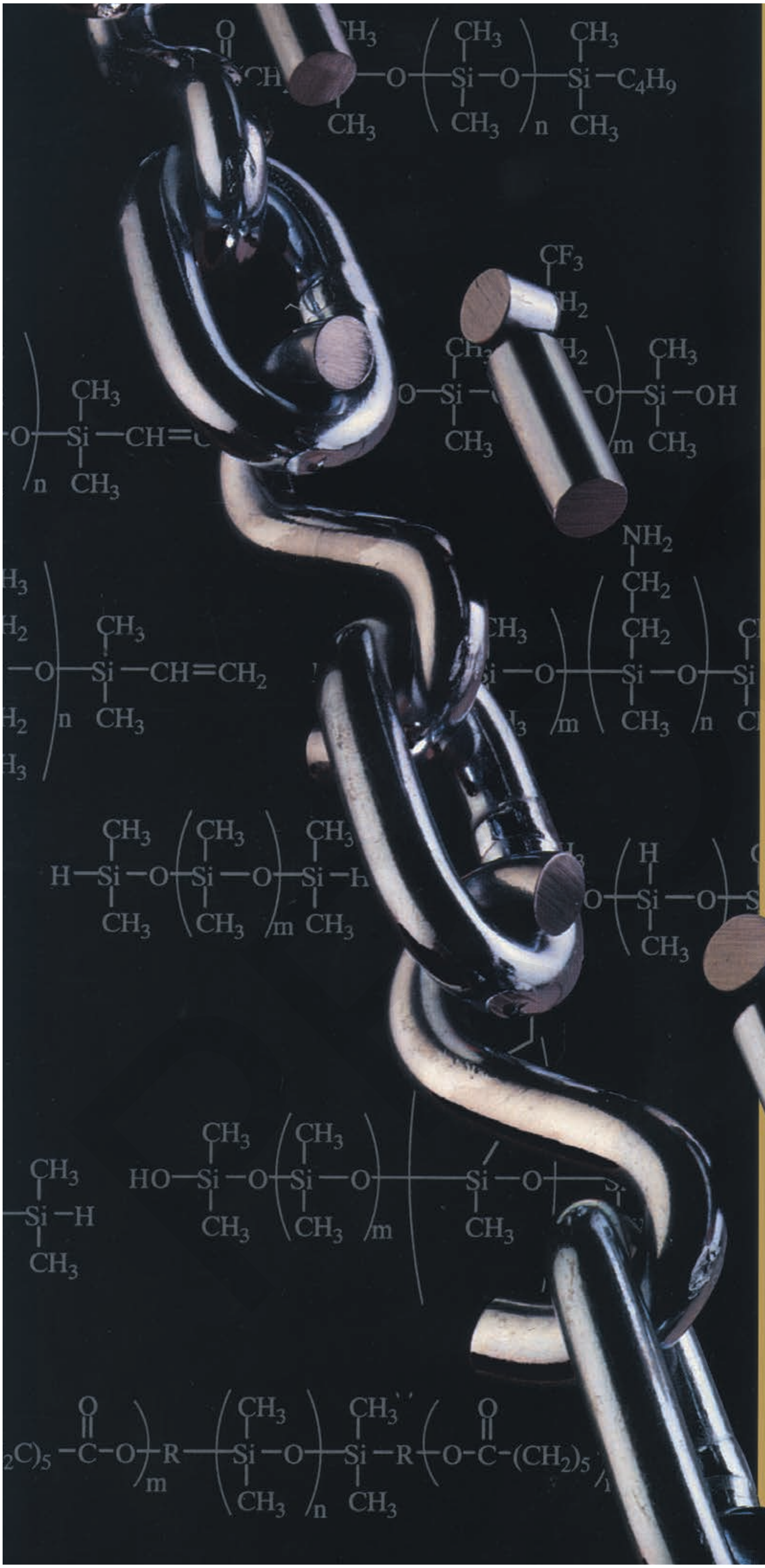
Locate the point where the line indicating the desired blend viscosity intersects the constructed line. From this point, follow down to the horizontal scale to read the percent of the higher viscosity fluid to use in the blend.

This method is reasonably accurate in predicting blend viscosity when the two fluids differ in viscosity by no more than one magnitude (one power of ten). When fluids covering a wider range are blended, the chart will only approximate the finished viscosity. To achieve a viscosity of 800 cSt. as shown in the example, 68% of 1000 cSt. and 32% of 500 cSt. fluids are blended.



The calculation basis for blending is:

$$\log = \frac{A \log^1 + B \log^2}{A + B}$$



Gelest

REACTIVE SILICONES:

FORGING NEW POLYMER LINKS

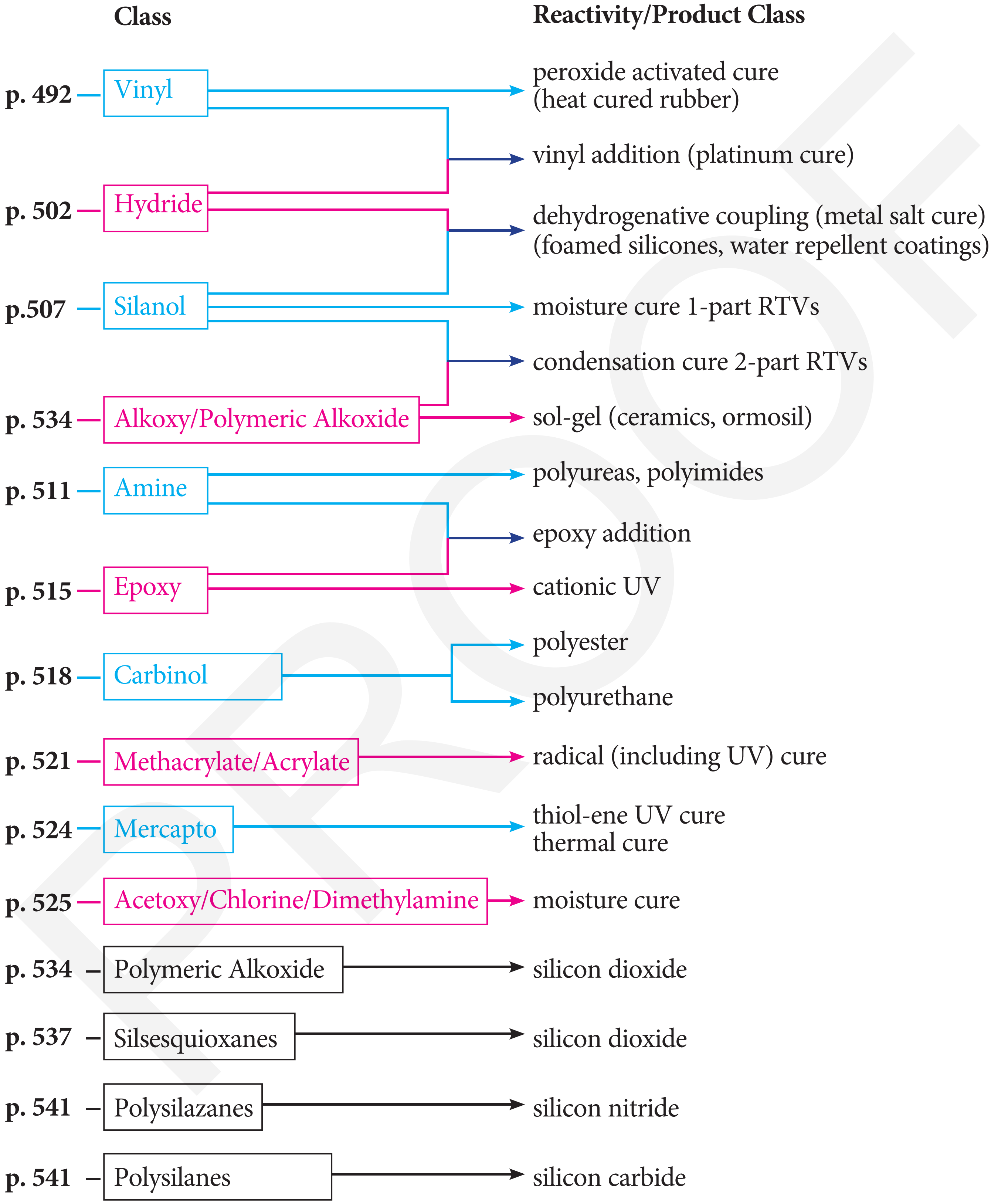
MATERIALS FOR:

Adhesives
Binders
Ceramic Coatings
Dielectric Coatings
Encapsulants
Gels
Membranes
Optical Coatings
Photolithography
Polymer Synthesis
Sealants

Gelest

Enabling your technology

Functional Silicone Reactivity Guide

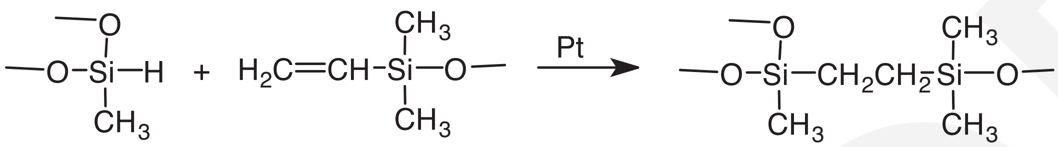


CONTENTS

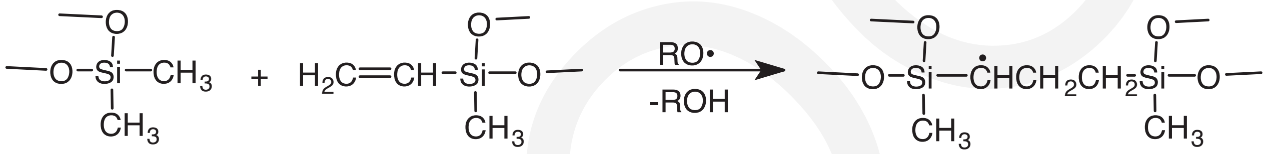
$Si—CH=CH_2$

Vinyl Functional Polymers

The reactivity of vinyl functional polymers is utilized in two major regimes.[1] Vinyl terminated polymers are employed in addition cure systems. The bond forming chemistry is the platinum catalyzed hydrosilylation reaction which proceeds according to the following equation:



Vinylmethylsiloxane copolymers and vinyl T-structure fluids are mostly employed in peroxide activated cure systems, which involve peroxide-induced free radical coupling between vinyl and methyl groups. Concomitant and subsequent reactions take place among methyl groups and between crosslink sites and methyl groups. The initial crosslinking reaction is depicted in the following equation:



Addition Cure (Platinum Cure)

Addition cure chemistry provides an extremely flexible basis for formulating silicone elastomers. An important feature of the cure system is that no byproducts are formed, allowing fabrication of parts with good dimensional stability. Cures below 50°C, Room Temperature Vulcanizing (RTV), cures between 50° and 130°C, Low Temperature Vulcanizing (LTV), and cures above 130°C, High Temperature Vulcanizing (HTV), are all readily achieved by addition cure. The rheology of the systems can also be varied widely, ranging from dip-cures to liquid injection molding (LIM) and conventional heat-cure rubber (HCR) processing. Vinyl-terminated polydimethylsiloxanes with viscosities greater than 200 cSt generally have less than 2% volatiles and form the base polymers for these systems. More typically, base polymers range from 1000 to 60,000 cSt. The crosslinking polymer is generally a methylhydrosiloxane-dimethylsiloxane copolymer with 15-50 mole % methylhydrosiloxane. The catalyst is usually a complex of platinum in alcohol, xylene, divinylsiloxanes or cyclic vinylsiloxanes. The system is usually prepared in two parts. By convention, the A part typically contains the vinyl-containing silicone and the platinum catalyst at a level of 5-10ppm, and the B part usually contains the hydride functional siloxane.

Formulation of addition cure silicones must address the following issues:

Strength- Unfilled silicones have extremely poor mechanical properties and will literally crumble under pressure from a fingernail. The most effective reinforcing filler is hexamethyldisilazane treated fumed silica. Alternatively, if clarity must be maintained, vinyl "Q" reinforcing resins are employed.

---

[1] Arkles, B., CHEMTECH, **1983**, *13*, 542.

Platinum Catalysts- see p. 545

Addition Cure Modifiers- see p. 546

Hardness- Higher crosslink density provides higher durometer elastomers. Gels are weakly crosslinked systems and even contain substantial quantities of "free" fluids. In principal, molar equivalents of hydrides react with vinyls. See the section on hydride functional fluids for further information. Also, polymers with vinyl pendant on the chain rather than at chain ends are utilized to modify hardness and compression set.

Consistency- The viscosity of the base polymer and a variety of low surface area fillers ranging from calcium carbonate to precipitated silica are used to control the flow characteristics of silicone elastomers.

Temperature of Cure- Selection of platinum catalysts generally controls the preferred temperature of cure.[1] Platinum in vinyldisiloxanes is usually used in room temperature cures. Platinum in cyclic vinylsiloxanes is usually used in high temperature cures. See the Platinum listings in the catalyst section.(p. 493)

Work Time (Speed of Cure)- Apart from temperature, moderators (sometimes called retarders) and inhibitors are used to control work time. Moderators slow, but do not stop platinum catalysts. A typical moderator is tetravinyltetramethylcyclotetrasiloxane. Inhibitors stop or "shut-down" platinum catalysts and therefore are fugitive, i.e volatile or decomposed by heat or light (UV). Acetylenic alcohols such as methylisobutynol are volatile inhibitors. Patent literature shows that t-butylhydroperoxide is an effective inhibitor that breaks down at temperatures above 130°.

Low Temperature Properties, Optical Properties- The introduction of vinyl polymers with phenyl groups alters physical properties of elastomers. At levels of 3-4 mole %, phenyl groups improve low temperature properties. At higher levels, they are used to alter refractive index of elastomers, ranging from matching fillers for transparency to optical fiber applications. Unfortunately, increased phenyl substitution lowers mechanical properties of elastomers.

Shelf Life- A fully compounded elastomer is a complex system. Shelf-life can be affected by moisture, differential adsorption of reactive components by fillers and inhibitory effects of trace impurities. Empirical adjustments of catalyst and hydride levels are made to compensate for these effects.

Compounding- All but the lowest consistency elastomers are typically compounded in sigma-blade mixers, planetary mixers, two-roll mills or, for large scale production, twin-screw extruders.

Quick Start Formulation Transfer and Impression Molding Elastomer

This low strength formulation is useful as a reproductive molding compound. It is presented here because it can be prepared without special equipment and is an instructive starting point for addition cure silicone elastomers.

DMS-V31	1000 cSt vinyl-terminated polydimethylsiloxane	100 parts
SIS6962.0	hexamethyldisilazane treated silica	50 parts
HMS-301	methylhydrosiloxane-dimethylsiloxane copolymer	3-4 parts
SIP6830.3	platinum complex solution	150-200ppm

In small portions, work the DMS-V31 into the silica with a spatula. After a uniform dispersion is produced, work in the HMS-301. The blend may be stored in this form. Just prior to use add the platinum solution with an eyedropper and work it in rapidly. Working time is 5-10 minutes. The rate of cure can be retarded by adding tetravinyltetramethylcyclotetrasiloxane (SIT7900.0).

[1] Lewis, L. et al. *J. Mol. Cat. A: Chem.* **1996**, *104*, 293.; Lewis, L. et al. *J. Inorg. Organomet. Polym.* **1996**, *6*, 123.

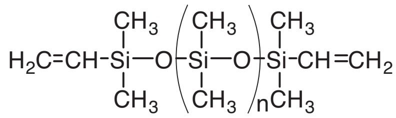
Peroxide Activated Cure

Activated cure silicone elastomers are processed by methods consistent with conventional rubbers. These silicone products are referred to as HCRs (heat cured rubbers). The base stocks are high molecular weight linear polydiorganosiloxanes that can be converted from a highly viscous plastic state into a predominantly elastic state by crosslinking. Vinylmethylsiloxane-dimethylsiloxane copolymers of extremely high molecular weights are the typical base stocks for activated cure silicone elastomers. The base stocks are commonly referred to as gums. Gums typically have molecular weights from 500,000 to 900,000 with viscosities exceeding 2,000,000 cSt. Free radical coupling (cure) of vinyl and methyl groups is usually initiated by peroxides at process temperatures of 140°-160°. Generally, peroxide loading is 0.2-1.0%. Following the cure, a post-cure at 25-30° higher temperature removes volatile peroxide decomposition products and stabilizes polymer properties. The most widely used peroxides include dibenzoylperoxide (often as a 50% concentrate in silicone oil), dicumylperoxide (often 40% on calcium carbonate), 2,5-dimethyl-2,5-di-t-butylperoxyhexane and bis(dichlorobenzoyl)peroxide[1]. The last peroxide is particularly recommended for aromatic-containing siloxanes. Terpolymer gums containing low levels of phenyl are used in low temperature applications. At increased phenyl concentrations, they are used in high temperature and radiation resistant applications and are typically compounded with stabilizing fillers such as iron oxide. Phenyl groups reduce cross-linking efficiency of peroxide systems and result in rubbers with lower elasticity. Fluorosilicone materials offer solvent resistance. Lower molecular weight vinylsiloxanes are frequently added to modify processability of base stocks.

While the use of peroxide activated cure chemistry for vinylmethylsiloxanes is well established for gum rubber stocks, its to use is growing in new applications that are comparable to some peroxide cure acrylic systems. Relatively low viscosity vinylmethylsiloxanes and vinyl T-fluids are employed as grafting additives to EPDM elastomers in the wire and cable industry to improve electrical properties. They also form reactive internal lubricants for vulcanizeable rubber formulations. At low levels they are copolymerized with vinyl monomers to form surfactants for organosols.

[1] Lynch, W., “Handbook of Silicone Rubber Fabrication”, Van Nostrand Reichold, 1978.

Peroxide Catalysts- see p. 549



Vinyl Terminated PolyDimethylsiloxanes

(7)-483 CAS: [68083-19-2] TSCA

Code	Viscosity	Molecular Weight	Wgt % Vinyl	Vinyl - Eq/kg	Density	Price/100g	Price/3kg	Price/16kg
DMS-V00	0.7	186	29	10.9	0.81	¥16,300	¥160,100	-
DMS-V03	2-3	500	10-12	3.6-4.3	0.92	¥24,400	¥210,900	-
DMS-V05	4-8	800	7-9	2.4-2.9	0.93	¥25,000	¥216,100	-
DMS-V21	100	6000	0.8-1.2	0.33-0.37	0.97	¥10,400	¥55,400	¥138,000
DMS-V22	200	9400	0.4-0.6	0.21-0.24	0.97	¥8,100	¥48,000	¥122,000
DMS-V25	500	17,200	0.37-0.43	0.11-0.13	0.97	¥9,000	¥50,700	¥128,000
DMS-V31	1000	28,000	0.18-0.26	0.07-0.10	0.97	¥7,800	¥44,300	¥114,000
DMS-V33	3500	43,000	0.12-0.15	0.05-0.06	0.97	¥9,000	¥50,700	¥128,000
DMS-V35	5000	49,500	0.10-0.13	0.04-0.05	0.97	¥7,800	¥44,300	¥114,000
DMS-V41	10,000	62,700	0.08-0.12	0.03-0.04	0.97	¥9,000	¥50,700	¥128,000
DMS-V42	20,000	72,000	0.07-0.09	0.025-0.030	0.98	¥10,400	¥55,400	¥138,000
DMS-V46	60,000	117,000	0.04-0.06	0.018-0.020	0.98	¥10,400	¥55,400	¥138,000
DMS-V51	100,000	140,000	0.03-0.05	0.016-0.018	0.98	¥11,900	¥64,500	¥174,000
DMS-V52	165,000	155,000	0.03-0.04	0.013-0.016	0.98	¥11,900	¥64,500	¥174,000

COMMERCIAL

These materials are most often employed in 2-part addition cure silicone elastomers.

Monodisperse Vinyl Terminated PolyDimethylsiloxane

DMS-Vm31	1000	28,000	0.18-0.26	0.07-0.10	0.97	¥24,700	¥158,200
DMS-Vm35	5000	49,500	0.10-0.13	0.04-0.05	0.97	¥24,700	¥158,200

Monodisperse telechelic silicone fluids offer advantages over traditional telechelic fluids. These materials contain little or no low molecular weight non-functional components which can plasticize and migrate out of cured elastomers, reducing or eliminating migratory contamination issues.

Reduced Volatility Grades*

DMS-V25R	500	17,200	0.37-0.43	0.11-0.13	0.97	¥22,400	¥148,800
DMS-V35R	5000	49,500	0.10-0.13	0.04-0.05	0.97	¥28,200	¥181,000

*total volatiles, 4 hours @ 150°C: 0.2% maximum

Fumed Silica Reinforced Vinyl Terminated PolyDimethylsiloxane

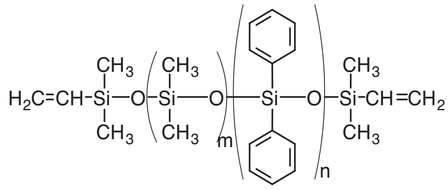
Code	Viscosity	Base Fluid Viscosity	wt% Silica	Vinyl - Eq/Kg	Density	Price/100g	Price/3kg	Price/16kg
DMS-V31S15	3000	1000	15-18	0.06	1.1	¥13,400	¥81,400	¥195,000

Precompounded base materials provide access to low durometer formulations without the need for special compounding equipment required to mix fumed silica. The following is a starting-point formulation.

Part A			Part B		
DMS-V31S15	Base	99.85%	DMS-V31	Vinyl Silicone	90.0%
SIP6831.2	Catalyst	0.15%	HMS-301	Crosslinker	10.0%

Prepare Part A and Part B separately. When ready to cure mix 3 parts A to 1 part B. The mix will cure over 4 hours at room temperature to give the following properties.

Hardness:	20-30 Shore A	Tensile Strength	3.5MPa (500psi)
Elongation	400-450%	Tear Strength	16N/mm (91ppi)



Vinyl Terminated Diphenylsiloxane-Dimethylsiloxane Copolymers CAS: [68951-96-2] TSCA (7)-481

Code	Mole % Diphenylsiloxane	Viscosity	Molecular Weight	Vinyl – Eq/Kg	Refractive Index	Price/100g	Price/3kg
PDV-0325	3.0-3.5	500	15,500	0.10-0.16	1.420	¥14,100	¥96,600
PDV-0331	3.0-3.5	1000	27,000	0.065-0.11	1.420	¥15,400	¥106,900
PDV-0341	3.0-3.5	10,000	62,000	0.027-0.037	1.420	¥16,200	¥113,300
PDV-0346	3.0-3.5	60,000	78,000	0.017-0.021	1.420	¥18,300	¥130,800
PDV-0525	4-6	500	14,000	0.12-0.16	1.430	¥17,200	¥96,600
PDV-0535	4-6	5000	47,500	0.03-0.06	1.430	¥16,200	¥113,300
PDV-0541	4-6	10,000	60,000	0.027-0.038	1.430	¥20,200	¥145,000
PDV-1625	15-17	500	9,500	0.19-0.23	1.465	¥17,400	¥104,500
PDV-1631	15-17	1000	19,000	0.09-0.12	1.465	¥23,300	¥170,800
PDV-1635	15-17	5,000	35,300	0.052-0.060	1.465	¥31,300	¥196,000
PDV-1641	15-17	10,000	55,000	0.033-0.040	1.465	¥43,200	¥255,000
PDV-2331	22-25	1000-1500	12,500	0.13-0.19	1.493	¥65,800	¥342,000
PDV-2335	22-25	4000-5000	23,000	0.07-0.10	1.493	¥76,400	¥403,000

COMMERCIAL

Vinyl Terminated polyPhenylMethylsiloxane CAS: [225927-21-9] TSCA-L

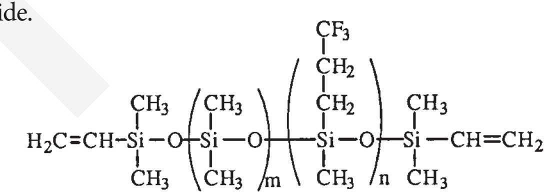
Code	Mole % PhenylMethylsiloxane	Viscosity	Molecular Weight	Vinyl– Eq/Kg	Refractive Index	Density	Price/100g
PMV-9925	99-100	300-600	2000-3000	0.5-1.2	1.537	1.11	¥40,600

These materials are most often employed in 2-part addition cure silicone elastomers where special thermal or optical properties are required.

VinylPhenylMethyl Terminated VinylPhenylsiloxane - PhenylMethylsiloxane Copolymer CAS: [68037-82-1]TSCA

Code	Mole % PhenylMethylsiloxane	Viscosity	Molecular Weight	Vinyl– Eq/Kg	Refractive Index	Density	Price/100g
PVV-3522	30-40	80-150	800-1500	6.0-7.5	1.530	1.10	¥45,900

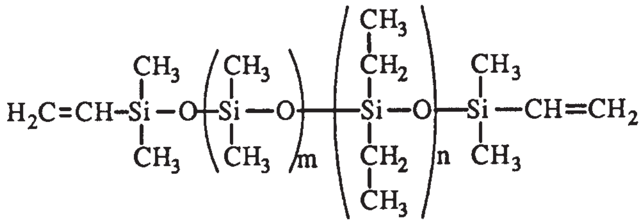
Crosslinks with dicumyl peroxide.



Vinyl Terminated TrifluoropropylMethylsiloxane - Dimethylsiloxane Copolymer CAS: [68951-98-4] TSCA

Code	Mole % $CF_3CH_2CH_2MeSiO$	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
FMV-4035	35-45	4,000-6,000	6,000-9,000	1.388	1.13	¥32,600	¥186,500
FMV-4042	35-45	14,000-18,000	25,000-35,000	1.388	1.13	¥49,900	¥254,400

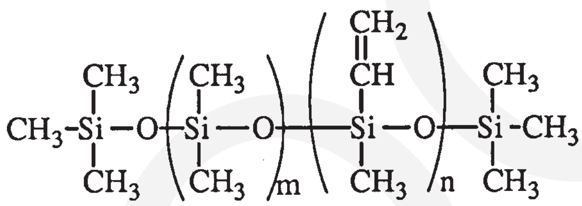
Trifluoropropylmethylsiloxane copolymers offer greater solvent resistance (lower hydrocarbon solubility) and lower refractive index than analogous dimethylsiloxane homopolymers.



Vinyl Terminated Diethylsiloxane - Dimethylsiloxane Copolymers

Code	Mole % Diethylsiloxane	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100 g
EDV-2022	18-22	150-300	8000-12,000	1.413	0.953	¥51,200

Diethylsiloxane copolymers offer better hydrocarbon compatibility (greater solubility) and higher refractive index than analogous dimethylsiloxane homopolymers.



Vinylmethylsiloxane - Dimethylsiloxane Copolymers, trimethylsiloxy terminated CAS: [67762-94-1] TSCA

Code	Mole % Vinylmethylsiloxane	Viscosity, cSt.	Molecular Weight	Vinyl - Eq/kg	Specific Gravity	Price/100 g	Price/1kg
VDT-123	0.8-1.2	250-350	12,000	0.11-0.15	0.97	¥10,100	¥50,000
VDT-127	0.8-1.2	700-800	23,000	0.11-0.15	0.97	¥13,400	¥73,000
VDT-131	0.8-1.2	800-1200	28,000	0.11-0.15	0.97	¥10,100	¥50,000
VDT-163	0.3-0.7	2,000,000-4,000,000	425,000	0.04-0.08	0.98	¥20,000	¥118,000
VDT-431	4.0-5.0	800-1200	28,000	0.5-0.7	0.97	¥10,600	¥55,000
VDT-731	7.0-8.0	800-1200	28,000	0.9-1.1	0.96	¥10,100	¥50,000
VDT-954	11.0-13.0	300,000-500,000	225,000	1.1-1.4	0.98	¥36,600	¥202,000
VDT-5035	48-52	4500-5500	50,000	6.0-6.5	0.98	¥15,900	¥90,000

Vinyl containing copolymers are used as crosslinkers in Pt and peroxide cure elastomer. High vinyl content copolymers form elastomers used in high accuracy soft lithography[1,2,3].

[1]Choi, D. et al. *Mat. Sci. Eng. C.* **2004**, *24*, 213.
[2]Infuehr, R. et al. *Appl. Surf. Sci.* **2003**, *254*, 836.
[3]Schmid, H.; Michel. B. *Macromolecules* **2000**, *33*, 3042.

Vinylmethylsiloxane - Dimethylsiloxane Copolymers, silanol terminated, 4-6% OH CAS: [67923-19-7] TSCA

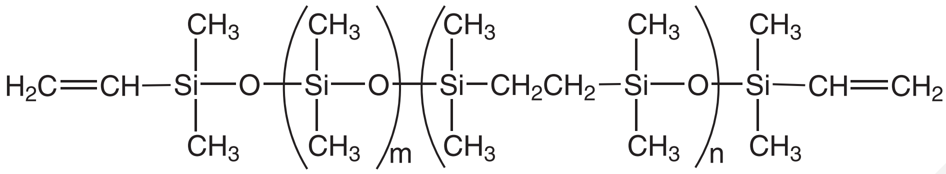
VDS-1013	10-15	25-40	550-650	0.9-1.4	0.99	¥17,800	¥107,000

Vinylmethylsiloxane - Dimethylsiloxane Copolymers, vinyl terminated CAS: [68083-18-1] TSCA

VDV-0131	0.3-0.4	800-1200	28,000	0.04-0.055	0.97	¥24,700	-

These materials are modifiers for addition cure and activated cure elastomers.

See also MCS-V212, p. 500

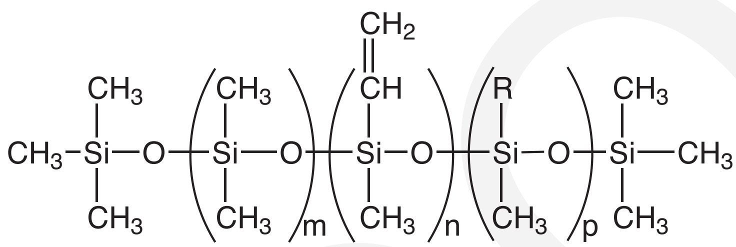


Vinyl Terminated Ethylene-Siloxane Copolymer Fluids

[26710-23-6]

Code	Viscosity	Mole % Siloxane	Specific Gravity	Refractive Index	Molecular Weight	Price/100g	Price/1kg
DCE-V7512	150-250	70-80	0.907	1.429	>2000	¥35,300	¥214,000

Ethylene-siloxane copolymer polymers exhibit reversion resistant behavior.



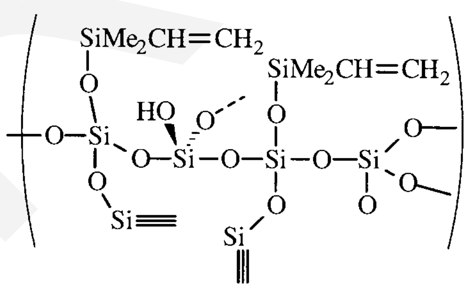
Vinyl Gums (balance dimethylsiloxane unless otherwise specified)

TSCA

Code	Mole % Vinylmethylsiloxane	Comonomer %	Specific Gravity	Price/100 g	Price/1kg
VGM-021	0.2-0.3		0.98	¥13,000	¥38,000
VGP-061	0.1-0.2	6-7% Diphenylsiloxane	0.99	¥13,000	¥54,000
VGF-991	1.0-2.0%	98-9% Trifluoropropylmethylsiloxane	1.35	¥20,400	¥108,000
DGM-000*	0.0	100% dimethylsiloxane	0.98	¥13,000	¥38,000

* This gum is listed here for convenience. It contains no vinyl functionality.

These materials are base polymers for activated cure specialty silicone rubbers.



Vinyl Q Resins Dispersions

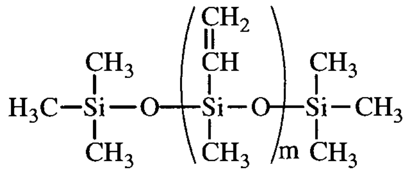
CAS: [68584-83-8] TSCA

Code	Base	Viscosity	Vinyl Eq/kg	Refractive Index	Density	Price/100g	Price/3kg
VQM-135*	DMS-V41	4,500-7000	0.2-0.3	1.405	1.02	¥8,500	¥87,000
VQM-146*	DMS-V46	50,000-60,000	0.18-0.23	1.406	1.02	¥10,100	¥110,000
VQX-221	50% in xylene	-	0.4-0.6	-	1.05	¥11,400	¥131,000

*20-25% Q-resin

Vinyl Q resins are clear reinforcing additives for addition cure elastomers.

See also Hydride Q resins.

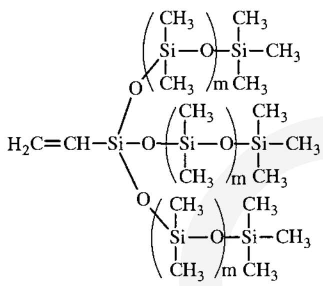


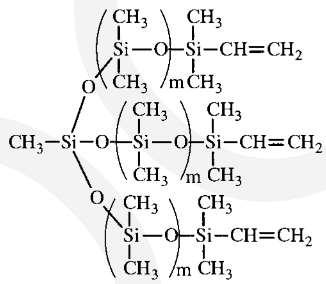
Vinylmethylsiloxane Homopolymers TSCA

Code	Description	Molecular Weight	Viscosity	Density	Price/100g	Price/3kg
VMS-005	cyclics	258-431	3-7	0.99	¥15,400	¥76,000
VMS-T11*	linear	1000-1500	7-15	0.96	¥32,600	¥363,000

*CAS: [68037-87-6]

Low molecular weight vinylmethylsiloxanes are primarily used as moderators (cure-rate retarders) for vinyl-addition cure silicones. They also are reactive intermediates and monomers.





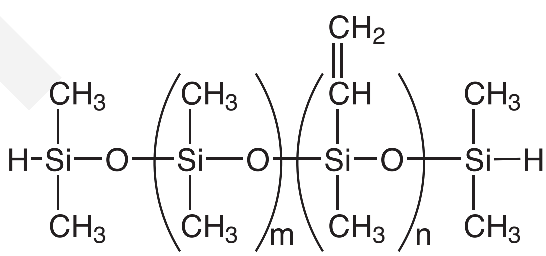
Vinyl T-structure Polymers

Code	Branch Point	Branch Terminus	Vinyl – Eq/Kg	Viscosity	Density	Refractive Index	Price/100g
VTT-106*	Vinyl	Methyl	2-4	5-8	0.90	-	¥16,200
MTV-112	Methyl	Vinyl	3-6	15-30	0.96	1.407	¥32,600

*CAS: [126581-51-9] TSCA

T-structure polymers contain multiple branch points.

These materials are additives and modifiers for addition cure and activated cure elastomers.



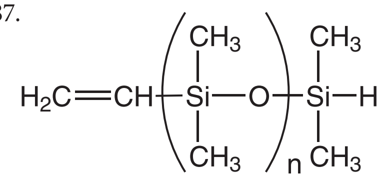
VinylMethylsiloxane – Dimethylsiloxane copolymer, hydride terminated

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Vinyl- Eq/Kg	Price/100g	Price/1kg
VDH-422	150-250	8000-10,000	-	0.98	0.3-0.5	¥19,400	¥118,000

Vinyl Functional Macromers

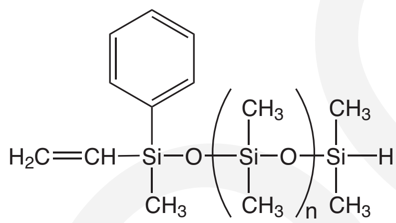
Hetero bi-functional silicone fluids contain little or no low molecular weight components. They can be used as additives into traditional RTV-2 silicone formulations or undergo a stepgrowth process when catalyzed by platinum, resulting in a silicone elastomer.[1]

1. Goff, J. et al, (Polymer Preprints) **2012**, *53(1)*, 487.



α-MonoVinyl-Ω-MonoHydride Terminated PolyDimethylsiloxane

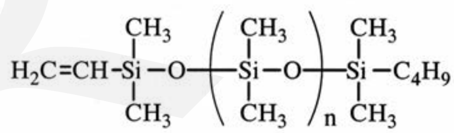
Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g
DMS-HV15	40-60	2000-3000	1.404	0.96	¥43,200
DMS-HV22	150-250	10,000	1.403	0.97	¥43,200



α-MonoVinyl-MonoPhenyl-Ω-MonoHydride Terminated PolyDimethylsiloxane

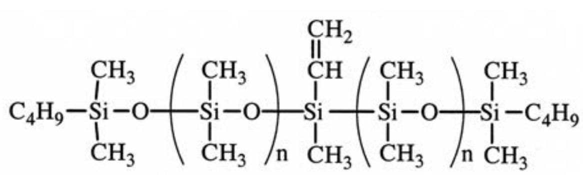
Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g
PMM-HV12	20	2000	1.4135	0.97	¥41,900

Mono-vinyl functional silicone fluids can be used as components in silicone gels and modifiers in release coatings.



MonoVinyl Terminated PolyDimethylsiloxanes - asymmetric

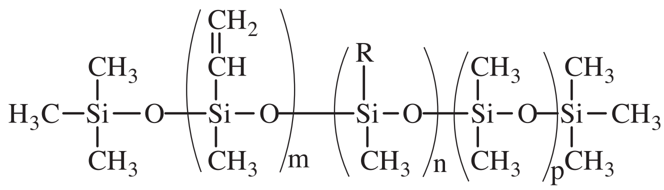
Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g
MCR-V21	80-120	5500-6500	1.403	0.97	¥32,600
MCR-V41	8000-12000	55,000-65,000	1.404	0.98	¥59,100



MonoVinyl Functional PolyDimethylsiloxane - symmetric

CAS: [689252-00-1]

Code	Viscosity	Molecular Weight	Refractive Index	Density	Price/100g
MCS-V212	16-24	1200-1400	1.419	0.95	¥32,600



VinylMethylsiloxane Terpolymers

(3-5% Vinylmethylsiloxane)-(35-40% Octylmethylsiloxane)-(Dimethylsiloxane) terpolymer CAS: [597543-32-3] TSCA

Code	Viscosity	Molecular Weight	Density	Refractive Index	Vinyl-Eq/Kg	Price/100g	Price/1kg
VAT-4326	500-700	10,000-12,000	0.93	1.437	0.20-0.24	¥18,000	¥92,000

Vinyl-alkyl terpolymers are used in hybrid organic polymer-silicone applications.
Employed as a matrix polymer in vapor sensor films.[1]

[1] Blok, E. et al, US Patent 7,138,090, **2006**.

(3-5% Vinylmethylsiloxane)-(35-40% Phenylmethylsiloxane)-(Dimethylsiloxane) terpolymer

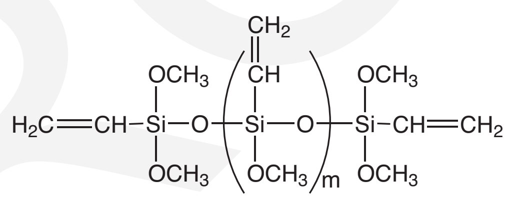
Code	Viscosity	Molecular Weight	Density	Refractive Index	Vinyl-Eq/Kg	Price/100g	Price/1kg
VPT-1323	250-350	2500-3000	1.03	1.467	0.25-0.29	¥16,200	¥95,000

Vinyl-phenyl terpolymers are used in refractive index match applications.

Dimethylsiloxane-vinylmethylsiloxane – (Propylene Oxide – Ethylene Oxide) Block Copolymers

Code	Viscosity	Molecular Weight	Density	Refractive Index	Vinyl-Eq/Kg	Price/100g	Price/1kg
DBP-V102	200	10,000	-	-	0.08-0.10	¥23,300	¥126,000
DBP-V052	200	10,000	-	-	0.03-0.05	¥23,300	¥126,000

Vinyl functional glycol-silicone copolymers are used as hydrophilic additives in silicone RTV-2 formulations.



Vinylmethoxysiloxane Homopolymer CAS: [131298-48-1] TSCA

Code	Description	Viscosity	Density	Price/100g	Price/1kg
VMM-010*	oligomer	8 - 12	1.10	¥10,900	¥58,000

*R.I.: 1.428; 22-3 wgt% vinyl

Vinylethoxysiloxane Homopolymer CAS: [29434-25-1] TSCA

Code	Description	Viscosity	Density	Price/100g	Price/1kg
VEE-005*	oligomer	4 - 7	1.02	¥13,000	¥73,000

*19-22 wgt% vinyl

Vinylethoxysiloxane-Propylethoxysiloxane Copolymer TSCA

Code	Description	Viscosity	Density	Price/100g	Price/1kg
VPE-005*	oligomer	3 - 7	1.02	¥13,000	¥73,000

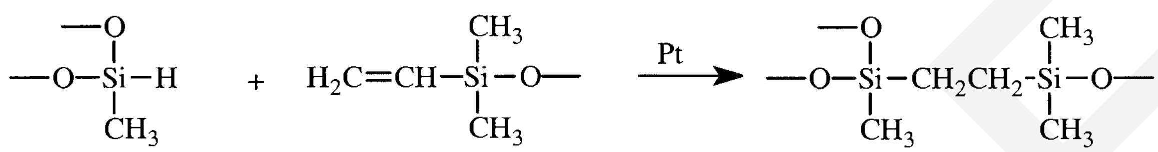
*9-11 wgt% vinyl

These materials are employed as adhesion promoters for vinyl-addition cure RTVs, as crosslinking agents for neutral cure RTVs, and as coupling agents in polyethylene for wire and cable applications.

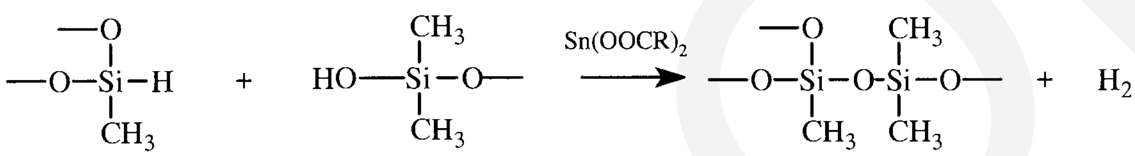
$\equiv$Si–H
Hydride Functional Polymers

Hydride functional siloxanes undergo three main classes of reactivity: hydrosilylation, dehydrogenative coupling and hydride transfer.

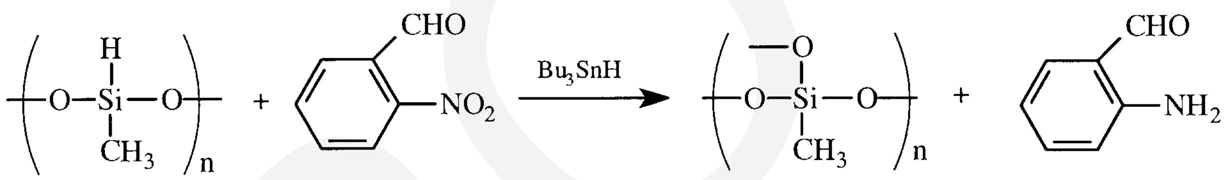
Hydrosilylation



Dehydrogenative Coupling



Reduction



Hydrosilylation - Addition Cure

The hydrosilylation of vinyl functional siloxanes by hydride functional siloxanes is the basis of addition cure chemistry used in 2-part RTVs and LTVs.[1,2] The most widely used materials for these applications are methylhydrosiloxane-dimethylsiloxane copolymers which have more readily controlled reactivity than the homopolymers and result in tougher polymers with lower cross-link density. The preferred catalysts for the reactions are platinum complexes such as SIP6830.3 and SIP6832.2. In principle, the reaction of hydride functional siloxanes with vinyl functional siloxanes takes place at 1:1 stoichiometry. For filled systems, the ratio of hydride to vinyl is much higher, ranging from 1.3:1 to 4.5:1. The optimum cure ratio is usually determined by measuring the hardness of cured elastomers at different ratios. Phenyl substituted hydrosiloxanes are used to crosslink phenylsiloxanes because of their greater solubility and closer refractive index match. The following chart gives some examples of starting ratios for common polymers and crosslinkers calculated at 1.5 Hydride to Vinyl ratio.

1. Warrick, E. et al. *Rubber Chem. Tech.* **1979**, *52*, 437.
2. Dolgov, O. et al. *Organosilicon Liquid Rubbers, Int'l Poly. Sci. & Tech.* Monograph *#1*, RAPRA, **1975**.

Starting Ratios of Hydride Functional Siloxanes (parts) to 100 parts of Vinylsiloxane*

Hydrosiloxane Vinylsiloxane	HMS-013	HMS-151	HMS-301
DMS-V31	80.8	4.2	2.1
DMS-V41	11.5	1.8	0.9
PDV-0341	11.9	1.9	0.9

* formulation is based on 1.5 Si-H to 1 CH_2=CH-Si; filled formulations may require up to 3x the amount listed

The hydrosilylation of olefins is utilized to generate alkyl- and arylalkyl-substituted siloxanes, which form the basis of organic compatible silicone fluids. The hydrosilylation of functional olefins provides the basis for formation of silicone block polymers.

Dehydrogenative Coupling - Water Repellency, Foamed Silicones

Hydroxyl functional materials react with hydride functional siloxanes in the presence bis(2-ethylhexanoate)tin, dibutyldilauryltin, zinc octoate, iron octoate or a variety of other metal salt catalysts. The reaction with hydroxylic surface groups is widely used to impart water-repellency to glass, leather, paper and fabric surfaces and powders. A recent application is in the production of water-resistant gypsum board. Application is generally from dilute (0.5-2.0%) solution in hydrocarbons or as an emulsion. The coatings are generally cured at 110-150°C. Polymethylhydrosiloxane is most commonly employed. Polyethylhydrosiloxane imparts water-repellency, but has greater organic compatibility.

Silanol terminated polydimethylsiloxanes react with hydride functional siloxanes to produce foamed silicone materials. In addition to the formal chemistry described above, the presence of oxygen and moisture also influences cross-link density and foam structure.

Reductions[3]

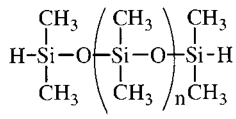
Polymethylhydrosiloxane is a versatile low cost hydride transfer reagent. It has a hydride equivalent weight of 60. Reactions are catalyzed by Pd^0 or dibutyltin oxide. The choice of reaction conditions leads to chemoselective reduction, e.g. allyl reductions in the presence of ketones and aldehydes.[4,5,6] Esters are reduced to primary alcohols in the presence of $Ti(OiPr)_4$[7].

See brochure “Silicon-Based Reducing Agents”.

Physical Properties

Polymethylhydrosiloxanes exhibit the highest compressibility of the silicone fluids, 9.32% at 20,000 psi and the lowest viscosity temperature coefficient, 0.50.

3. Larson, G. L., Fry, J. L., “*Ionic and Organometallic-Catalyzed Organosilane Reductions*”, in *Organic Reactions* S. E. Denmark, Ed. Volume 71, John Wiley and Sons, pp 1-771, **2008**.
4. Lipowitz, J. et al. *J. Org. Chem.* **1973**, *38*, 162.
5. Keinan, E. et al. *Israel J. Chem*. **1984**, *24*, 82. and *J. Org. Chem.* **1983**, *48*, 3545
6. Mukaiyama, T. et al. *Chem. Lett*. **1983**, 1727.
7. Reding, M. et al. *J. Org. Chem*. **1995**, *60*, 7884.



Hydride Terminated PolyDimethylsiloxanes

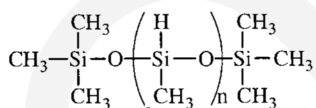
CAS: [70900-21-9] TSCA

Code	Viscosity	Molecular Weight	wt% H	Equivalent Weight	Specific Gravity	Refractive Index	Price/100g	Price/1kg
DMS-H03	2 - 3	400-500	0.5	225	0.90	1.395	¥17,800	¥68,000
DMS-H11	7-10	1000-1100	0.2	550	0.93	1.399	¥17,800	¥68,000
DMS-H21	100	4000-5000	0.04	3,000	0.97	1.403	¥28,600	¥115,000
DMS-H25	500	17,200	0.01	8,600	0.97	1.403	¥20,100	¥78,000
DMS-H31	1000	28,000	0.007	14,000	0.97	1.403	¥20,100	¥78,000
DMS-H41	10,000	62,700	0.003	31,350	0.97	1.403	¥21,900	¥86,000

Hydride terminated silicones are chain extenders for vinyl-addition silicones, enabling low viscosity, high elongation formulations. They are also intermediates for functionally terminated silicones.

Monodisperse Hydride Terminated PolyDimethylsiloxane

Code	Viscosity	Molecular Weight	wt% H	Equivalent Weight	Specific Gravity	Refractive Index	Price/100g	Price/1kg
DMS-Hm15	50	3000-3500	0.07	1,625	0.96	1.403	¥26,000	¥161,000
DMS-Hm25	500	17,200	0.01	8,600	0.97	1.403	¥26,000	¥161,000

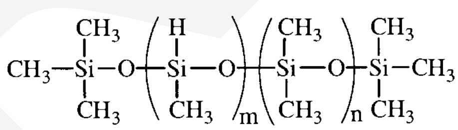


polyMethylHydrosiloxanes, Trimethylsiloxy terminated

Tg: -119° V.T.C: 0.50 CAS: [63148-57-2] TSCA

Code	Viscosity	Molecular Weight	Mole % (MeHSiO)	Equivalent Weight	Specific Gravity	Refractive Index	Price/100g	Price/3kg
HMS-991	15-25	1400-1800	100	67	0.98	1.395	¥7,700	¥40,600
HMS-992	20-35	1800-2100	100	65	0.99	1.396	¥8,500	¥47,000
HMS-993	30-45	2100-2400	100	64	0.99	1.396	¥10,900	¥73,000

MethylHydrosiloxane homopolymers are used as water-proofing agents, reducing agents and as components in some foamed silicone systems.



MethylHydrosiloxane - Dimethylsiloxane Copolymers, Trimethylsiloxy terminated

CAS: [68037-59-2] TSCA

Code	Viscosity	Molecular Weight	Mole % (MeHSiO)	Equivalent Weight	Specific Gravity	Refractive Index	Price/100g	Price/3kg
HMS-013	5000-8000	45,000-60,000	0.5-1.5	10,000	0.97	1.404	¥18,000	¥168,600
HMS-031	25-35	1900-2000	3-4	1600	0.97	1.401	¥15,400	¥95,000
HMS-053	750-1000	20,000-25,000	4-6	1475	0.97	1.403	¥16,700	¥117,500
HMS-064	6000-9000	50,000-60,000	4-8	1240	0.97	1.403	¥20,400	¥194,100
HMS-071	25-35	1900-2000	6-7	1000	0.97	1.401	¥19,400	¥122,800
HMS-082	110-150	5500-6500	7-9	925	0.97	1.403	¥9,800	¥62,300
HMS-151	25-35	1900-2000	15-18	490	0.97	1.400	¥9,800	¥62,300
HMS-301*	25-35	1900-2000	25-35	245	0.98	1.399	¥8,500	¥51,200
HMS-501	10-15	900-1200	45-55	135	0.96	1.394	¥9,800	¥62,300

*available in reduced volatility grade

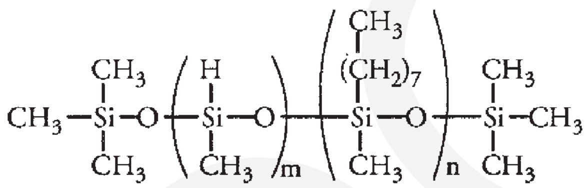
Specialty Hydrosiloxanes

MethylHydrosiloxane - Dimethylsiloxane Copolymers, Hydride terminated CAS: [69013-23-6] TSCA

Code	Viscosity	Molecular Weight	Mole % (MeHSiO)	Equivalent Weight	Specific Gravity	Refractive Index	Price/100g	Price/3kg
HMS-H271	24-60	2000-2600	25-30	200	0.96	1.402	¥11,700	¥84,400
HMS-HM271*	30-70	2000-3000	25-30	200	0.96	1.402	¥10,900	¥71,100

*mixed methyl, hydride terminated.

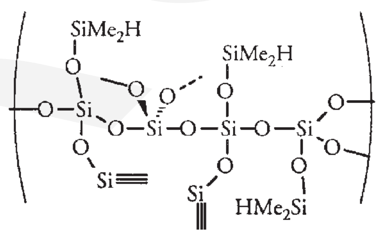
MethylHydrosiloxane copolymers are the primary crosslinkers for vinyl-addition silicones and intermediates for functional copolymers.



MethylHydrosiloxane - OctylMethylsiloxane copolymers and terpolymers

Code	Viscosity	Mole % (MeHSiO)	Equivalent Weight	Specific Gravity	Refractive Index	Price/25g	Price/100g
HAM-301*	30-80	25-30	440-480	0.91	1.442	¥19,400	¥55,200
HAM-3012**	20-60	25-30	280-320	0.93	1.425	¥16,700	¥46,400

*CAS: [68554-69-8] TSCA ** contains, 30-35% $C_8H_{17}MeSiO$, 35-40% Me_2SiO

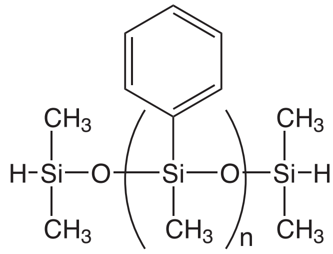


Hydride Q Resin CAS: [68988-57-8] TSCA

Code	Viscosity	Hydride Eq/kg	Equivalent Weight	Specific Gravity	Refractive Index	Price/25g	Price/100g
HQM-105	3-5	7.8-9.2	110-130	0.94	1.410	¥8,500	¥19,900
HQM-107	6-8	7.5-9.0	115-135	0.95	1.410	¥11,100	¥28,400

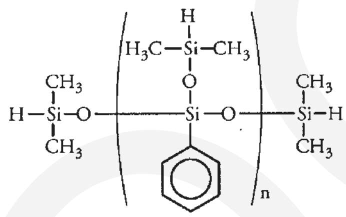
see also SST-3MH1.1 p.538; SST-H8HS8 p540

Phenyl Functional Hydrosiloxanes



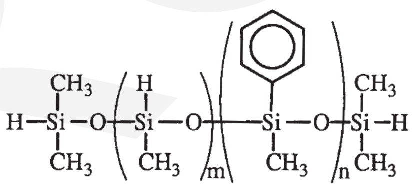
polyPhenylMethylsiloxane, Hydride Terminated*

Code	Viscosity	Mole % [$(HMe_2SiO)(C_6H_5Si)O$]	Equivalent Weight	Specific Gravity	Refractive Index	Price/100g	Price/1 kg
PMS-H03	2 - 5	300-500	200	0.93	1.453	¥35,300	-
PMS-H11	8 - 12	900-1100	500	-	-	¥43,200	-



polyPhenyl - (DiMethylHydrosiloxy)siloxane, hydride terminated

Code	Viscosity	Mole % [$(HMe_2SiO)(C_6H_5Si)O$]	Equivalent Weight	Specific Gravity	Refractive Index	Price/25g	Price/100g
HDP-111	50-80	99-100	150-155	1.01	1.463	¥23,100	¥67,100



MethylHydrosiloxane - PhenylMethylsiloxane copolymer, hydride terminated CAS: [115487-49-5] TSCA

Code	Viscosity	Mole % (MeHSiO)	Equivalent Weight	Specific Gravity	Refractive Index	Price/25g	Price/100g
HPM-502*	75-110	45-50	160-170	1.08	1.500	¥18,000	¥49,900

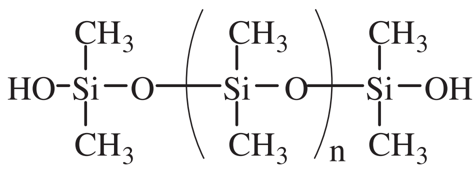
*unit MW: 200

Component in flexible optical waveguides.[1]

[1]Bichler, S. et al, *Optical Materials*, **2012**, 34, 772.

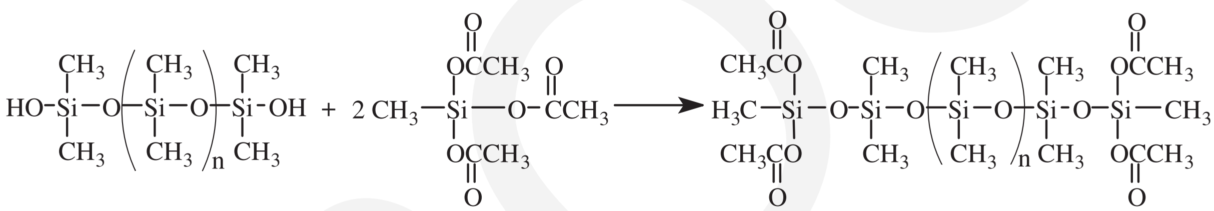
≡Si—OH

Silanol Functional Polymers

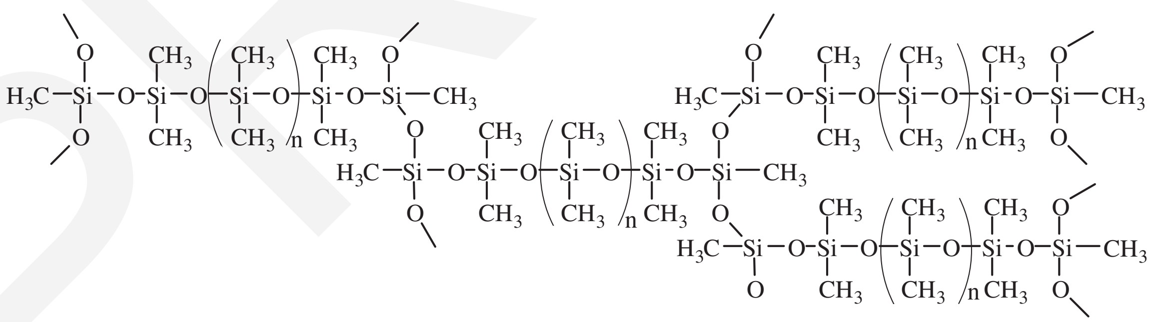


Terminal silanol groups render polydimethylsiloxanes susceptible to condensation under both mild acid and base conditions. They are intermediates for most room temperature vulcanizeable (RTV) silicones. Low molecular weight silanol fluids are generally produced by kinetically controlled hydrolysis of chlorosilanes. Higher molecular weight fluids can be prepared by equilibrating low molecular weight silanol fluids with cyclics, equilibrium polymerization of cyclics with water under pressure or methods of polymerization that involve hydrolyzeable end caps such as methoxy groups. Low molecular weight silanol fluids can be condensed to higher molecular weight silanol fluids by utilization of chlorophosphazene ($PNCl_2$) catalysts.

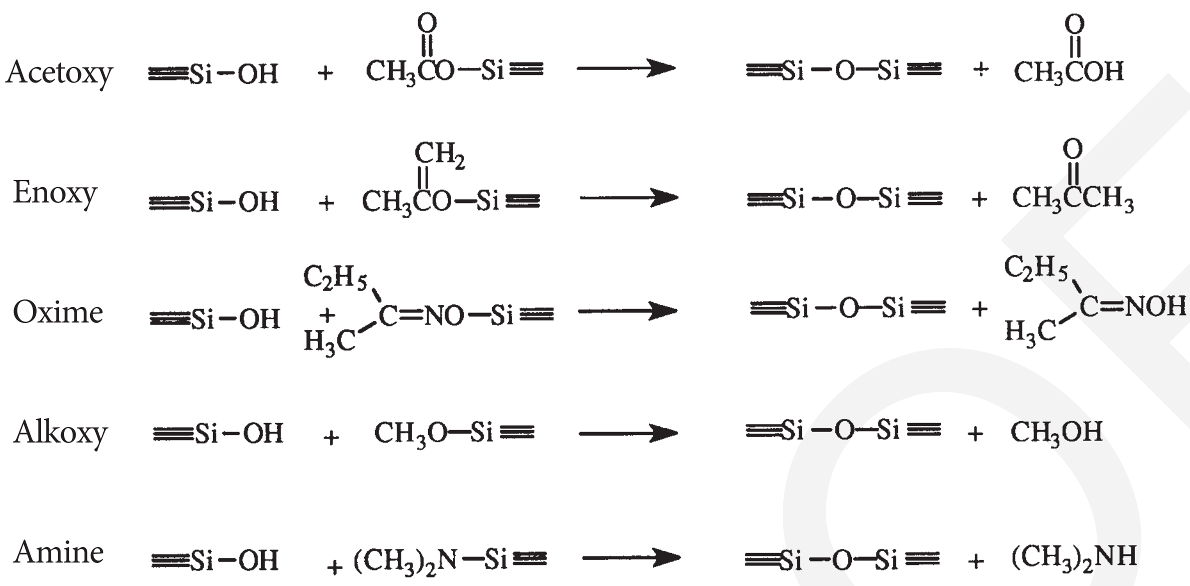
Condensation cure one-part and two-part RTV systems are formulated from silanol terminated polymers with molecular weights ranging from 15,000 to 150,000. One-part systems are the most widely used. One-part systems are crosslinked with moisture-sensitive multi-functional silanes in a two stage reaction. In the first stage, after compounding with fillers, the silanol is reacted with an excess of multi-functional silane. The silanol is in essence displaced by the silane. This is depicted below for an acetoxy system.



The silicone now has two groups at each end that are extremely susceptible to hydrolysis. The silicone is stored in this form and protected from moisture until ready for use. The second stage of the reaction takes place upon use. When the end groups are exposed to moisture, a rapid crosslinking reaction takes place.



The most common moisture cure systems are:



The crosslinking reaction of alkoxy systems are catalyzed by titanates, frequently in combination with tin compounds and other metal-organics. Acetoxy one-part systems usually rely solely on tin catalysts. The tin level in one-part RTV systems is minimally about 50ppm with a ratio of ~2500:1 for Si-OR to Sn, but typical formulations have up to ten times the minimum. Other specialty crosslinking systems include benzamido and mixed alkoxyamino. The organic (non-hydrolyzeable) substituents on the crosslinkers influence the speed of cure. Among the widely used crosslinkers vinyl substituted is the fastest: vinyl > methyl > ethyl >> phenyl.

Two-part condensation cure silanol systems employ ethylsilicates (polydiethoxysiloxanes) such as PSI-021 as crosslinkers and dialkyltincarboxylates as accelerators. Tin levels in these systems are minimally 500ppm, but typical formulations have up to ten times the minimum. Two-part systems are inexpensive, require less sophisticated compounding equipment, and are not subject to inhibition.

The following is a starting point formulation for a two-part RTV.

10:1 ratio of A to B.

Part A			Part B		
DMS-S45	silanol fluid	70%	DMS-T21	100 cSt. silicone fluid	50%
SIS6964.0	silica powder	28%	SIS6964.0	silica powder	45%
PSI-021	ethylsilicate	2%	SND3260	DBTL tin catalyst	5%

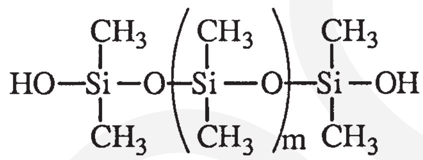
This low tear strength formulation can be improved by substituting fumed silica for silica powder.

Incorporation of hydride functional (Si-H) siloxanes into silanol elastomer formulations results in foamed structures. The blowing agent is hydrogen which forms as a result of silanol condensation with hydrosiloxanes. Foam systems are usually two components which are compounded separately and mixed shortly before use.

Condensation Cure Catalysts- see p. 548
Condensation Cure Crosslinkers- see p. 547

Silanol terminated diphenylsiloxane copolymers are employed to modify low temperature properties or optical properties of silicone RTVs. They are also utilized as flow control agents in polyester coatings. Diphenylsiloxane homopolymers are glassy materials with softening points >120°C that are used to formulate coatings and impregnants for electrical and nuclear applications.

The reactivity of silanol fluids is utilized in applications other than RTVs. Low viscosity silanol fluids are employed as filler treatments and structure control additives in silicone rubber compounding. Intermediate viscosity, 1000-10,000 cSt. fluids can be applied to textiles as durable fabric softeners. High viscosity silanol terminated fluids form the matrix component in tackifiers and pressure sensitive adhesives.



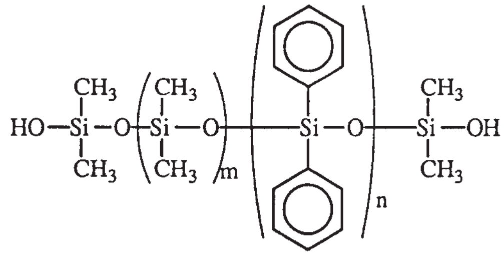
Silanol Terminated PolyDimethylsiloxanes

CAS: [70131-67-8] TSCA

Code	Viscosity	Molecular Weight	wt% (OH)	(OH) - Eq/kg	Specific Gravity	Refractive Index	Price/100g	Price/3kg	Price/16kg
DMS-S12	16-32	400-700	4.5-7.5	2.3-3.5	0.95	1.401	¥10,100	¥55,200	¥197,000
DMS-S14	35-45	700-1500	3.0-4.0	1.7-2.3	0.96	1.402	¥8,800	¥47,200	¥163,000
DMS-S15	45-85	2000-3500	0.9-1.2	0.53-0.70	0.96	1.402	¥8,800	¥47,200	¥163,000
DMS-S21	90-120	4200	0.8-0.9	0.47-0.53	0.97	1.402	¥8,000	¥41,700	¥106,000
DMS-S27	700-800	18,000	0.2	0.11-0.13	0.97	1.403	¥7,400	¥37,700	¥99,000
DMS-S31	1000	26,000	0.1	0.055-0.060	0.98	1.403	¥7,400	¥37,700	¥99,000
DMS-S32	2000	36,000	0.09	0.050-0.055	0.98	1.403	¥7,400	¥37,700	¥99,000
DMS-S33*	3500	43,500	0.08	0.045-0.050	0.98	1.403	¥7,400	¥37,700	¥99,000
DMS-S35	5000	49,000	0.07	0.039-0.043	0.98	1.403	¥8,000	¥41,700	¥104,000
DMS-S42	18,000	77,000	0.04	0.023-0.025	0.98	1.403	¥8,800	¥45,600	¥114,000
DMS-S45	50,000	110,000	0.03	0.015-0.017	0.98	1.403	¥8,800	¥45,600	¥114,000
DMS-S51	90,000-150,000	139,000	0.02	0.010-0.015	0.98	1.403	¥13,300	¥87,000	¥217,000

COMMERCIAL

*also available as an emulsion (see DMS-S33M50 pg 533



Silanol Terminated Diphenylsiloxane - Dimethylsiloxane Copolymers

TSCA

Code	Viscosity	Mole % Diphenylsiloxane	Molecular Weight	Refractive Index	wt% (OH)	Price/100g	Price/3kg
PDS-0338*	6000-8000	2.5-3.5	50,000	1.420	0.4-0.7	¥18,800	¥293,000
PDS-1615**	50-60	14-18	900-1000	1.473	3.4-4.8	¥15,600	¥278,000

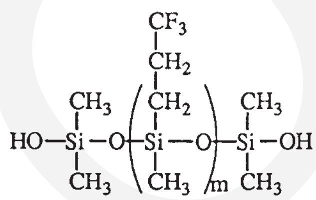
*CAS: [68083-14-7]   **CAS: [68951-93-9]

Employed as color stabilizers in sintered PTFE composites.

Silanol Terminated PolyDiphenylsiloxane

Tm: 142-155°; contains cyclics   CAS: [63148-59-4] TSCA

Code	Viscosity	Mole % Diphenylsiloxane	Molecular Weight	Refractive Index	wt% (OH)	Price/100g	Price/1kg
PDS-9931	glassy solid	100	1000-1400	1.610	2.4-3.4	¥25,700	¥168,700



Silanol Terminated PolyTrifluoropropylMethylsiloxane

CAS: [68607-77-2] TSCA

Code	Viscosity	Mole % $CF_3CH_2CH_2MeSiO$	Molecular Weight	Refractive Index	wt% (OH)	Specific Gravity	Price/100g
FMS-9921	50-160	100	550-800	1.379	5-7%	1.28	¥27,300
FMS-9922	150-250	100	800-1200	1.379	3-5%	1.28	¥38,500

Silanol-Trimethylsilyl Modified Q Resins

CAS: [56275-01-5] TSCA

Code	Wgt % Q resin	Molecular Weight	wt%(OH)	Base Resin	solvent	Price/100g	Price/3kg
SQO-299	100	3000-4000	1.7-2.0	-	-	¥30,500	¥280,000
SQD-255	50	3000-4000	-	-	50% D5	¥10,100	¥63,000
SQT-221	60	3000-4000	-	-	40% toluene	¥8,500	¥45,000
SQS-261	35-40	3000-4000	-	DMS-S61*	40% toluene	¥15,400	¥92,000

COMMERCIAL

*300,000-400,000 MW silanol terminated polydimethylsiloxane

Silanol-Trimethylsilyl-modified Q resins are often referred to as MQ resins. They serve as reinforcing resins in silicone elastomers and tackifying components in pressure sensitive adhesives.

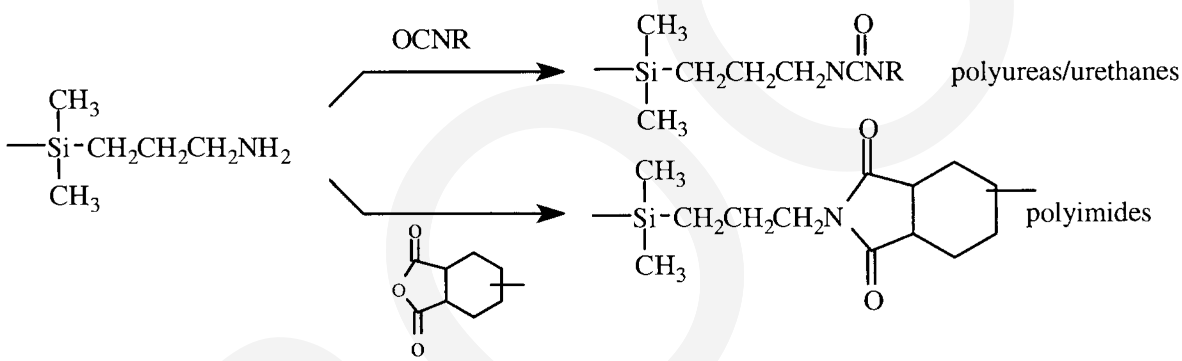
Silanol terminated vinylmethylsiloxane copolymers - see Vinylmethylsiloxane Dimethylsiloxane Copolymers, silanol terminated, p. 494

$\equiv SiCH_2CH_2CH_2NH_2$

Amino Functional Silicones

Aminoalkylfunctional silicones have a broad array of applications as a result of their chemical reactivity, their ability to form hydrogen bonds and, particularly in the case of diamines, their chelating ability. Additional reactivity can be built into aminoalkyl groups in the form of alkoxy groups. Aminoalkylsiloxanes are available in the three classes of structures typical for silicone polymers: terminated, pendant group and T-structure.

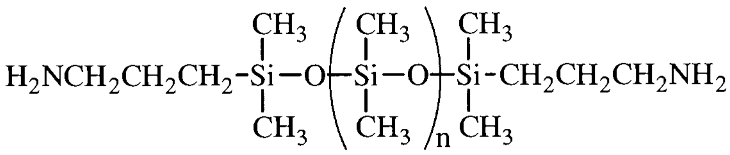
Aminopropyl terminated polydimethylsiloxanes react to form a variety of polymers including polyimides, polyureas[1] and polyurethanes. Block polymers based on these materials are becoming increasingly important in microelectronic (passivation layer) and electrical (low-smoke generation insulation) applications. They are also employed in specialty lubricant and surfactant applications. Phosphorylcholine derivatives have been utilized as coatings for extended wear contact lens[2].



Amino functionality pendant from the siloxane backbone is available in two forms: (aminopropyl)-methylsiloxane-dimethylsiloxane copolymers and (aminoethylaminopropyl)-methylsiloxane-dimethylsiloxane copolymers. They are frequently used in modification of polymers such as epoxies and urethanes, internal mold releases for nylons and as lubricants, release agents and components in coatings for textiles and polishes.

Aminoalkyl T-structure silicones are primarily used as surface treatments for textiles and finished metal polishes (e.g. automotive car polishes). The resistance to wash-off of these silicones is frequently enhanced by the incorporation of alkoxy groups which slowly hydrolyze and form crosslink or reactive sites under the influence of the amine. The same systems can be reacted with perfluorocarboxylic acids to form low surface energy (<7 dynes/cm) films.[3]

[1]Riess, C. *Monatshefte Chem*. **2006**, *137*, 1434.
[2]Willis, S. et al *Biomaterials*, **2001**, *22*, 3261.
[3]Thürman, A. *J. Mater. Chem*. **2001**, *11*, 381.



Aminopropyl Terminated PolyDimethylsiloxanes

Tg: -123° CAS: [106214-84-0] TSCA

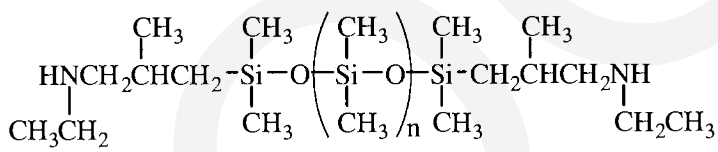
Code	Viscosity	Molecular Weight	wt% Amine (NH_2)	Specific Gravity	Refractive Index	Price/100g	Price/1kg
DMS-A11	10-15	850-900	3.2-3.8	0.98	1.412	¥24,100	¥130,000
DMS-A12	20-30	900-1000	3.0-3.2	0.98	1.411	¥19,400	¥102,000
DMS-A15	50-60	3000	1.0-1.2	0.97	1.408	¥14,900	¥68,000
DMS-A21	100-120	5000	0.6-0.7	0.98	1.407	¥13,800	¥68,000
DMS-A31	900-1100	25,000	0.11-0.12	0.98	1.407	¥13,800	¥68,000
DMS-A32	1800-2200	30,000	0.08-0.09	0.98	1.404	¥11,100	¥53,000
DMS-A35	4000-6000	50,000	0.05-0.06	0.98	1.404	¥13,800	¥71,000

COMMERCIAL

Reduced Volatility Grades

Code	Viscosity	Molecular Weight	wt% Amine (NH_2)	Specific Gravity	Refractive Index	Price/100g	Price/1kg
DMS-A32R*	1900-2300	30,000	0.08-0.09	0.98	1.404	¥23,600	¥117,000

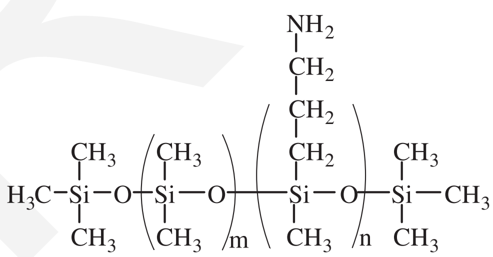
*total volatiles, 4 hours @ 150°C: 2.0 wt% maximum



N-EthylAminoisobutyl Terminated PolyDimethylsiloxane

CAS: [254891-17-3] TSCA

Code	Viscosity	Molecular Weight	% Amine (NH)	Specific Gravity	Refractive Index	Price/100g	Price/1kg
DMS-A211	8-12	800-1000	2.8-3.2	0.93	1.422	¥28,900	¥179,000
DMS-A214	32-40	2500-3000	1.0-1.4	0.96	1.411	¥28,900	¥179,000

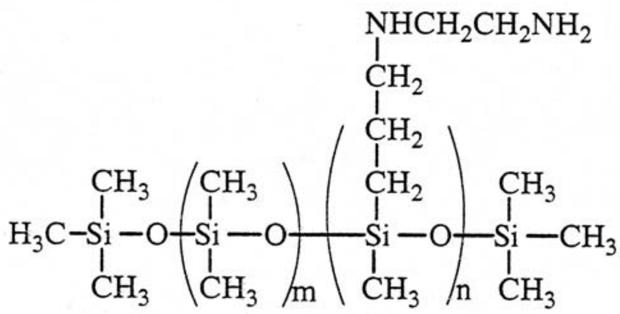


AminopropylMethylsiloxane - Dimethylsiloxane Copolymers

CAS: [99363-37-8] TSCA

Code	Viscosity	Molecular Weight	Mole % (Aminopropyl) MethylSiloxane	Specific Gravity	Refractive Index	Price/100g	Price/3kg
AMS-132	80-120	4500-6000	2-3	0.96	1.404	¥12,500	¥66,000
AMS-152	100-300	7000-9000	4-5	0.97	1.408	¥12,500	¥66,000
AMS-162	64-200	4000-5000	6-7	0.97	1.410	¥12,500	¥66,000
AMS-163	1800-2200	50,000	6-7	0.97	1.411	¥26,000	¥150,000
AMS-191	40-60	2000-3000	9-11	0.97	1.412	¥23,300	¥141,000
AMS-1203	900-1100	20,000	20-25	0.98	1.426	¥23,300	¥141,000

COMMERCIAL



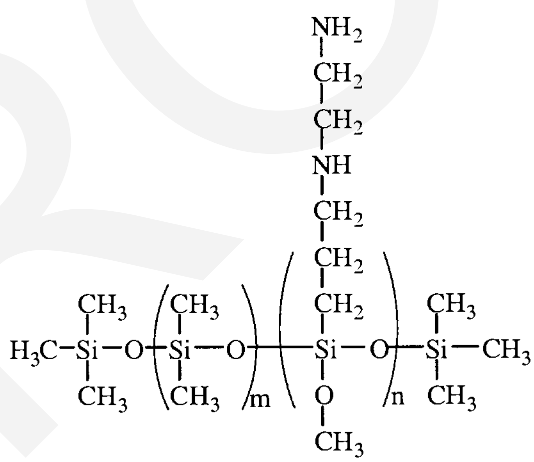
AminoethylaminopropylMethylsiloxane - Dimethylsiloxane Copolymers CAS: [71750-79-3] TSCA

Code	Viscosity	Molecular Weight	Mole % (Diamino-propyl)MethylSiloxane	Specific Gravity	Refractive Index	Price/100g	Price/3kg
AMS-233	900-1200	-	2 - 4	0.98	1.407	¥12,500	¥75,000
AMS-2202	300-500	-	18-24	0.98	1.41	¥24,700	¥139,000

AminoethylaminoisobutylMethylsiloxane - Dimethylsiloxane Copolymers CAS: [106842-44-8] TSCA

Code	Viscosity	Molecular Weight	Mole % (Diamino-isobutyl)MethylSiloxane	Specific Gravity	Refractive Index	Price/100g	Price/3kg
AMS-242	120-150	-	3-5	0.97	1.404	¥16,200	¥101,000

Amine Functional Siloxanes with Alkoxy Groups



AminoethylaminopropylMethoxysiloxane - Dimethylsiloxane Copolymers with branch structure CAS: [67923-07-3] TSCA

Code	Viscosity	Molecular Weight	Mole % (Diamino-propyl)MethoxySiloxane	Specific Gravity	Base Equiv. meq/g	Price/100g	Price/3 kg
ATM-1112	100-200	5000-6500	0.5-1.5	0.97	0.55	¥18,300	¥129,000
ATM-1322*	200-300	-	2 - 4	0.97	-	¥11,100	¥58,000

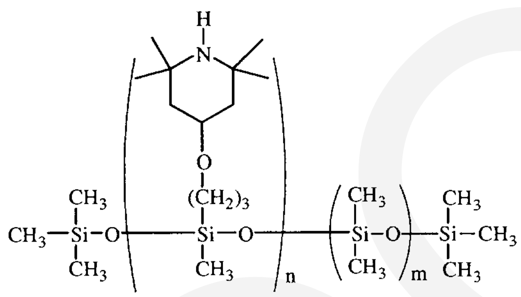
*also available as an emulsion

Diaminoalkoxysiloxanes cure to form durable films on metal substrates.

See ATM-1322M50; p. page 533

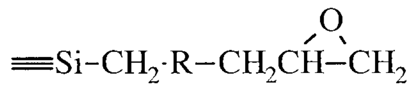
Hindered Amine Functional Siloxanes

Hindered Amine Light Stabilizers (HALS) may be incorporated into polysiloxane structures affording an ultraviolet light stabilizer system that is compatible with other stabilizers such as hindered phenolics and organophosphites and is strongly resistant to water extraction.



(Tetramethylpiperidinyloxy)propylMethylsiloxane-Dimethylsiloxane copolymer CAS: [182635-99-0] TSCA

Code	Viscosity	mole % HALS functional MethylSiloxane	Specific Gravity	Refractive Index	Price/100g	Price/1kg
UBS-0541	10000	4-6	1.00	1.408	¥22,500	¥140,000
UBS-0822	250	7-9	0.98	1.409	¥19,400	¥118,000



Epoxy Functional Silicones

Difunctional and multifunctional epoxy silicones include lower molecular weight siloxanes with discrete structures and higher molecular weight silicones with either pendant or terminal epoxy functionalization. Depending on specific structures and formulations, they selectively impart a wide range of properties, associated with silicones-low-stress, low temperature properties, dielectric properties and release. Properties of cured silicone modified epoxies vary from hydrophilic to hydrophobic depending on the epoxy content, degree of substitution and ring-opening of epoxides to form diols. The ring-strained epoxycyclohexyl group is more reactive than the epoxypropoxy group and undergoes thermally or chemically induced reactions with nucleophiles including protic surfaces such as cellulosics of polyacrylate resins.

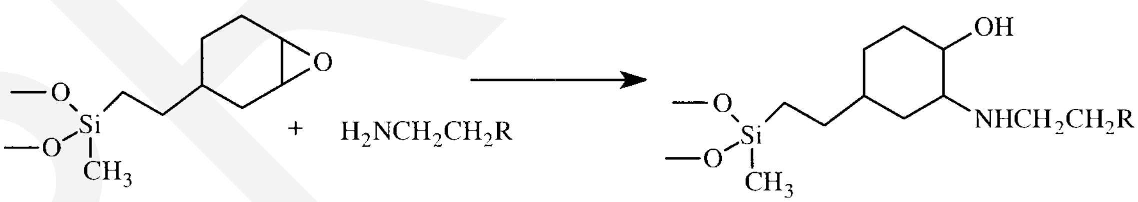
The compatibility of epoxy functional silicones with conventional epoxies varies. In simple unfilled systems, total solubility is required. For filled systems, it is often desireable to consider systems that are miscible but have only limited solubility since microphase separation can allow a mechanism for stress-relief.

Epoxysilicones with methoxy groups can be used to improve adhesion to substrates such as titanium, glass or silicon. They also can improve chemical resistance of coatings by forming siloxane crosslinks upon exposure to moisture.

Silicone - Epoxy Compatibility

	Epoxy Type		
Gelest Product	Bisphenol	Polyglycol	Cycloaliphatic
SIB1092.0	miscible	soluble	soluble
PMS-E11	soluble	soluble	soluble
DMS-E09	soluble	soluble	soluble
DMS-E11	insoluble	miscible	miscible
EMS-622	insoluble	miscible	insoluble

(10% silicone 90% epoxy)



A UV initiator for cycloaliphatic epoxides is OMBO037 described in the Catalyst Section. Epoxy functional siloxane copolymers with polyalkyleneoxide functionality provide hydrophilic textile finishes.

Epoxypropoxypropyl Terminated PolyDimethylsiloxanes [102782-97-8] TSCA

Code	Viscosity	Molecular Weight	Epoxy-Eq/kg	Specific Gravity	Refractive Index	Price/100g	Price/1 kg
DMS-E09	8-11	363	5.5	0.99	1.446	¥19,400	¥118,000
DMS-E11	12-18	500-600	1.9-2.2	0.98	1.419	¥27,300	¥148,000
DMS-E12	20-35	1000-1400	1.6-1.9	0.98	1.417	¥35,300	¥204,000
DMS-E21	100-140	4500-5500	0.45-0.35	0.98	1.408	¥35,300	¥204,000

Used in preparation of photocurable silicone for soft lithography[1].

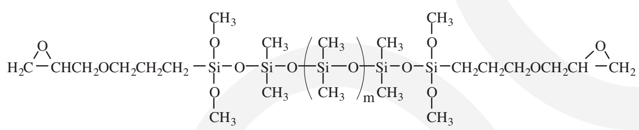
[1]Choi, D. et al, *JACS*, **2003**, *125*, 4060.

(Epoxypropoxypropyl Methylsiloxane)-(Dimethylsiloxane) Copolymers CAS: [68440-71-7] TSCA

EMS-622	200-300	7,000-9,000	5-7	0.99	1.412	¥11,400	¥52,300

Epoxypropoxypropyl Terminated PolyPhenylMethylsiloxanes [102782-98-9] TSCA

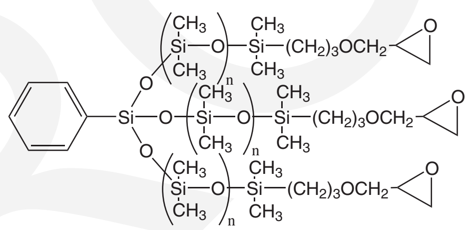
PMS-E11	15-30	500-600	3.0-3.6	1.01	1.475	¥51,200	-
PMS-E15	30-50	1200-1500	1.0-1.7	1.01	1.490	¥59,100	-



(Epoxypropoxypropyl)dimethoxysilyl Terminated PolyDimethylsiloxanes [188958-73-8] TSCA

DMS-EX21	80-120	3500-4000	0.48-0.5	0.98	1.408	¥16,400	¥85,000

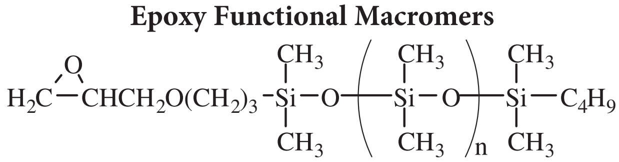
Multifunctional Siloxanes



MonoPhenyl functional Tris(Epoxy Terminated PolyDimethylsiloxane) [90393-83-2] TSCA

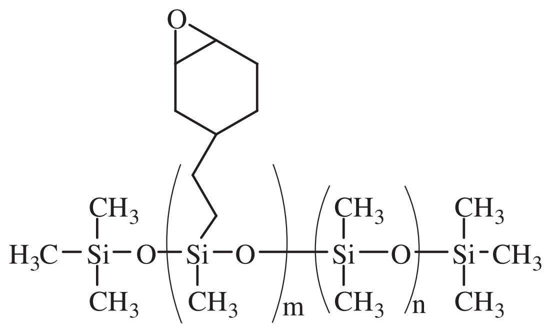
Code	Viscosity	Molecular Weight	Epoxy–Eq/Kg	Melting Point	Specific Gravity	Refractive Index	Price/25g
MCT-EP13	30-35	500-750	4-6	-73°	1.05	1.4742	¥18,000

Epoxy Functional Macromers



Mono-(2,3-Epoxy)Propylether Terminated PolyDimethylsiloxane CAS: [127947-26-6]

Code	Viscosity	Molecular Weight	Epoxy–Eq/Kg	Specific Gravity	Refractive Index	Price/100g	Price/1 kg
MCR-E11	10-15	1000	0.8-1.2	0.96	1.410	¥27,300	¥168,700
MCR-E21	100-120	5000	0.1-0.3	0.97	1.408	¥26,000	¥140,900

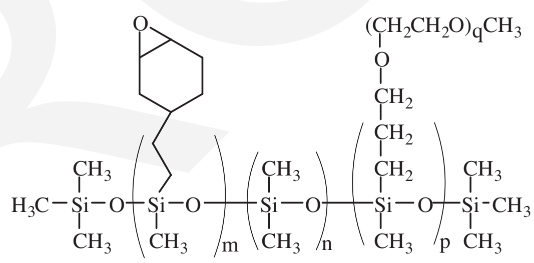


Cycloaliphatic Epoxy Silicones

These materials, characterized by a combination of cycloaliphatic and siloxane structures, have outstanding weathering characteristics, controlled release and coefficient of friction and excellent electrical properties. They can be cured either by cationic UV photoinitiators or conventional epoxy hardeners. In cationic UV-cure systems the cycloaliphatic epoxy silicones combine the properties of reactive diluents with surfactant properties. The release properties can be employed to make parting layers for multilayer films. If high levels of epoxy functional silicones are used in UV-cure formulations, cationic photoinitiators with hydrophobic substitution are preferred.

(EpoxycyclohexylethylMethylsiloxane) - Dimethylsiloxane Copolymers CAS: [67762-95-2] TSCA

Code	Viscosity	Molecular Weight	Mole % (Epoxycyclohexyl)-ethylMethylSiloxane	Specific Gravity	Refractive Index	Price/100g	Price/1 kg
ECMS-127	500-1200	12,000-15,000	1-2	0.98	1.407	¥8,500	¥36,200
ECMS-227	650-800	18,000-20,000	2-3	0.98	1.407	¥8,500	¥36,200
ECMS-327	650-850	18,000-20,000	3-4	0.99	1.409	¥8,500	¥36,200
ECMS-924	300-450	10,000-12,000	8-10	0.97	1.421	¥9,800	¥44,100



(2-3% EpoxycyclohexylethylMethylsiloxane)(10-15% MethoxypolyalkyleneoxyMethylSiloxane)-(Dimethylsiloxane) Terpolymers

Code	Viscosity	Molecular Weight	Epoxy-Eq/Kg	Specific Gravity	Refractive Index	Price/100g	Price/1 kg	Price/10 kg
EBP-234	4000-5000	25,000-36,000	0.75-0.80	1.03	1.445	¥9,300	¥40,900	

CAS: [69669-36-9] TSCA

Epoxycyclohexylethyl Terminated PolyDimethylsiloxanes CAS: [102782-98-9] TSCA

Code	Viscosity	Molecular Weight	Epoxy-Eq/Kg	Specific Gravity	Refractive Index	Price/100g	Price/1 kg
DMS-EC13	25-35	900-1100	1.9-2.0	0.99	1.433	¥51,200	¥231,000
DMS-EC17	60-80	3200-3600	0.5-0.7	0.98	1.412	¥51,200	-

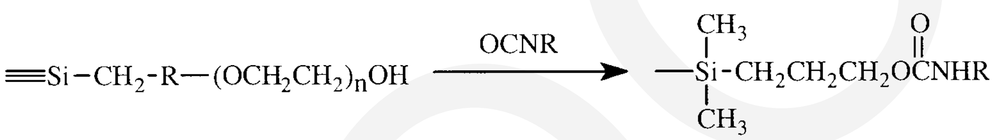
see also SIB1092.0

$$\equiv Si{-}CH_2{-}R{-}(OCH_2CH_2)_nOH$$

Carbinol Functional Silicones

Carbinol (Hydroxy) Functional Siloxanes

The term carbinol refers to a hydroxyl group bound to carbon (C-OH) and is frequently used in silicone chemistry to differentiate them from hydroxyl groups bound to silicon (Si-OH) which are referred to as silanols. Carbinol terminated siloxanes contain primary hydroxyl groups which are linked to the siloxane backbone by non-hydrolyzeable transition groups. Frequently a transition block of ethylene oxide or propylene oxide is used. Carbinol functional polydimethylsiloxanes may be reacted into polyurethanes, epoxies, polyesters and phenolics.

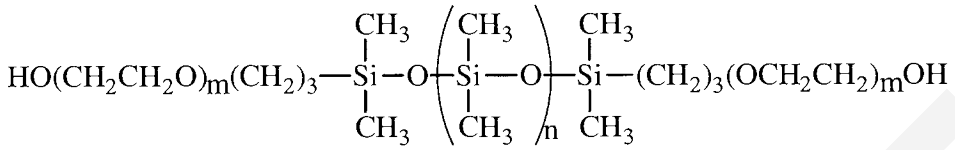


Applications include additives for urethane leather finishes and as reactive internal lubricants for polyester fiber melt spinning. They are also utilized as surfactants and processing aids for dispersion of particles in silicone formulations.

Polyethyleneoxide transition blocks are more polar than polypropyleneoxide blocks and maintain a broad range of liquid behavior. Carbinol terminated siloxanes with caprolactone transition blocks offer a highly polar component which enables compatibility in a variety of thermoplastic resins.

Mono(dicarbinol) terminated polydimethylsiloxanes are macromers with diol termination on one end of a polydimethylsiloxane chain. In contrast with telechelic carbinol terminated polydimethylsiloxanes, they have the unique ability to react with isocyanates to form urethanes with pendant silicone groups. In this configuration the mechanical strength of the polyurethane is maintained while properties such as hydrophobicity, release and low dynamic coefficient of friction are achieved. For example, a 2 wgt % incorporation of MCR-C61 or MCR-C62 into an aromatic urethane formulation increases water contact angle from 78° to 98°. The reduction of coefficient of friction and increased release of urethanes formulated with diol terminated macromers has led to their acceptance as additives in synthetic leather.

Carbinol functional Macromers - see Macromers p. 530



Carbinol (Hydroxyl) Terminated PolyDimethylsiloxanes

Code	Viscosity	Molecular Weight	Weight % Non-Siloxane	Specific Gravity	Refractive Index	Price/100g	Price/1kg
DMS-C15	30-50	1000	20	0.98	1.417	¥22,500	¥121,000
DMS-C16	50-65	600-850	-	0.97	1.416	¥20,700	¥110,000
DMS-C21	110-140	4500-5500	4	0.98	1.407	¥14,600	¥73,000
DMS-C23	300-350	10,000	-	0.98	1.406	¥16,200	¥83,000
DBE-C25*	400-450	3500-4500	60	1.07	1.450	¥11,100	¥53,000
DBP-C22**	200-300	2500-3200	45-55	0.99	1.434	¥15,600	¥80,000

note: for DMS-C15, DMS-C21, DMS-C23 m=1 CAS: [156327-07-0]; for DMS-C16 m=0 CAS: [104780-66-7] TSCA

*A-B-A ethylene oxide - dimethylsiloxane - ethylene oxide block polymer CAS: [68937-54-2]

**A-B-A propylene oxide - dimethylsiloxane - propylene oxide block copolymer m=12-16 CAS: [161755-53-9]

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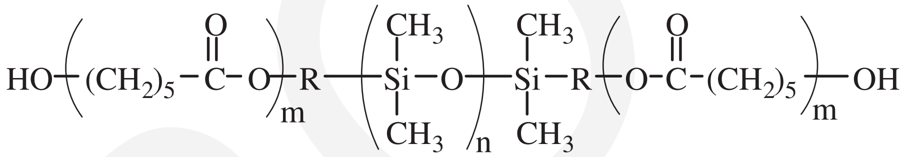
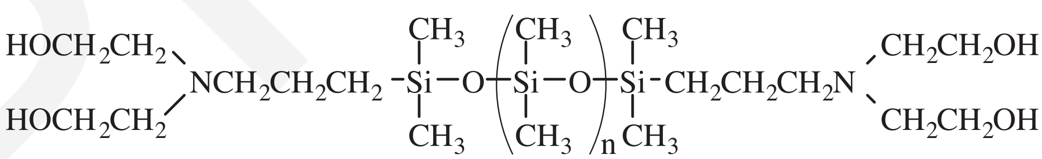


Carbinol (Hydroxyl) Terminated PolyDimethylsiloxanes

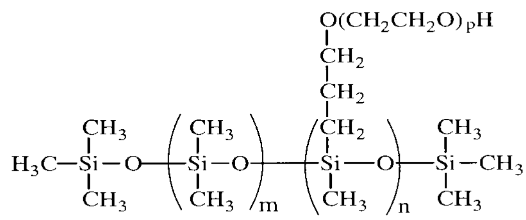
Code	Melting Point	Molecular Weight	Weight % Non-Siloxane	Specific Gravity	Refractive Index	Price/100g	Price/1kg
DBL-C31*	52-6°	5700-6900	50	1.05	-	¥20,400	¥111,000
DBL-C32**	80-85°	7000-8000	25-30	1.05	-	¥23,300	¥130,000

A-B-A caprolactone - dimethylsiloxane - caprolactone block polymer, *m=15-20; **m=7-10 CAS: [120359-07-1]



[Bis(Hydroxyethyl)Amine] Terminated PolyDimethylsiloxanes

Code	Viscosity	Molecular Weight	Weight % Non-Siloxane	Specific Gravity	Refractive Index	Price/100g	Price/1kg
DMS-CA21	120-160	3000	10	0.97	1.414	¥31,600	¥206,000

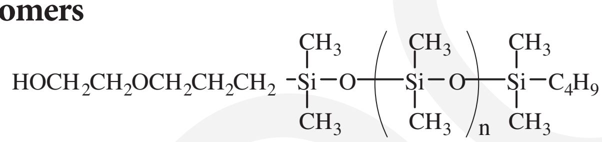


(Carbinol functional)Methylsiloxane-Dimethylsiloxane Copolymers

Code	wt% Non-Siloxane	OH Content (meq/g)	Glycol chains/mol	Viscosity	Molecular Weight	Specific Gravity	Refractive Index	CAS	Price 100g	Price 1kg
CMS-221	20-25	0.7-0.9	3-4	125-150	4000	1.00	1.419	68937-54-2	¥8,800	¥8,800
CMS-222	20	0.4-0.6	2-3	150-200	5500-6500	0.98	1.411	68957-00-6	¥14,100	¥69,000
CMS-832*	50-60	0.2-0.3	-	1000-2000	2000-5000	1.09	1.505	200443-93-2	¥16,200	¥95,000
CMS-626	65	0.3-0.5	1-3	550-650	4500-5500	1.09	1.458	68937-54-2	¥13,800	¥68,000

*(Hydroxypolyethyleneoxypropyl)methylsiloxane-(3,4-Dimethoxyphenylpropyl)methylsiloxane-Dimethylsiloxane terpolymer

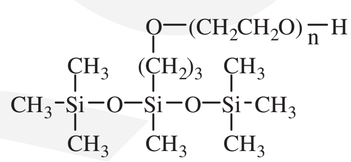
Carbinol Functional Macromers



MonoCarbinol Terminated PolyDimethylsiloxane

CAS: [207308-30-3] TSCA

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCR-C12	15-20	1000	1.409	0.96	¥36,600	¥144,500
MCR-C18	60-140	5000	1.405	0.97	¥24,900	¥134,500
MCR-C22	250	10,000	1.404	0.98	¥23,300	¥116,000

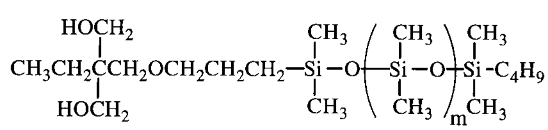


MonoCarbinol Terminated Functional PolyDimethylsiloxanes - symmetric

CAS: [67674-67-3] TSCA

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCS-C11*	5-15	280-380	1.413	0.905	¥14,100	-
MCS-C13**	35-40	550-650	1.446	1.02	¥16,200	¥82,300

* n=0, CAS [17962-67-3] **n=6-9, CAS[67674-67-3]

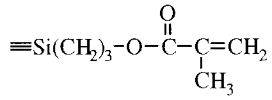


MonoDiCarbinol Terminated PolyDimethylsiloxane

CAS: [218131-11-4]

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCR-C61	50-60	1000	1.417	0.97	¥19,400	¥133,200
MCR-C62	100-125	5000	1.409	0.97	¥19,400	¥133,200

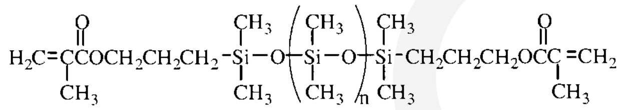
Diol terminated silicones improve electrical and release properties of polyurethanes.



Methacrylate and Acrylate Functional Siloxanes

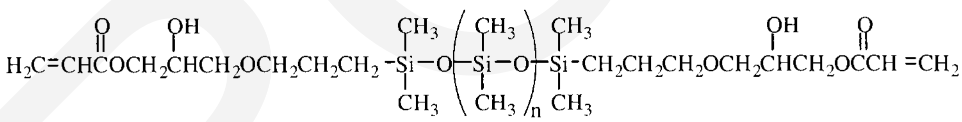
Methacrylate and Acrylate functional siloxanes undergo the same reactions generally associated with methacrylates and acrylates, the most conspicuous being radical induced polymerization. Unlike vinylsiloxanes which are sluggish compared to their organic counterparts, methacrylate and acrylate siloxanes have similar reactivity to their organic counterparts. The principal applications of methacrylate functional siloxanes are as modifiers to organic systems. Upon radical induced polymerization, methacryloxypropyl terminated siloxanes by themselves only increase in viscosity. Copolymers with greater than 5 mole % methacrylate substitution crosslink to give non-flowable resins. Acrylate functional siloxanes cure at greater than ten times as fast as methacrylate functional siloxanes on exposure to UV in the presence of a photoinitiator such as ethylbenzoin. They form permeable membranes for fiber-optic oxygen and glucose sensors.[1]

Oxygen is an inhibitor for methacrylate polymerization in general. The high oxygen permeability of siloxanes usually makes it necessary to blanket these materials with nitrogen or argon in order to obtain reasonable cures.



Methacryloxypropyl Terminated PolyDimethylsiloxanes CAS: [58130-03-3]

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/25g	Price/100g
DMS-R05	4 - 6	380-550	1.448	0.97	¥19,900	¥57,000
DMS-R11	8-14	900-1200	1.422	0.98	¥24,100	¥70,800
DMS-R18	50-90	4500-5500	1.409	0.98	¥24,100	¥70,800
DMS-R22	125-250	10,000	1.405	0.98	¥24,100	¥70,800
DMS-R31	1000	25,000	1.404	0.98	¥20,700	¥59,700



(3-Acryloxy-2-hydroxypropoxypropyl) Terminated PolyDimethylsiloxanes CAS: [128754-61-0]

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/25g	Price/100g
DMS-U21	60-140	600-900	1.426	0.99	¥12,700	¥32,900

Acryloxy Terminated Ethyleneoxide - Dimethylsiloxane-Ethyleneoxide ABA Block Copolymers CAS: [117440-21-8] TSCA

Code	Viscosity	Molecular Weight	MW PDMSO block	Refractive Index	Specific Gravity	Price/100g	Price/1kg
DBE-U12*	80-120	1500-1600	700-800	1.450	1.03	¥19,400	¥118,000
DBE-U22**	110-150	1700-1800	1000-1200	1.445	1.03	¥14,100	¥81,000

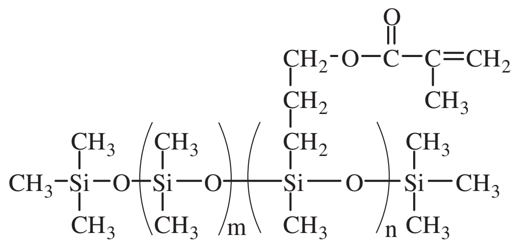
* 45-55 wgt% CH_2CH_2O **30-35 wgt% CH_2CH_2O

Methacryloxypropyl Terminated Branched PolyDimethylsiloxanes CAS: [80722-63-0]

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/25g	Price/100g
SIB1400.0	14-18	683	1.432	0.99	¥16,400	¥44,800

see also- methacrylate functional macromers

[1] Li, L. et al. *Analyt. Chem.* **1995**, *67*, 3746.



(Methacryloxypropyl)methylsiloxane - Dimethylsiloxane Copolymers

CAS: [104780-61-2] TSCA

Code	Viscosity	Specific Gravity	Mole % (Methacryloxypropyl)Methylsiloxane	Price/100g
RMS-044	8000-10,000	0.98	4 - 6	¥69,700
RMS-033	1000-2000	0.98	2 - 4	¥43,200
RMS-083	2000-3000	0.99	7 - 9	¥52,500

(Acryloxypropyl)methylsiloxane - Dimethylsiloxane Copolymers

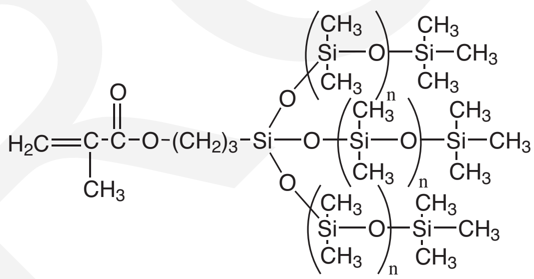
Code	Viscosity	Specific Gravity	Mole % (Acryloxypropyl)Methylsiloxane	Price/100g
UMS-182	80-120	1.01	15-20	¥40,600
UMS-992*	50-125	1.10	99-100	¥32,600

*homopolymer Refractive Index: UMS-182 = 1.426; UMS-992 = 1.464 UMS-182-CAS: 158061-40-6

(3-Acryloxy-2-Hydroxypropoxypropyl)Methylsiloxane-Dimethylsiloxane Copolymer

Code	Viscosity	Molecular Weight	Mole % (Acryloxyfunctional)Methylsiloxane	Price/100g
UCS-052	500-1,500	7500-8500	4-6	¥24,100

amber liquid



Methacryloxypropyl T-structure Siloxanes

CAS: [67923-18-6] TSCA

Code	Viscosity	Molecular Weight	Specific Gravity	Price/100g
RTT-1011	10 - 20	570-620	0.95	¥26,300

contains multiple branch points (>2 methacrylate groups)

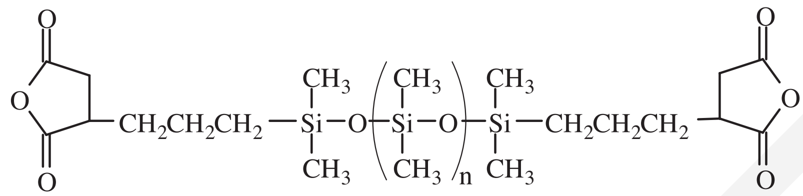
Acryloxypropyl T-structure Siloxanes

Code	Viscosity	Molecular Weight	Specific Gravity	Refractive Index	Price/100g
UTT-1012	10 - 30	500-900	0.96	1.421	¥32,600

contains multiple branch points (>2 acrylate groups)

Methacrylate functional macromers- see p. 530, 531

Anhydride, Bicycloheptenyl, and Carboxylate functional Silicones

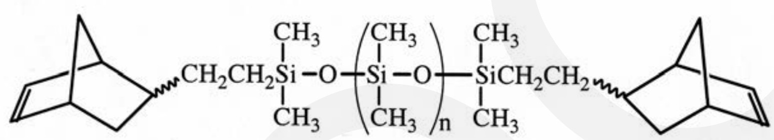


Anhydride functional Silicones

Anhydride functional siloxanes can be reacted directly with amines and epoxides or hydrolyzed to give dicarboxylic acid terminated siloxanes.

Succinic Anhydride Terminated PolyDimethylsiloxane

Code	Viscosity	Molecular Weight	Specific Gravity	Refractive Index	Price/25g	Price/100g
DMS-Z21	75-100	600-800	1.06	1.436	¥24,700	¥72,100



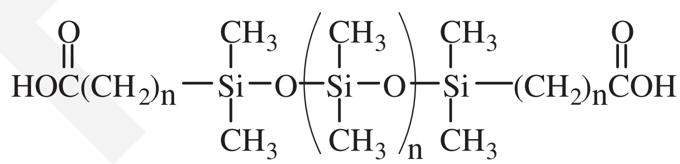
Bicycloheptenyl functional Silicones

Bicycloheptenyl terminated silicones undergo ring-opening metathesis polymerization (ROMP) reactions.[1,2]

[1] Finkelstein, E. 10th Int'l Organosilicone Symp. Proc, **1993**, P-120.
[2] Angeletakis, C. et al, US Pat. 6,455,029, **2002.**

(Bicycloheptenyl)ethyl Terminated PolyDimethylsiloxane CAS: [945244-93-9]

Code	Viscosity	Molecular Weight	Specific Gravity	Refractive Index	Price/25g	Price/100g
DMS-NB25	400-600	12,000-16,000	0.98	1.406	¥24,700	¥70,000
DMS-NB32	1300-1800	16,000-20,000	0.96	1.406	¥24,700	¥70,000



Carboxylate functional Silicones

Carboxylic acid functional siloxanes are excellent rheology and wetting modifiers for polyesters. When reacted with inorganic bases or amines, they perform as anti-static surfactants and lubricants.

(Carboxyalkyl) Terminated PolyDimethylsiloxane

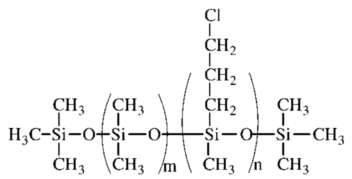
Code	Viscosity	Molecular Weight	Termination	Specific Gravity	Refractive Index	Price/25g	Price/100g
DMS-B12*	15-30	1000	Carboxydecyl	0.96	1.421	¥18,800	¥54,000
DMS-B25*	450-550	10,000	Carboxydecyl	0.97	1.403	¥17,200	¥49,000
DMS-B31**	800-1200	28,000	Carboxypropyl	0.98	-	¥17,200	¥49,000

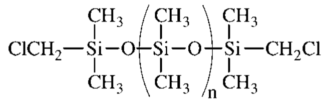
*CAS: [58130-04-4] ** [158465-59-9]

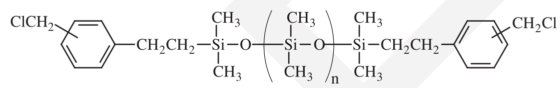
Chloroalkyl and Mercapto Functional Silicones

Chloroalkyl-functional Silicones

Chlororopropyl-functional silicones are moderately stable fluids which are reactive with polysulfides and durable press fabrics. They behave as internal lubricants and plasticizers for a variety of resins where low volatility and flammability resistance is a factor. Chloromethyl and chloromethylphenethyl terminated polydimethylsiloxanes offer access to block copolymers through various polymerization chemistries such as ATRP & RAFT.







(Chloropropyl)Methylsiloxane - Dimethylsiloxane Copolymers CAS: [70900-20-8] TSCA

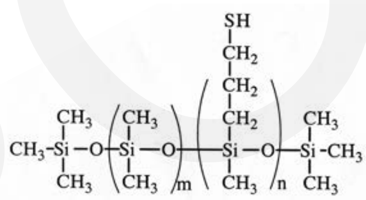
Code	Viscosity	Molecular Weight	Mole % (Chloro-propyl)MethylSiloxane	Specific Gravity	Refractive Index	Price/100g	Price/1kg
LMS-152	300-450	7500-10,000	14 - 16	1.01	1.420	¥28,900	¥156,400

Chloromethyl terminated PolyDimethylsiloxane CAS: [158465-60-2]

Code	Viscosity	Molecular Weight		Specific Gravity	Refractive Index	Price/100g	Price/1kg
DMS-L21	100-150	6000-8000	-	0.98	1.406	¥24,700	¥153,000

Chloromethylphenethyl terminated PolyDimethylsiloxane

Code	Viscosity	Molecular Weight		Specific Gravity	Refractive Index	Price/100g	Price/1kg
DMS-LP21	100-150	5000	-	0.98	1.420	¥32,600	-



Mercapto-functional Silicones

Mercapto-functional siloxanes strongly adsorb onto fibers and metal surfaces. High performance toner fluids for reprographic applications are formulated from mercapto-fluids. As components in automotive polishes they are effective rust inhibitors. They act as internal mold release agents for rubber and semi-permanent lubricants for automotive weather stripping. Mercapto-fluids are valuable additives in cosmetic and hair care products. They also undergo radical initiated (including UV) addition to unsaturated resins. Homopolymers are used as crosslinkers for vinylsiloxanes in rapid UV cure fiber optic coatings[1] and soft lithography stamps.[2]

[1] Mueller, U. et al. *J. Macromol. Sci. Pure Appl. Chem.* **1996**, *A43*, 439.
[2] Campos, L. et al. *Chem. Mater.* **2009**, *21*, 531.

Mercaptopropyl terminated PolyDimethylsiloxane

Code	Viscosity	Molecular Weight		Specific Gravity	Refractive Index	Price/100g	Price/1kg
DMS-SM21	80-120	10000	-	-	-	¥51,200	-

(Mercaptopropyl)Methylsiloxane - Dimethylsiloxane Copolymers CAS: [102783-03-9] TSCA

Code	Viscosity	Molecular Weight	Mole % (Mercapto-propyl) MethylSiloxane	Specific Gravity	Refractive Index	Price/100g	Price/1kg
SMS-022	120-250	6000-8000	2 - 3	0.97	1.406	¥9,300	¥40,900
SMS-042	120-170	6000-8000	4 - 6	0.98	1.408	¥9,300	¥40,900
SMS-142	100-200	3000-4000	13 - 17	0.98	1.410	¥19,400	¥117,300
SMS-992*	75-150	4000-7000	99-100	0.97	1.496	¥35,300	-

*homopolymer, contains cyclics

Polydimethylsiloxanes with Hydrolyzable Functionality

Polydimethylsiloxanes with hydrolyzable functionality react with water to produce silanol terminated fluids of equivalent or higher degrees of polymerization. Polymers with this category of reactivity are almost never directly hydrolyzed. Chlorine and dimethylamine terminated fluids are usually employed in ordered chain extension and block polymer synthesis, particularly urethanes and polycarbonates. Acetoxy and dimethylamine terminated fluids can also be used as unfilled bases for rapid cure RTVs.

Chlorine Terminated PolyDimethylsiloxanes CAS: [67923-13-1] TSCA

Code	Viscosity	Molecular Weight	Specific Gravity	Price/100g	Price/1kg
DMS-K05	3-8	425-650	1.00	¥19,400	¥110,000
DMS-K13	20-50	2000-4000	0.99	¥35,300	¥199,000
DMS-K26	500-800	15,000-20,000	0.99	¥28,400	¥175,000

Chlorine Terminated Nonafluorohexylmethylsiloxane – Dimethylsiloxane Copolymers CAS: [908858-79-7] TSCA-L

Code	Viscosity	Molecular Weight	Specific Gravity	Price/25g	Price/1kg
FMS-K11	5-15	500-1000	1.46	¥25,200	¥74,000

Diacetoxymethyl Terminated PolyDimethylsiloxanes CAS: [158465-54-4] TSCA

Code	Viscosity	Molecular Weight	Specific Gravity	Price/100g	Price/1kg
DMS-D33	2000-4000	36,000	0.99	¥20,400	

Dimethylamino Terminated PolyDimethylsiloxanes CAS: [67762-92-9] TSCA

Code	Viscosity	Molecular Weight	Specific Gravity	Price/100g	Price/1kg
DMS-N05	3 - 8	450-600	0.93	¥45,900	-
DMS-N12	15 - 30	1550-2000	0.95	¥40,600	-

hazy liquids

Ethoxy Terminated PolyDimethylsiloxanes CAS: [70851-25-1] TSCA

Code	Viscosity	Molecular Weight	Specific Gravity	Price/100g	Price/1kg
DMS-XE11	5-10	800-900	0.94	¥11,900	¥61,600

TriEthoxysilylethyl Terminated PolyDimethylsiloxanes CAS: [195158-81-7]

Code	Viscosity	Molecular Weight	Specific Gravity	Price/100g	Price/1kg
DMS-XT11	8-12	600-900	0.96	¥11,900	¥61,600

Methoxy Terminated PolyDimethylsiloxanes CAS: [68951-97-3] TSCA

Code	Viscosity	Molecular Weight	Specific Gravity	Price/100g	Price/1kg
DMS-XM11	5-12	900-1000	0.94	¥11,100	¥55,800

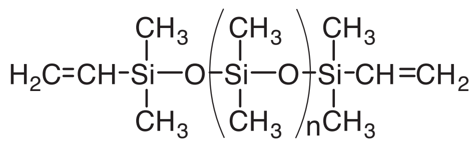
MethoxyMethylsiloxane-Dimethylsiloxane copolymer
methoxy terminated with branch structure CAS: [68440-84-6] TSCA

Code	Viscosity	Mole % MethoxyMethylsiloxane	Specific Gravity	Price/100g	Price/1kg
XMS-5025.2*	2-5	10-20	0.83	¥11,400	¥70,000

*20% in isopropanol

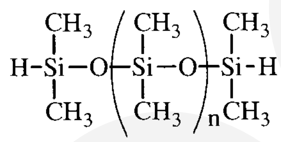
Monodisperse Reactive Silicones via Anionic Living Polymerization

Monodisperse silicones offer certain advantages over standard telechelic silicones. They have a discrete molecular weight and no low molecular weight non-functional cyclic siloxanes that can migrate out of the fluid or materials produced with them. Higher molecular weight vinyl functional materials can be used as base silicones for 2-part RTVs.



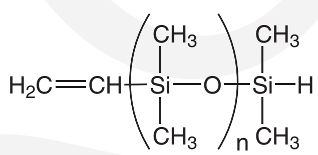
Monodisperse Vinyl Terminated PolydiMethylsiloxane

Code	Viscosity	Molecular Weight	Wt% Vinyl	Vinyl – Eq/kg	Specific Gravity	Price/100g	Price/3kg
DMS-Vm31	1000	28,000	0.18-0.26	0.07-0.10	0.97	¥24,700	¥158,200
DMS-Vm35	5000	49,500	0.10-0.13	0.04-0.05	0.97	¥24,700	¥158,200



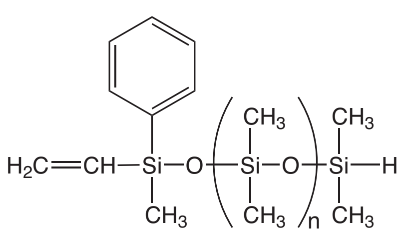
Monodisperse Hydride Terminated PolyDimethylsiloxane

Code	Viscosity	Molecular Weight	Wt% H	Equivalent Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
DMS-Hm15	50	3000-3500	0.07	1,625	0.96	1.403	¥26,000	¥161,000
DMS-Hm25	500	17,200	0.01	8,600	0.97	1.403	¥26,000	¥161,000



α-MonoVinyl-Ω-MonoHydride Terminated PolyDimethylsiloxane

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
DMS-HV15	40-60	2000-3000	1.404	0.96	¥43,200	¥201,000
DMS-HV22	150-250	10,000	1.403	0.97	¥43,200	¥201,000



α-MonoVinyl-MonoPhenyl-Ω-MonoHydride-Terminated PolyDimethylsiloxane

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
PMM-HV12	20	2000	1.4135	0.97	¥41,900	¥208,000

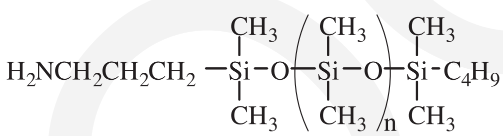
Macromers and Monofunctional Silicones

Macromers are relatively high molecular weight species with a single functional polymerizeable group which, although used as monomers, have high enough molecular weight or internal monomer units to be considered polymers. A macromer has one end-group which enables it to act as a monomer molecule, contributing only a single monomeric unit to a chain of the final macromolecule. The term macromer is a contraction of the word macromonomer. Copolymerization of macromers with traditional monomers offers a route to polymers that are usually associated with grafting. Macromers provide a mechanism for introducing pendant groups onto a polymer backbone with conditions consistent with radical, condensation or step-growth polymerization but result in pendant groups that are usually associated with significantly different polymerization conditions and significantly different physical properties than the main polymer chain. Siloxane macromers afford a mechanism for introducing a variety of desirable properties without disrupting the main chain integrity of an organic polymer.

Two general classes of siloxane macromers are available: asymmetric and symmetric. Asymmetric macromers have been the most widely used, but symmetric monomers, which open a path for hyper-branched polymers, are anticipated to have increased commercial utilization. Macromers are primarily defined by the functional group anticipated to be the reactive functionality in a polymerization. Other modifications usually effect a greater degree of compatibility with the proposed bulk polymer. These include modifying or replacing the most widely used siloxane building block, dimethylsiloxane, with other siloxanes, typically trifluoropropylmethylsiloxane.

MonoAminopropyl Terminated PolyDimethylsiloxanes

MonoAminopropyl Terminated PolyDimethylsiloxanes are most widely used as intermediates for acrylamide functional macromers or as terminating groups for polyamides and polyimides.

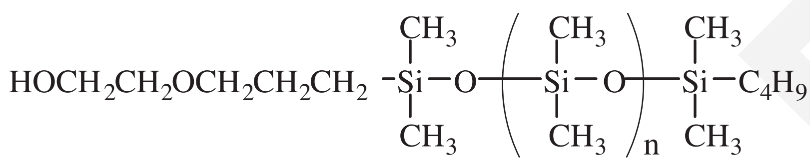


MonoAminopropyl Terminated PolyDimethylsiloxanes - asymmetric

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCR-A11	8-12	800-1000	1.411	0.92	¥49,900	¥240,000
MCR-A12	18-25	2000	1.411	0.97	¥48,500	¥222,000

MonoCarbinol Terminated PolyDimethylsiloxanes

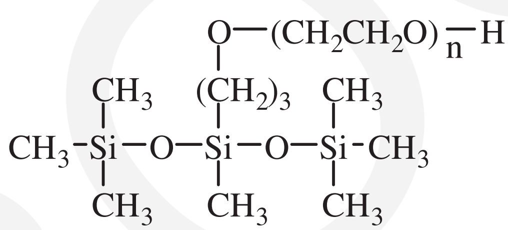
Monocarbinol terminated silicones are pigment dispersants and compatibilizers for a variety of resin systems including epoxies, urethanes and silicones. The action of these materials has been likened to surfactants for non-aqueous systems.



MonoCarbinol Terminated PolyDimethylsiloxanes - asymmetric CAS: [207308-30-3] TSCA

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCR-C12	15-20	1000	1.409	0.96	¥36,600	¥144,500
MCR-C18	80-90	5000	1.405	0.97	¥24,900	¥134,500
MCR-C22	250	10000	1.404	0.98	¥23,300	¥116,000

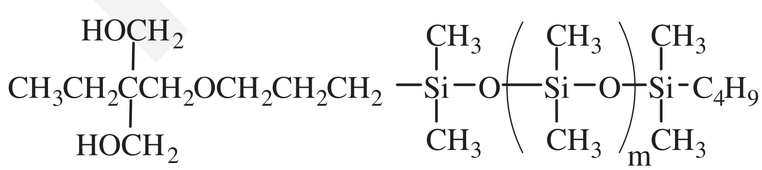
hydroxyethoxypropyl terminated



MonoCarbinol Terminated Functional PolyDimethylsiloxanes - symmetric CAS: [67674-67-3] TSCA

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCS-C11*	5-15	280-380	1.413	0.905	¥14,100	-
MCS-C13**	35-40	550-650	1.446	1.02	¥16,200	¥82,300

* n=0, CAS [17962-67-3] **n=6-9, CAS[67674-67-3]

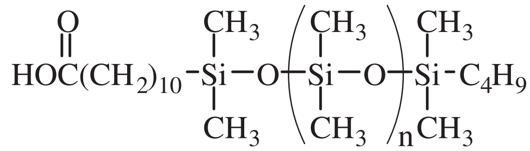


MonoDiCarbinol Terminated PolyDimethylsiloxanes - asymmetric CAS: [218131-11-4] TSCA

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCR-C61	50-60	1000	1.417	0.97	¥19,400	¥133,200
MCR-C62	100-125	5000	1.409	0.97	¥19,400	¥133,200

MonoCarboxy Terminated PolyDimethylsiloxanes

Carboxylic acid terminated silicones form esters. They also behave as surfactants.

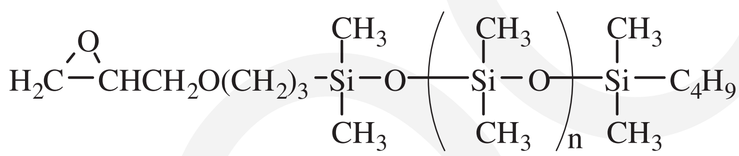


MonoCarboxydecyl Terminated PolyDimethylsiloxanes - asymmetric

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCR-B12	20	1500	1.415	0.94	¥51,200	-

MonoEpoxyTerminated PolyDimethylsiloxanes

Monofunctional epoxy terminated silicones have been utilized as modifiers for aliphatic epoxy systems. They have been used as thermal stress reduction additives to epoxies employed in electronic applications. They have also been acrylated to form UV curable macromers.



Mono (2,3-Epoxy)Propylether Terminated PolyDimethylsiloxanes - asymmetric

CAS:[1108731-31-2]/ [127947-26-6] TSCA

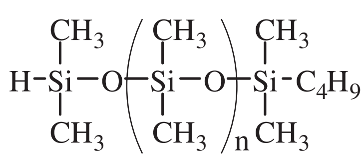
Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCR-E11	10-15	1000	1.410	0.96	¥27,300	¥168,700
MCR-E21	120	5000	1.408	0.97	¥26,000	¥140,900

Mono (2,3-Epoxy)Propylether Functional PolyDimethylsiloxanes - symmetric

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCS-E15	45-55	800-900	1.398	1.09	¥40,600	¥215,000

MonoHydrideTerminated PolyDimethylsiloxanes

Hydride functional macromer can be derivatized or reacted with a variety of olefins by hydrosilylation. They are also modifiers for platinum-cure silicone elastomers.



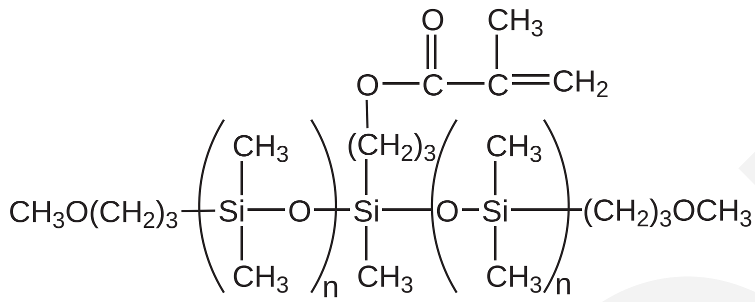
MonoHydride Terminated PolyDimethylsiloxanes - asymmetric

CAS:[1038821-58-7] TSCA

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCR-H07	5-8	800-900	1.404	0.96	¥40,600	¥210,000
MCR-H11	8-12	900-1100	1.407	0.96	¥32,600	¥195,100
MCR-H21	80-120	4500-5000	1.411	0.96	¥32,600	¥195,100

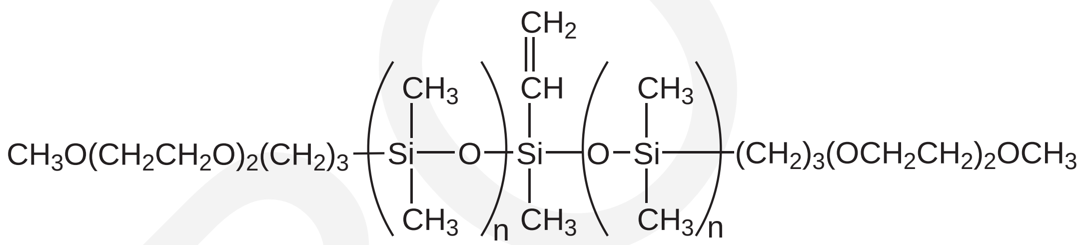
Polar Endcapped Symmetric Macromers

Macromers with polar terminations can be used as additives into more polar organic resins to add silicone characteristics with reduced likelihood of phase separation.



MonoMethacryloxypropyl Functional PolyDimethylsiloxanes, methoxypropyl terminated - symmetric

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCS-MX11	8-12	1000	-	0.96	¥59,100	-



MonoVinyl Functional PolyDimethylsiloxanes, methoxy(diethyleneoxide)propyl terminated - symmetric

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCS-VX15	40-60	5000	-	0.96	¥59,100	-

MonoMethacrylateTerminated PolyDimethylsiloxanes

The most widely employed silicone macromers are methacrylate functional. Applications have been reported for hair spray[1], contact lens[2], pigment dispersion[3] and adhesive release[4]. The materials copolymerize smoothly with other acrylate and styrenic monomers as indicated by their reactivity ratios.

1. US Pats 5166276, 5480634; 2. JP-A-230115/90, US Pat 6,943,203; 3. US Pat 6,991,884; 4. US Pat 4,728,571

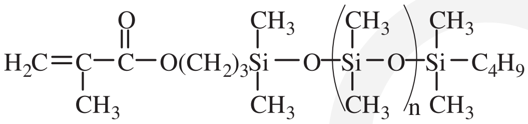
Reactivity Ratios

Monomers	r1:r2*
MCR-M11:methylmethacrylate	nm**:1.60
MCR-M22:methylmethacrylate	nm**:2.10
MCR-M11:styrene	0.26:1.07
MCR-M11:acrylonitrile	5.4:0.89

*M1M1°/M1M2°:M2M2°/M2M1°; **no meaningful results

Solubility of Macromers in Polar Monomers

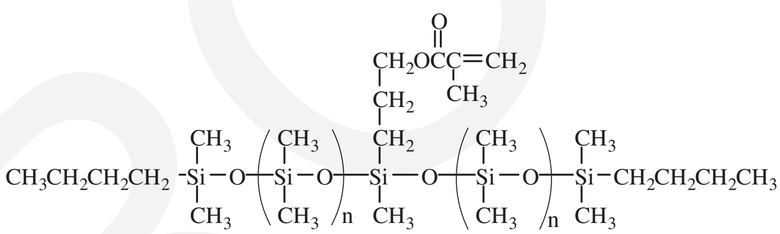
Macromer	Solubility (wt%) in Dimethylacrylamide	Solubility (wt%) in Hydroxyethylmethacrylate
MCR-M11	4	1
MCS-M11	8	2
MFR-M15	100 (miscible)	2



MonoMethacryloxypropyl Terminated PolyDimethylsiloxanes - asymmetric CAS: [146632-07-7] TSCA

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCR-M07	6-9	600-800	1.416	0.96	¥36,600	¥202,000
MCR-M11	10	800-1000	1.411	0.96	¥23,300	¥131,900
MCR-M17	70-80	5000	1.406	0.97	¥27,300	¥160,800
MCR-M22	150-200	10000	1.405	0.97	¥27,300	¥160,800

inhibited with BHT



MonoMethacryloxypropyl Functional PolyDimethylsiloxanes - symmetric TSCA

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCS-M11	7-9	800-1000	1.417	0.93	¥20,700	¥118,600

inhibited with BHT

MonoMethacryloxypropyl Terminated PolyDimethylsiloxanes - asymmetric

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MFR-M15	50-70	800-1000	1.398	1.09	¥61,800	-

inhibited with BHT

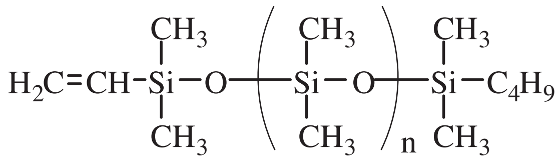
MonoMethacryloxypropyl Terminated PolyTrifluoropropylMethylsiloxanes - symmetric

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MFS-M15	40-60	800-1000	1.398	1.09	¥51,200	-

inhibited with BHT

MonoVinylTerminated PolyDimethylsiloxanes

Monovinyl functional siloxanes are utilized to control modulus and tack in silicone gels, elastomers and coatings.



MonoVinyl Terminated PolyDimethylsiloxanes - asymmetric

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCR-V21	80-120	5500-6500	1.403	0.97	¥32,600	¥175,500
MCR-V41	8000-12000	55000-65000	1.404	0.98	¥59,100	¥238,000

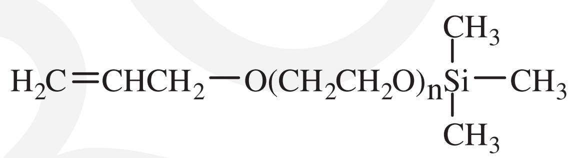
MonoVinyl Functional PolyDimethylsiloxanes - symmetric

TSCA

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/100g	Price/1kg
MCS-V212	16-24	1200-1400	1.419	0.97	¥32,600	¥152,700

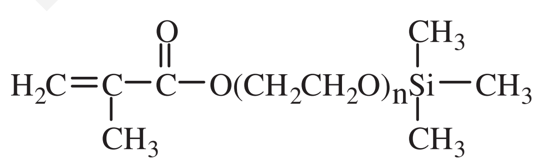
Silylated Organic Macromers

Silylated macromers provide a route to incorporation of polar monomers into mixtures of non-polar monomers. Subsequent to polymerization, the trimethylsilyl group is removed by hydrolysis.



MonoAllyl-Mono Trimethylsiloxy Terminated Polyethylene Oxide - asymmetric

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/25g	Price/100g
SIA0479.0	20-25	500	1.456	1.04	¥13,000	¥34,500



MonoMethacryloxy-Mono Trimethylsiloxy Terminated Polyethylene Oxide - asymmetric

Code	Viscosity	Molecular Weight	Refractive Index	Specific Gravity	Price/25g	Price/100g
SIM6485.9	-	400	-	1.02		¥28,900

Reactive Silicone Emulsions

Emulsions of reactive silicones are playing an increasing role in formulation technology for water-borne systems. Primary applications for silicone emulsions are in textile finishes, release coatings and automotive polishes. Silanol fluids are stable under neutral conditions and have non-ionic emulsifiers. Aminoalkylalkoxysiloxanes are offered with cationic emulsifiers.

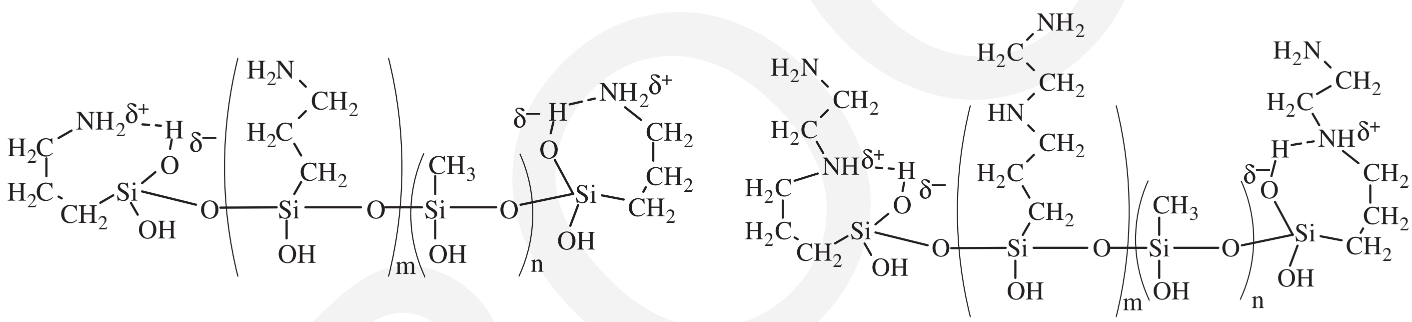
Reactive Silicone Emulsions

emulsifier content: 3-6% TSCA

Code	silicone class	base fluid viscosity	wt% solids	emulsion type	Price/100 g	Price/3kg	Price/18kg
DMS-S33M50	silanol	3500	50	nonionic	¥6,100	¥36,900	¥99,000
ATM-1322M50*	diamino/alkoxy	200-300	50	cationic	¥6,100	¥37,000	¥104,000

*0.45mEq/g combined primary and secondary amine

Water-borne Silsesquioxane Oligomers



Water-borne silsesquioxane oligomers act as primers for metals, additives for acrylic latex sealants and as coupling agents for siliceous surfaces.[1] They offer both organic group and silanol functionality. These amphoteric materials are stable in water solutions and, unlike conventional coupling agents, have very low VOCs.

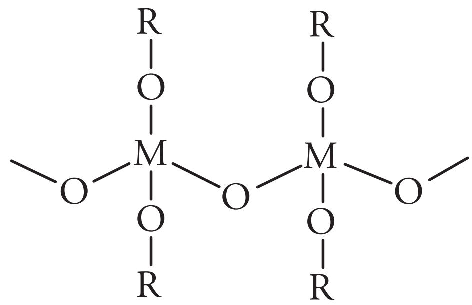
Water-borne Silsesquioxane Oligomers

TSCA

Code	Functional Group	Mole %	Molecular Weight	Weight % in solution	Specific Gravity	Viscosity	pH	Price/100g	Price/3kg
WSA-7011*	Aminopropyl	65-75	250-500	19-21	1.10	5-15	10-10.5	¥7,200	¥107,000
WSA-9911**	Aminopropyl	100	270-550	21-26	1.06	5-15	10-10.5	¥8,500	¥87,000
WSA-7021	Aminoethylaminopropyl	65-75	370-650	23-27	1.10	5-10	10-11	¥11,100	¥127,000
WSAV-6511‡	Aminopropyl, vinyl	60-65	250-500	15-20	1.11	3-10	10-11	¥12,700	¥139,000
WSAF-1511	Aminopropyl, fluoroalkyl	15-20	—	15-20	1.06	1-5	3-5	¥15,400	¥172,000

*CAS[1411854-75-5] **[29159-37-3] ‡[207308-27-8]

[1] Arkles, B. in *"Silanes & Other Coupling Agents"*, Mittal, K. L. Ed. **1992**, p91, Utrecht.



Polymeric Metal Alkoxides

Polymeric metal alkoxides fall into two main classes: oxo-bridged, which can be regarded as partially hydrolyzed metal alkoxides, and alkoxide bridged which can be regarded as organo diester alkoxides. Both classes have the advantages of high metal content and low volatility.

Polymeric metal alkoxides are used primarily as curing agents for 2-part RTVs and in the preparation of binders and coatings including investment casting resins and zinc-rich paints. The latter appplications can be considered as special examples of Sol-Gel technology. *Sol-Gel* is a method for preparing specialty metal oxide glasses and ceramics by hydrolyzing a chemical precursor or mixture of chemical precursors that pass sequentially through a solution state and a gel state before being dehydrated to a glass or ceramic.

Sol-Gel Process Technology and Chemistry

Preparation of metal oxides by the sol-gel route proceeds through three basic steps: 1) partial hydrolysis of metal alkoxides to form reactive monomers; 2) the polycondensation of these monomers to form colloid-like oligomers (sol formation); 3) additional hydrolysis to promote polymerization and cross-linking leading to a 3-dimensional matrix (gel formation). Although presented sequentially, these reactions occur simultaneously after the initial processing stage.

MONOMER FORMATION (PARTIAL HYDROLYSIS)

$$M(OR)_n + H_2O \longrightarrow (RO)_{n-1}MOH + ROH$$

e.g. $$Ti(OC_2H_5)_4 + H_2O \xrightarrow[\text{catalyst}]{\text{solvent}} (C_2H_5O)_3TiOH + C_2H_5OH$$

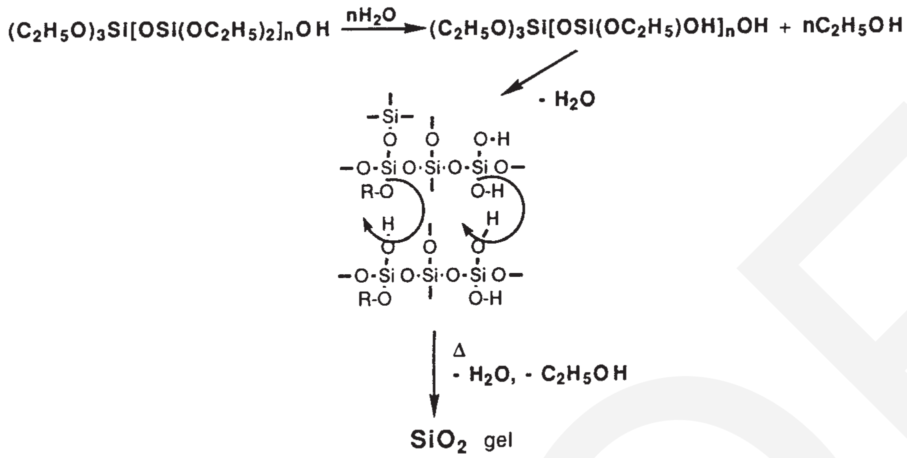
SOL FORMATION (POLYCONDENSATION)

$$2\ (RO)_{n-1}MOH \longrightarrow (RO)_{n-1}M\text{-}O\text{-}M(OR)_{n-2}OH + ROH$$

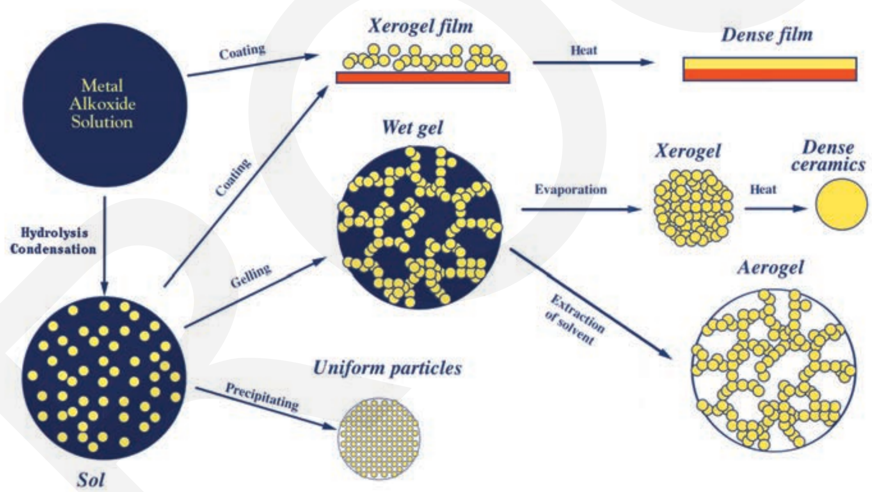
$$(RO)_{n-1}\text{-}O\text{-}M(OR)_{n-2}OH \xrightarrow[\text{dimers}]{\text{monomers}} (RO)_{n-1}M\text{-}O\text{-}M[\text{-}OM(OR)_{n-2}]_nOH + ROH$$

e.g. $$n(C_2H_5O)_3SiOH \longrightarrow (C_2H_5O)_3Si[OSi(OC_2H_5)_2]_nOH + nC_2H_5OH$$

Gelation (Cross-Linking)



As polymerization and cross-linking progress, the viscosity of the sol gradually increases until the sol-gel transition point is reached. At this point the viscosity abruptly increases and gelation occurs. Further increases in cross-linking are promoted by drying and other dehydration methods. Maximum density is achieved in a process called densification in which the isolated gel is heated above its glass transition temperature. The densification rate and transition (sintering) temperature are influenced primarily by the morphology and composition of the gel.



REFERENCES:

METAL ALKOXIDES AND DIKETONATES

Bradley, D. C.; Mehrotra, R. C.; Gaur, D. P. *Metal Alkoxides,* Acadmeic Press, 1978.

Mehrotra, R. C.; Bohra, R.; Gaur, D. P. *"Metal Diketonates and Allied Derivatives"* Academic Press, 1978.

SOL-GEL TECHNOLOGY

Brinker, C. J.; Scherer, G. W. *Sol-Gel Science*, Academic Press, 1990.

Brinker, C. J.; Clark, D. E.; Ulrich, D. R. *Better Ceramics Through Chemistry,* (Materials Research Society Proceedings 32), Elsevier, 1984.

Brinker, C. J.; Clark, D. E.; Ulrich, D. R. *Better Ceramics Through Chemistry* II, III, IV (IV add'l ed. B. J. Zelinski) (Materials Research Society Proceedings 73, 121, 180) Mat'l. Res. Soc., 1984, 1988, 1990.

Hench, L. L.; Ulrich, D. R. *Ultrastructure Processing of Ceramics, Glasses and Composites,* Wiley, 1984.

Hench, L. L.; Ulrich, D. R. *Science of Ceramid Processing,* Wiley, 1986.

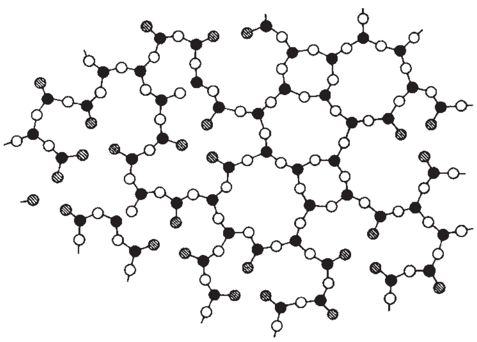
Klein, L. C. *Sol-Gel Technology for Thin Fillms, Fibers, Preforms, and Electronics,* Noyes, 1988.

Polymeric Metal Alkoxides

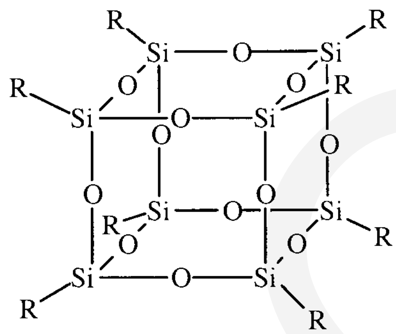
name	metal content	unit M.W.	viscosity, cSt	density
PSI-021				
Poly(DIETHOXYSILOXANE)	20.5-21.5% Si	134.20	3-5	1.05-1.07
[$(C_2H_5O)_2SiO$]	(40-42% SiO_2 equivalent)			
crosslinker for two-component condensation cure (silanol) RTVs.				
[68412-37-3] TSCA		100g / ¥6,100	2kg / ¥24,600	
PSI-023				
Poly(DIETHOXYSILOXANE)	23.0-23.5% Si	134.20	20-35	1.12-1.15
[$(C_2H_5O)_2SiO$]	(48-52% SiO_2 equivalent)			
base for zinc-rich paints				
[68412-37-3] TSCA		100g / ¥7,700		
PSI-026				
Poly(DIMETHOXYSILOXANE)	26.0-27.0% Si	106.15	6-9	1.14-1.16
[$(CH_3O)_2SiO$]				
highest SiO_2 content precursor for sol-gel				
[25498-02-6] TSCA		100g / ¥11,900	500g / ¥38,500	
PSIAL-007				
DIETHOXYSILOXANE -s-BUTYLALUMINATE copolymer		7.5-8.5%Al		0.90-1.00
sol-gel intermediate for aluminum silicates.[1]		6.6-7.6% Si		
1. J. Boilot in "Better Ceramics Through Chemistry III, p121				
[68959-06-8] TSCA		100g / ¥24,100	500g / ¥87,300	
PSITI-019				
DIETHOXYSILOXANE - ETHYLTITANATE copolymer		19.1-19.6% Si	10-25	
[$(C_2H_5O)_2SiO$][$(C_2H_5O)_2TiO$]		2.1-2.3% Ti		
employed in formation of titania-silica aerogels.[1]				
1. Miller, J.; et al. J. Mater. Chem. **1995**, *5*, 1795.				
		25g / ¥14,100	100g / ¥37,900	
PSIPO-019				
DIETHOXYSILOXANE - ETHYLPHOSPHATE copolymer		19.1-19.6% Si	8-12	1.09-1.11
[$(C_2H_5O)_2SiO$][$(C_2H_5O)OPO$]	hygroscopic	1.4-1.5% P	R.I.: 1.400	
[51960-53-3]		25g / ¥14,100	100g / ¥37,900	
PAN-040				
Poly(ANTIMONY ETHYLENE GLYCOXIDE)	39.8-40.4% Sb	303.55	solid	
	catalyst for transesterification			
[$C_6H_{12}O_6Sb_2$] [29736-75-2] TSCA		25g / ¥9,000	100g / ¥19,000	
PTI-023				
Poly(DIBUTYLTITANATE)	22.0-23.0% Ti	210.10	3200-3500	1.07-1.10
[$(C_4H_9O)_2TiO$]	stabilized with ~5% ethylene glycol			
[9022-96-2] TSCA		100g / inquire	500g / inquire	
PTI-008				
Poly(OCTYLENEGLYCOL-TITANATE)	7.5-7.6% Ti	482.54	1700	1.035
	contains ~5% free 2-ethyl-1,3-hexanediol, oligomeric			
[$OCH_2CHEt(CH_2)_4OTi(CH_2CHEt(CH_2)_4OH)_2$]$_n$		flashpoint: 50°C(122°F)		
[5575-43-9]		25g / inquire	100g / inquire	

PolySilsesquioxanes and T-Resins
$RSiO_{1.5}$

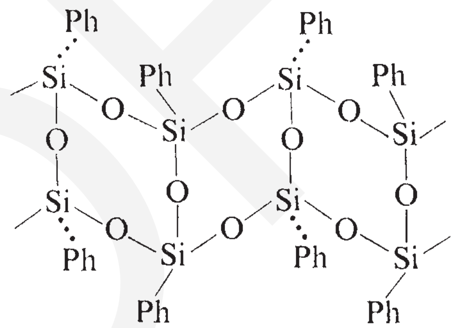
PolySilsesquioxanes and T-resins are highly crosslinked materials with the empirical formula $RSiO^{1.5}$. They are named from the organic group and a one and a half (sesqui) stoichiometry of oxygen bound to silicon. T-resin, an alternate designation, indicates that there are three (Tri-substituted) oxygens substituting the silicon. Both designations simplify the complex structures that have now come to be associated with these polymers. A variety of paradigms have been associated with the structure of these resins ranging from amorphous to cubes containing eight silicon atoms, sometimes designated as T_8 structures. Ladder structures have been attributed to these resins, but the current understanding is that in most cases these are hypothetical rather than actual structures.



Amorphous



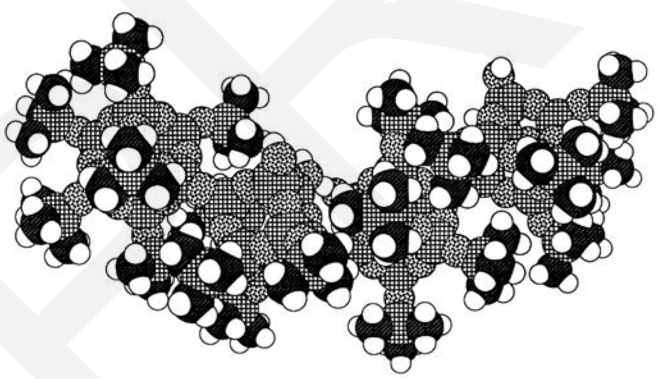
T_8 cube



Hypothetical Ladder

Polysilsesquioxanes are used as matrix resins for molding compounds, catalyst supports and coating resins. As dielectric, planarization and reactive ion etch resistant layers, they find application in microelectronics. As abrasion resistant coatings they protect plastic glazing and optics. As preceramic coatings they convert to silicon dioxide, silicon oxycarbide, and silicon carbide depending on the oxidizing conditions for the high temperature thermal conversion.

Polysilsesquioxane resins containing silanols (hydroxyls) can be cured at elevated temperatures. Formulation and catalysis is generally performed at room-temperature or below. At temperatures above 40°C most resins soften and become tacky, becoming viscous liquids by 120°C. The condensation of silanols leads to cure and the resins become tough binders or films. The cure is usually accelerated by the addition of 0.1-0.5% of a catalyst such as dibutyltindiacetate, zinc acetate or zinc 2-ethylhexanoate. The resins can also be dispersed insolvents such as methylethylketone for coating applications.



Polymeric Q resins with cage structure
(according to Wengrovius)

see Vinyl, Silanol & Hydride Q Resins

polySilsesquioxanes Liquid T-Resins

Code	Name	Viscosity (cSt)	M.W. (approximate)	Refractive Index	Specific Gravity	Price/100g	Price/1kg
SLT-3A101	poly(Methylsilsesquioxane) [181186-37-8] TSCA	20-30 methoxy terminated	700-1100	1.402 (alkoxy wgt% 25-30)	1.143	¥10,300	-
SLT-3A302	poly(Propylsilsesquioxane) [314270-00-3] TSCA	25-40 ethoxy terminated	-	1.424	1.035	¥9,800	-
SLT-3A802	poly(Octylsilsesquioxane) [1385031-14-0] TSCA-L	400-600 ethoxy terminated	1000-1800	1.454	0.979	¥16,200	-

These materials are oligomeric alkoxysilane hydrolyzates and are the basis of coating resins.

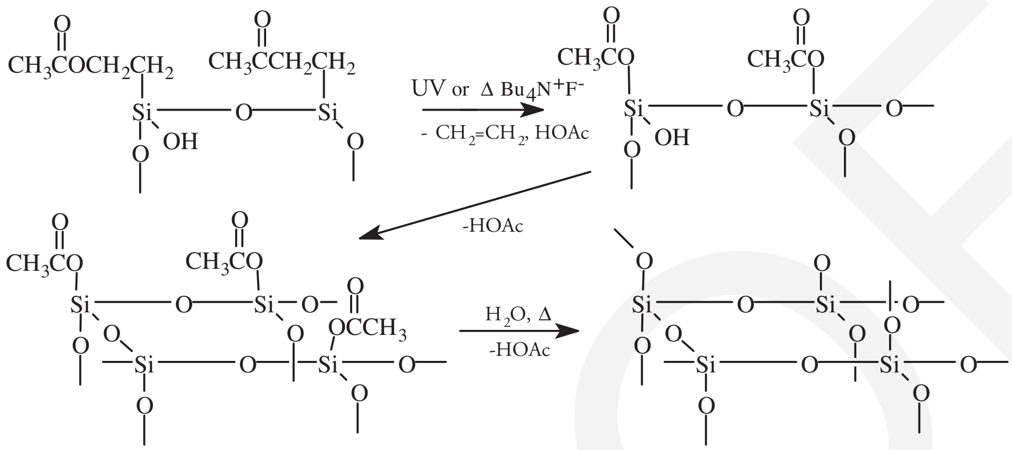
polySilsesquioxanes Solid T-Resins

Code	Name	M.W. (approximate)	% (OH)	Refractive Index	Specific Gravity	Price/100g	Price/1kg
SST-3M01	poly(Methylsilsesquioxane) 100% Methyl [68554-70-1] TSCA	7000-8000	4.0-6.0	1.42	-	¥20,400	¥108,000
SST-3M02	poly(Methylsilsesquioxane) 100% Methyl [68554-70-1] TSCA		2.5-4.0	-	1.08	¥19,400	¥102,000
SST-3MH1.1	poly(Methyl-Hydridosilsesquioxane) 90% Methyl, 10% Hydride	10 wt% sol'n in methyltetrahydrofuran			0.91	¥19,400	-
SST-3P01	poly(Phenylsilsesquioxane) 100% Phenyl [70131-69-0] TSCA	1200-1600	4.5-6.5	1.56		¥22,500	¥135,000
SST-3PM1	poly(Phenyl-Methylsilsesquioxane) 90% Phenyl, 10% Methyl [181186-29-8]	-	-	1.55		¥19,400	¥118,000
SST-3PM2	(Phenylsilsesquioxane)-(Dimethylsiloxane) copolymer 70% Phenyl, 30% DiMethyl [73138-88-2] TSCA		3.0-5.0	-	1.08	¥15,100	¥89,000
SST-3PM4	(40% Phenyl- 45% Methylsilsesquioxane)-(5% Phenylmethylsiloxane) (10% Diphenylsiloxane) tetrapolymer 85% Silsesquioxane, 15% Siloxane [181186-36-7] TSCA	1400-1600		2.0-3.0	1.08	¥19,400	¥118,000
SST-3PP1	poly(Phenyl-Propylsilsesquioxane) 70% Phenyl, 30% Propyl [68037-90-1] TSCA (equivalent weight: 400)	1500-1800	3.5-5.5	1.54	1.25	¥8,500	¥37,000
SST-3PV1	poly(Phenyl-Vinylsilsesquioxane) 90% Phenyl, 10% Vinyl	1000-1300	-	-	-	¥26,300	-
SST-3Q01	poly[(Octadecyldimethylammoniumchloride)propylsilsesquioxane] [1353244-79-7]	water soluble			-	¥24,700	-
SST-3R01	poly(Methacryloxypropylsilsesquioxane)	1000-3000	-	-	-	¥51,200	-

Water - borne silsesquioxanes- see p. 533

Thermally & UV Labile Polysilsesquioxanes

Silsesquioxanes containing β-electron withdrawing groups can be converted to silicon dioxide via elimination and hydrolysis at low temperatures or under UV exposure.[1] The thermal reaction cascade for β-substituted silsesquioxanes leading to SiO_2-rich structures with a low level of carbon occurs at temperatures above 180°.[2]



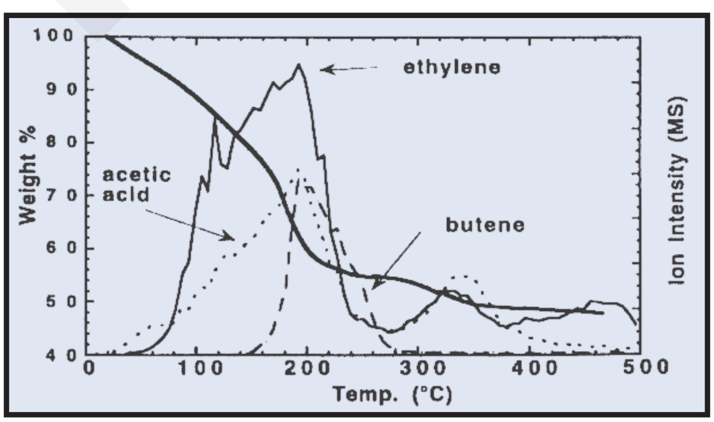
UV exposure results in pure SiO_2 films and suggests that patterning β-substituted silsesquioxane films can lead to direct fabrication of dielectric architectures.

1. Arkles, B.; Berry, D.; Figge, L.; J. Sol-Gel Sci. & Technol. **1997**, *8*, 465.
2. Ezbiansky, K. et al, Mater. Res. Soc. Proc., **2001**, *606*, 251.

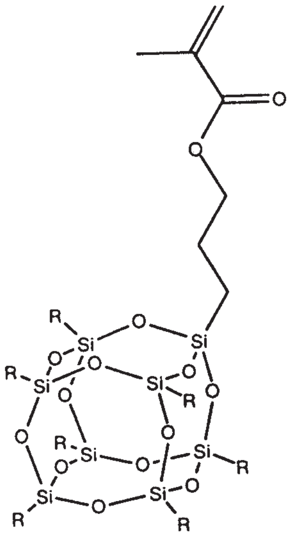
Thermally & UV labile polysilsesquioxanes

		M.W. (approximate)	% (OH)		Price/100g
SST-BAE1.2	poly(2-Acetoxyethylsilsesquioxane) converts to SiO_2 >350°C	-	-	18-20% sol'n in methoxypropano	CAS: [349656-50-4] TSCA ¥25,700
SST-BCE1.2	poly(2-Chloroethylsilsesquioxane) converts to SiO_2 >300°C	800-1400	3.0-5.5	14-16% sol'n in methoxypropanol	CAS: [188969-12-2] ¥24,100
SST-BBE1.2	poly(2-Bromoethylsilsesquioxane) converts to SiO_2 by UV	1200-2000	2.0-4.0	14-16% sol'n in methoxypropanol	¥32,600

2-Acetoxyethylsilsesquioxane
TGA/MS with 5% $Bu_4N^+F^-$



Specialty polysilsesquioxanes



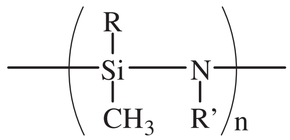
Specialty polysilsesquioxanes can be utilized as models and precursors for silica surfaces and zeolites. If a silicon is removed from a T8 cube, the open position of the remaining T7 cube can be substituted with catalytically active metals.[1] T7 cubes can be converted to functionalized T8 cubes. Functionalized T8 cubes are sometimes designated POSS (polyhedral oligomeric silsesquioxane) monomers. Methacrylate T8 cubes can be copolymerized with a variety of monomers to form homopolymers and copolymers. The polymers may be viewed structurally as nanocomposites or hybrid inorganic-organic polymers. The cube structures impart excellent mechanical properties and high oxygen permeability.[2] Hydride substituted T8 cubes can be introduced into vinyl-addition silicone rubbers.[3] T8 cubes in which all silicon atoms are substituted with hydrogen have demonstrated utility as flowable oxide precursors in microelectronics.

[1] Feher, F.; et al, J. Am. Chem. Soc., **1989**, *111*, 1741.
[2] Lichtenhan, J.; et al, Macromolecules, **1995**, *28*, 8435.
[3] Lichtenhan, J.; Comments Inorg. Chem. **1995**, *17*, 115.

Specialty polySilsesquioxanes

Code	Name	M.W. (approximate)	Solubility	Price/10g
POSS materials				
SST-A8C42	Allyl substituted poly(Isobutylsilsesquioxane) T8 cube with single substitution, employed in epoxy nanocomposites	851.55	THF, hexane	¥22,500
SST-R8C42	Methacryloxypropyl substituted poly(Isobutylsilsesquioxane) T8 cube with single substitution with polymerizeable functionality [307531-94-8]	943.64	THF, hexane	¥28,900
SST-H8H01	poly(Hydridosilsesquioxane) - polymeric T8 with all silicons hydride substituted T8 cube [137125-44-1]	3000-5000	17-20% hazy solution in methylisobutylketone; density 0.88	¥60,500
SST-H8HS8	poly(Hydridosilsesquioxane) - T8 with all silicons dimethylsiloxy ($HSiMe_2O$) substituted T8 cube [125756-69-6]	1017.98	see also HQM-107 p.16.	¥36,900
SST-V8V01	poly(Vinylsilsesquioxane) - T8 with all silicons vinyl substituted T8 cube [69655-76-1]	633.04		¥75,600

Polysilazanes and Polysilanes



polySILAZANES -(Si-N)-

Polysilazanes are preceramic polymers primarily utilized for the preparation of silicon nitride for thermal shock resistant refractories and dielectric coatings for microelectronics.[1]

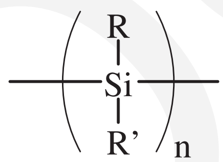
PSN-2H01.2
poly(PERHYDROSILAZANE) telomer
[176948-80-4] 10wt% in heptanes 10g / ¥51,200

PSN-2M01
poly(1,1-DIMETHYLSILAZANE) telomer
[89535-60-4] Tg: -82° >50 cSt. M.W.: 500-900 D_4^{20}: 1.04 10g / ¥37,900

PSN-2M02
poly(1,1-DIMETHYLSILAZANE) crosslinked
>1000 cSt. % char, 700°: 15-20% 10g / ¥47,200

PSN-2M11
poly(1,2-DIMETHYLSILAZANE)
100-300 cSt. D_4^{20}: 0.99 10g / ¥49,900

1. Kroke, E. et al, *Material Science and Engineering Reports,* **2000**, *26,* 97.



polySILANES -(Si-Si)-

Polysilanes have applications as preceramic polymers and photolabile coatings. Applications for polysilanes with methyl and phenyl group substitution are usually limited to silicon carbide precursors.

PSS-1C01
poly(DICYCLOHEXYLSILANE) solid 1.0g / ¥51,200

PSS-1H01
poly(DIHEXYLSILANE)
[207925-46-0] solid 1.0g / ¥27,300

PSS-1K02
poly(PERCHLOROSILANE) oligomer
4 or more silicon atoms solid 10g / ¥61,800

PSS-1M01
poly(DIMETHYLSILANE) MW 1000-3000
DP: 25-50 Flashpoint: 103° Tm: 250-270° (substantial degradation before mp)
Solid state source for volatile siliconcarbonitride (SiCN) precursors utilized in passivation of silicon-based photovoltaics
Employed in CVD of silicon carbonitride films.[1]
1. Scarlete, M.; et al; US Patent 7,396,563; **2008** (Label Licensed Gelest Product)
2. Yajima, S. et al. *J. Mater. Sci.* **1978**, *13*, 2569.
[30107-43-8] / [28883-63-8] TSCA 10g / ¥13,000 100g / ¥33,900

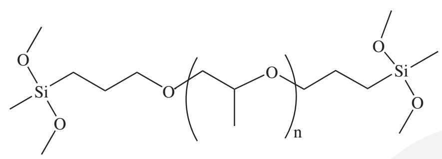
PSS-1P01
(50% DIMETHYLSILANE)(50% PHENYLMETHYLSILANE) copolymer
[143499-71-2]] solid 10g / ¥32,600

PSS-1P11
poly(PHENYLMETHYL)SILANE Density: 1.12
[146088-00-8] Tg: 112-122° fluorescent emission: 360nm 10g / ¥40,600

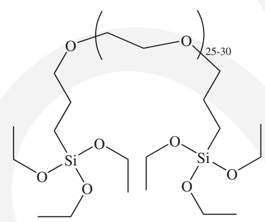
Silicone-Organic Hybrids with Hydrolyzable Functionality

Hybrid organic inorganic polymers containing alkoxy substitutions on silicon allow formulation of moisture cure adhesives, sealants and elastomers with physical properties, including adhesion and strength, which are significantly higher than conventional silicones. Moisture produces a condensation cure analogous to moisture cure silicones. Preferred catalysts are dibutylbispentanedionatetin, dimethyldineodecanoate tin and dibutyldilauryltin at levels of 0.2-1.0%. In order to allow through-section cure, maximum thickness is usually 1/4", (5mm).

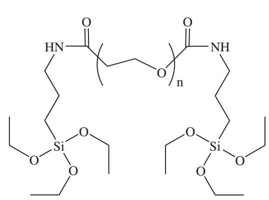
Polyether



SIB1660.0
BIS[3-METHYLDIMETHOXYSILYL)PROPYL]POLYPROPYLENE OXIDE
visc: 6000-10,000 cSt. M.W. 600-800 density: 1.00
base resin for tin catalyzed moisture-cure RTVs
[75009-80-0] HMIS: 3-1-1-X 100g / ¥8,500 2kg / ¥69,100



SIB1824.84
BIS(3-TRIETHOXYSILYLPROPYL)POLYETHYLENE OXIDE (25-30 EO) 1,400 - 1,600 (38-42°)
Hydrolytically stable hydrophilic silane
Proton conducting polymer electrolyte.[1]
1. Ghosh, B. et al. Chem. Mater. **2010**, *22*, 1483.
See also SIB1860.0
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[666829-33-0] HMIS: 2-1-1-X 25g / ¥25,700



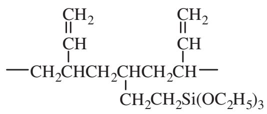
SIB1824.82
N,N'-BIS-[(3-TRIETHOXYSILYLPROPYL)AMINOCARBONYL]POLYETHYLENE OXIDE (10-15 EO)
UREASIL 1,000 - 1,200 1.088 1.458325
Dipodal hydrophilic silane
In combination with sulfolane forms gel electrolyte for solar cells.[1]
Forms proton conducting hybrid organic-inorganic polymer electrode membranes.[2]
1. Stathatos, E. et al. Adv. Funct. Mater. **2004**, *14*, 45.
2. Honma, I. et al. J. Membr. Sci. **2001**, *185*, 83.
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water
[178884-91-8] TSCA HMIS: 1-1-1-X 25g / ¥18,300 100g / ¥51,700

Antifog coatings can be formed from combinations of polyalkylene oxide functional silanes and film-forming hydrophilic silanes

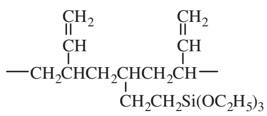
Multi-Functional and Polymeric Silanes

name	MW	D_4^{20}	n_D^{20}

Polybutadiene

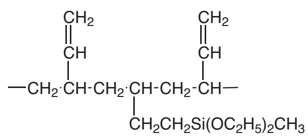


SSP-055
TRIETHOXYSILYL MODIFIED POLY-1,2-BUTADIENE, 50% in toluene — MW 3500-4500 — D_4^{20} 0.90
viscosity: 75-400 cSt.
coupling agent for EPDM resins
[72905-90-9] TSCA HMIS: 2-4-1-X store <5° — 100g / ¥22,000 — 2.0kg / ¥190,000

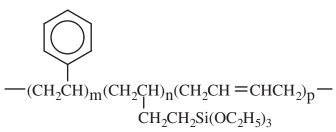


SSP-056
TRIETHOXYSILYL MODIFIED POLY-1,2-BUTADIENE, 50% in volatile silicone — MW 3500-4500 — D_4^{20} 0.93
viscosity: 600-1200 cSt.
primer coating for silicone rubbers
[72905-90-9] TSCA HMIS: 2-3-1-X store <5° — 100g / ¥24,700 — 2.0kg / ¥204,000

Developmental

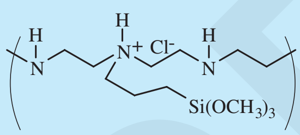


SSP-058
DIETHOXYMETHYLSILYL MODIFIED POLY-1,2-BUTADIENE, 50% in toluene — MW 3500-4500 — D_4^{20} 0.90
viscosity: 75-150 cSt.
water tree resistance additive for crosslinkable HDPE cable cladding
HMIS: 2-4-1-X store <5° — 100g / ¥26,300 — -

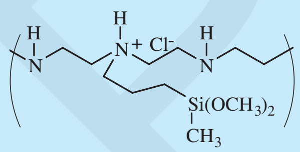


SSP-255
(30-35%TRIETHOXYSILYLETHYL)ETHYLENE-(35-40% 1,4-BUTADIENE) - (25-30% STYRENE) terpolymer, 50% in toluene — MW 4500-5500
viscosity: 20-30 cSt.
HMIS: 2-3-1-X — 100g / ¥28,600

Polyamine

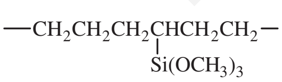


SSP-060
TRIMETHOXYSILYLPROPYL MODIFIED (POLYETHYLENIMINE), 50% in isopropanol — MW 1500-1800 — D_4^{20} 0.92
visc: 125-175 cSt — ~20% of nitrogens substituted
employed as a coupling agent for polyamides.[1]
in combination with glutaraldehyde immobilizes enzymes.[2]
1. Arkles, B; et al, SPI 42nd Composite Inst. Proc., 21-C, 1987
2. Cramer, S; et al, Biotech. & Bioeng. **1989**, *33(3)*, 344.
[136856-91-2]/[37251-86-8] TSCA HMIS: 2-4-1-X — 100g / ¥10,900 — 2.0kg / ¥106,000



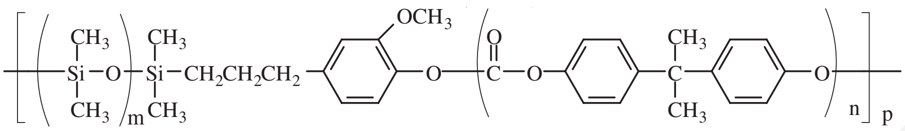
SSP-065
DIMETHOXYMETHYLSILYLPROPYL MODIFIED (POLYETHYLENIMINE), 50% in isopropanol — MW 1500-1800 — D_4^{20} 0.92
visc: 100-200 cSt — ~20% of nitrogens substituted
primer for brass
[1255441-88-5] TSCA HMIS: 2-4-1-X — 100g / ¥14,600 — 3.0kg / ¥203,000

Polyethylene

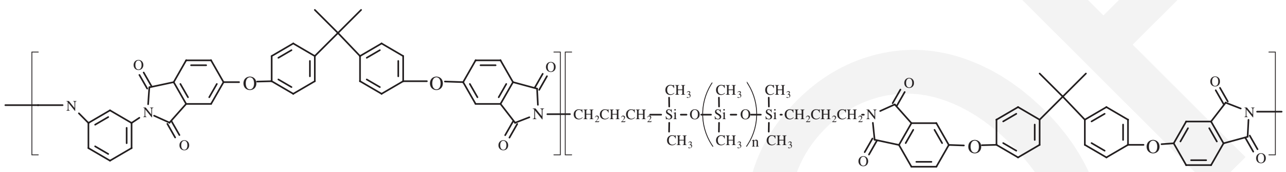


SSP-050
TRIMETHOXYSILYL MODIFIED POLYETHYLENE — D_4^{20} 0.927
0.5-1.2 mole % vinyltrimethoxysilane - ethylene copolymer
moisture crosslinkable thermoplastic — melt process temp: 170 - 200°
[35312-82-4] TSCA HMIS: 1-1-1-X — 100g / ¥13,000 — 2.0kg / ¥124,000

Thermoplastic Resins for Melt Processing or Solution Casting

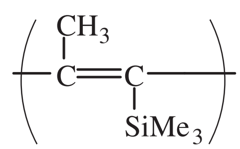


SSP-080
(DIMETHYLSILOXANE)(BISPHENOL -A CARBONATE) copolymer
(15 - 20% polydimethylsiloxane)
thermoplastic; tensile strength: 50MPa   Vicat mp: 145°   density: 1.19
[202483-49-6] TSCA HMIS: 1-1-0-X   100g / ¥35,300



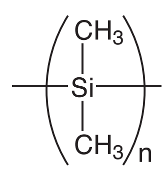
SSP-085
(DIMETHYLSILOXANE)(ETHERIMIDE) copolymer
(35-40% polydimethylsiloxane)phenylenediaminepolyetherimide
thermoplastic; tensile strength: 2800psi   Tg: 168°C   density: 1.18
[99904-16-2] TSCA HMIS: 1-1-0-X   100g / ¥35,300

SSP-070
POLY(TRIMETHYLSILYL)PROPYNE

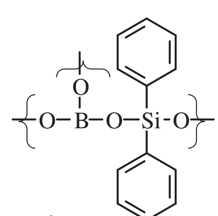


forms viscous 5% solutions in toluene/tetrahydrofuran
high oxygen permeability[1,2,3]; $PO_2/PN_2 = 1.7$
1. Masuda, T.; et al, *J. Am. Chem. Soc.*, **1983**, *105*, 7473.
2. Claes, S. et al, *J. Membrane Sci.*, **2012**, *389*, 459.
3. Claes, S. et al, *Macromolecules*, **2011**, *44*, 2766.
[87842-32-8]   HMIS: 1-1-0-X   10g / ¥53,800

Pre-Ceramic Polymers



PSS-1M01
poly(DIMETHYLSILANE)   MW 1000-3000
DP: 25-50   Flashpoint: 103°   Tm: 250-270° (substantial degradation before mp)
Solid state source for volatile siliconcarbonitride (SiCN) precursors utilized in passivation of silicon-based photovoltaics
Employed in CVD of silicon carbonitride films.[1]
1. Scarlete, M.; et al; US Patent 7,396,563; **2008** (Label Licensed Gelest Product)
2. Yajima, S. et al. *J. Mater. Sci.* **1978**, *13*, 2569.
[30107-43-8] / [28883-63-8] TSCA   10g / ¥13,000   100g / ¥33,900



SSP-040
POLY(BORODIPHENYLSILOXANE)   solid, Tg: 95-100°, Tm: 140-1°
employed in preparation of ceramic fibers.[1]
1. Yajima, S.; et al, Nature, **1977**, *266*, 521.
[70914-15-7] TSCA HMIS: 2-0-0-X   25g / ¥22,500   100g / ¥65,500

Precious Metal Catalysts for Vinyl-Addition Silicone Cure

The recommended starting point for platinum catalysts is 20ppm platinum or 0.05-0.1 parts of complex per 100 parts of vinyl-addition silicone formulation. Rhodium catalyst starting point is 30ppm based on rhodium. Other platinum concentrations are available upon request.

SIP6829.2
PLATINUM CARBONYL CYCLOVINYLMETHYLSILOXANE COMPLEX
1.85-2.1% platinum concentration in vinylmethylcyclicsiloxanes density: 1.02
catalyst for Si-H addition to olefins - silicone vinyl addition cure catalyst
employed in elevated temperature curing silicones
[73018-55-0] TSCA 2-2-0-X 5.0g / ¥19,400 25g / ¥67,100

SIP6830.3
PLATINUM - DIVINYLTETRAMETHYLDISILOXANE COMPLEX
3-3.5% platinum concentration in vinyl terminated polydimethylsiloxane, neutral density: 0.98
catalyst for Si-H addition to olefins - silicone vinyl addition cure catalyst
employed in room temperature curing silicones
[68478-92-2] TSCA 2-2-0-X 5.0g / ¥16,400 25g / ¥55,400

SIP6831.2
PLATINUM - DIVINYLTETRAMETHYLDISILOXANE COMPLEX in xylene density: 0.90
2.1-2.4% platinum concentration flashpoint: 38°C (100°F)
"hot" catalyst employed in room temperature curing silicones
[68478-92-2] TSCA 2-3-0-X 5.0g / ¥19,400 25g / ¥67,100

SIP6831.2LC
PLATINUM - DIVINYLTETRAMETHYLDISILOXANE COMPLEX in xylene - LOW COLOR
2.1-2.4% platinum concentration flashpoint: 38°C (100°F) density: 0.90
[68478-92-2] TSCA 2-3-0-X 10.0g / ¥45,900

SIP6832.2
PLATINUM - CYCLOVINYLMETHYLSILOXANE COMPLEX
2-2.5% platinum concentration in cyclic methylvinylsiloxanes, neutral density: 1.02
catalyst for Si-H addition to olefins - silicone vinyl addition cure catalyst
employed in moderate elevated temperature curing silicones
[68585-32-0] TSCA 2-2-0-X 5.0g / ¥18,000 25g / ¥59,100

SIP6833.2
PLATINUM-OCTANALDEHYDE/OCTANOL COMPLEX density: 0.84
2.0-2.5% platinum concentration in octanol
catalyst for Si-H addition to olefins - silicone vinyl addition cure catalyst
increases flammability resistance of silicones
[68412-56-6] TSCA 2-3-0-X 5.0g / ¥15,100 25g / ¥50,100

INRH078
TRIS(DIBUTYLSULFIDE)RHODIUM TRICHLORIDE
3.0-3.5% rhodium concentration in toluene density: 0.91
catalyst for Si-H addition to olefins - silicone vinyl addition cure catalyst, less susceptible to inhibition
employed in moderately elevated temperature curing silicones
[55425-73-5] TSCA HMIS: 3-4-0-X 5.0g / ¥28,500 25g / ¥101,000

Poisons for platinum catalysts used in vinyl-addition crosslinking must be avoided. Examples are:
- Sulfur compounds (mercaptans, sulfates, sulfides, sulfites, thiols and rubbers vulcanized with sulfur will inhibit contacting surfaces)
- Nitrogen compounds (amides, amines, imides, nitriles)
- Tin compounds (condensation-cure silicones, stabilized PVC)

Modifiers for Vinyl Addition Silicones

The following are the most common materials employed to modify aspects of platinum-cured vinyl-addition silicones. Other materials are found in the Silicon Compounds section.

Inhibitors and Moderators of Hydrosilylation

Product Code	M.W.	b.p.	density	R.I.
SID4613.0				
1,3-DIVINYLTETRAMETHYLDISILOXANE	186.40	139°	0.811	1.4123
$C_8H_{18}OSi_2$	TOXICITY- orl rat, LD50 >12,500mg/kg			
	flashpoint: 24°C(76°F)			
[2627-95-4] TSCA HMIS: 2-4-0-X	50g / ¥6,000			2kg / ¥110,000
SIT7900.0				
1,3,5,7-TETRAVINYL-1,3,5,7-TETRA-METHYLCYCLOTETRASILOXANE	344.66	110°/10 (-43°)mp	0.998	1.4342
$C_{12}H_{24}O_4Si_4$	flashpoint: 112°C (234°F)			
[2554-06-5] TSCA HMIS: 2-1-0-X	25g / ¥7,600			2kg / ¥112,100

Adhesion Promoters

Product Code	M.W.	b.p.	density	R.I.
SIA0540.0				
ALLYLTRIMETHOXYSILANE	162.26	146-8°	0.963^{25}	1.4036^{25}
$C_6H_{14}O_3Si$	flashpoint: 46°C(115°F)			
[2551-83-9] TSCA HMIS: 3-2-1-X	10g / ¥10,900			50g / ¥33,200

Special Crosslinkers

Product Code	M.W.	b.p.	density	R.I.
SIP6826.0				
PHENYLTRIS(DIMETHYLSILOXY)SILANE	330.68	91°/2	0.942	1.440^{25}
$C_{10}H_{26}O_3Si_4$	flashpoint: 87°C(190°F)			
crosslinker for medium refractive index vinyl addition silicone elastomers				
[18027-45-7] TSCA HMIS: 2-1-1-X	25g / ¥13,000			2kg / ¥203,000
SIT7278.0				
TETRAKIS(DIMETHYLSILOXY)SILANE	328.73	188-90°	0.886	1.3841
$C_8H_{28}O_4Si_5$	flashpoint: 67°C(153°F)			
crosslinker for Pt cure 2-component RTVs				
[17802-47-2] TSCA HMIS: 2-2-1-X	25g / ¥14,100			100g / ¥37,900
SIT8372.4				
TRIFLUOROPROPYLTRIS(DIMETHYLSILOXY)-SILANE	350.63	98-9°/40	0.962	1.3753
$C_9H_{25}F_3O_3Si_4$				
[3410-32-0] TSCA HMIS: 2-2-0-X	25g / ¥24,100			

Diluent Fluids for Gel Hardness and Tactile Response

Product Code		
DMS-T31		
polyDIMETHYLSILOXANE, 1000 cSt.	100g / ¥6,400	3kg / ¥39,300
ALT-143		
polyOCTYLMETHYLSILOXANE, 600-1000 cSt.	100g / ¥7,400	1kg / ¥35,000

Crosslinking Agents for Condensation Cure Silicones

Acetoxy Crosslinkers

Code M.W. density

SID2790.0
DI-t-BUTOXYDIACETOXYSILANE, tech-96 292.40 1.0196
SILICON DI-t-BUTOXIDE DIACETATE (-4°)mp
$C_{12}H_{24}O_6Si$ flashpoint: 95°C (203°F)
adhesion promoter for silicone RTVs
[13170-23-5] TSCA HMIS: 3-2-2-X 50g / ¥9,000 3kg / ¥68,700

SIE4899.0
ETHYLTRIACETOXYSILANE 243.28 1.143
$C_8H_{14}O_6Si$ (7-9°)mp
flashpoint: 106°C(223°F)
liquid crosslinker for silicone RTVs
[17689-77-9] TSCA HMIS: 3-1-1-X 25g / ¥3,400 2kg / ¥48,000

SIM6519.0
METHYLTRIACETOXYSILANE, 95% 220.25 1.175
$C_7H_{12}O_6Si$ (40°)mp
vapor pressure, 94°: 9mm flashpoint: 85°C(185°F)
most common cross-linker for condensation cure silicone RTVs
[4253-34-3] TSCA HMIS: 3-2-1-X 50g / ¥4,000 2kg / ¥62,000

SIM6519.2
METHYLTRIACETOXYSILANE-
ETHYLTRIACETOXYSILANE 80:20 BLEND
liquid crosslinker blend for silicone RTVs
[4253-34-3] 100g / ¥10,100 1kg / ¥53,100

SIV9098.0
VINYLTRIACETOXYSILANE 232.26 1.167
$C_8H_{12}O_6Si$ flashpoint: 88°C (190°F)
[4130-08-9] TSCA HMIS: 3-2-1-X 100g / ¥5,600 2kg / ¥55,000

Alkoxy Crosslinkers

SIB1817.0
BIS(TRIETHOXYSILYL)ETHANE 354.59 0.957
HEXAETHOXYDISILETHYLENE
$C_{14}H_{34}O_6Si_2$
additive to formulations that enhances adhesion
[16068-37-4] TSCA HMIS: 3-1-1-X 25g / ¥7,400 2kg / ¥104,100

SIM6555.0
METHYLTRIETHOXYSILANE 178.30 0.8948
$C_7H_{18}O_3Si$ TOXICITY- oral rat, LD50: 12,500mg/kg
[2031-67-6] TSCA HMIS: 1-3-1-X 25g / ¥3,400
2kg / ¥35,000

SIM6560.0
METHYLTRIMETHOXYSILANE 136.22 0.955
$C_4H_{12}O_3Si$ (-78°)mp
TOXICITY- oral rat, LD50: 12,500mg/kg
viscosity: 0.50 cSt flashpoint: 8°C(46°F)
[1185-55-3] TSCA HMIS: 3-4-1-X 25g / ¥3,400 2kg / ¥22,000

Code M.W. density

SIT7110.0
TETRAETHOXYSILANE, 98% 208.33 0.9335
TETRAETHYLORTHOSILICATE TEOS (-77°)mp
$C_8H_{20}O_4Si$ TOXICITY - oral rat, LD50: 6270mg/kg
flashpoint 46°C (116°F)
vapor pressure, 20°: 11.8mm viscosity: 0.8 cSt
[78-10-4] TSCA HMIS: 2-1-1-X 100g / ¥3,400 3kg / ¥17,000

SIT7777.0
TETRA-n-PROPOXYSILANE 264.44 0.9158
$C_{12}H_{28}O_4Si$ (<-80°)mp
flashpoint: 95°C (203°F) viscosity: 1.66 cSt
[682-01-9] TSCA HMIS: 2-2-1-X 100g / ¥7,200 2kg / ¥41,000

SIV9220.0
VINYLTRIMETHOXYSILANE 148.23 123° 0.970
$C_5H_{12}O_3Si$ TOXICITY- oral rat, LD50: 11,300mg/kg
viscosity: 0.6 cSt flashpoint: 28°C (82°F)
[2768-02-7] TSCA HMIS: 3-4-1-X 25g / inquire 2kg / inquire

Oxime Crosslinkers

SIM6590.0
METHYLTRIS(METHYLETHYLKETOXIMINO) SILANE, tech-95
METHYLTRIS(2-BUTANONEOXINO)SILANE 301.46 0.982
$C_{13}H_{27}N_3O_3Si$ TOXICITY- oral rat, LD50: 2000-3000mg/kg
flashpoint: 90°C (194°F)
neutral crosslinker for condensation cure silicones
[22984-54-9] TSCA HMIS: 2-2-1-X 100g / ¥7,700 2kg / ¥48,500

SIV9280.0
VINYLTRIS(METHYLETHYLKETOXIMINO) SILANE, tech-95
$C_{14}H_{27}N_3O_3Si$ 313.47 0.982
[2224-33-1] TSCA HMIS: 3-3-1-X 50g / ¥7,700 2kg / ¥56,400

Enoxy (Acetone) Crosslinkers

SIV9209.0
VINYLTRIISOPROPENOXYSILANE, tech-95 226.35 0.926
$C_{11}H_{18}O_3Si$
[15332-99-7] TSCA HMIS: 3-1-1-X 25g / ¥8,500 100g / ¥19,900

Amino and Benzamido Crosslinkers

SIB1610.0
BIS(N-METHYLBENZAMIDO)ETHOXYMETHYL- 356.50
SILANE, tech-90
$C_{19}H_{24}N_2O_3Si$
[16230-35-6] TSCA HMIS: 2-1-1-X 25g / ¥10,600 100g / ¥26,800

SIT8710.0
TRIS(CYCLOHEXYLAMINO)METHYLSILANE, tech-95 337.62
$C_{19}H_{39}N_3Si$ flashpoint: 72°C(161°F)
[15901-40-3] TSCA HMIS: 3-2-1-X 25g / ¥18,300 100g / ¥51,700

Tin Catalysts for Silicone Condensation Cure

name | M.W. | d^{20}

SNB1100
BIS(2-ETHYLHEXANOATE)TIN tech-95 405.11 1.28
TIN II OCTOATE contains free 2-ethylhexanoic acid
$C_{16}H_{30}O_4Sn$ TOXICITY - orl rat, LD50: 5,810 mg/kg
catalyst for two-component condensation RTVs
highest activity, short pot life,
does not cause silicone reversion
use level: 0.1-0.3%
[301-10-0] TSCA HMIS: 2-1-1-X 100g / ¥7,500 2.5kg / ¥34,000

SNB1101
BIS(2-ETHYLHEXANOATE)TIN, 50% 405.11 1.12
in polydimethylsiloxane *TIN II OCTOATE*
$C_{16}H_{30}O_4Sn$
predilution results in better compatibility with silicones
[301-10-0] TSCA HMIS: 2-1-1-X 100g / ¥7,000 1kg / ¥23,500

SNB1710
BIS(NEODECANOATE)TIN tech-90 461.23 1.16
TIN II NEODECANOATE contains free neodecanoic acid
$C_{20}H_{38}O_4Sn$ dark viscous liquid
catalyst for two-component condensation RTVs
slower than SNB1100
does not cause reversion
use level: 0.2-0.4%
[49556-16-3] TSCA HMIS: 2-1-0-X 50g / ¥9,300 250g / ¥23,500

SND2930
DI-n-BUTYLBIS(2-ETHYLHEXYLMALEATE)TIN, tech-95 687.46 1.145
DIBUTYLTIN DIISOOCTYLMALEATE
$C_{32}H_{56}O_8Sn$
catalyst for one-component RTVs
good adhesion to metal substrates
[25168-21-2] TSCA HMIS: 2-2-0-X 50g / ¥7,000 250g / ¥14,500

SND2950
DI-n-BUTYLBIS(2,4-PENTANEDIONATE)TIN, tech-95 431.13 1.2
$C_{18}H_{32}O_4Sn$ flashpoint: 91°C (196°F)
stable tin^{+4} catalyst with reduced reversion
can be used in conjunction with SND3260
catalyst in silicone RTV cures[1,2].
1. T. Lockhardt et al, US Pat. 4,517,337, **1985**
2. J. Wengrovius, US Pat. 4,788, 170, **1988**
[22673-19-4] TSCA HMIS: 2-2-1-X 25g / ¥7,000 2kg / ¥44,500

SND3110
DI-n-BUTYLBUTOXYCHLOROTIN, tech-95 341.48
$C_{12}H_{27}ClOSn$
catalyst for two-component condensation cure silicone RTVs.[1]
1. Chadho, R.; et al, US Pat. 3,574,785, **1971**
[14254-22-9] TSCA HMIS: 3-2-1-X 25g / ¥11,000 100g / ¥25,500

name | M.W. | d^{20}

SND3160
DI-n-BUTYLDIACETOXYTIN, tech-95 351.01 1.320
DIBUTYLTINDIACETATE (-10°)mp
$C_{12}H_{24}O_4Sn$ TOXICITY - oral mus, LD50: 109.7mg/kg
flashpoint: 143°C (290°F)
high activity catalyst for one-component condensation RTVs
suitable for acetoxy cure and neutral alkoxy cure
use level 0.1-0.3%
[1067-33-0] TSCA HMIS: 3-1-1-X 25g / ¥7,000 2.5kg / ¥54,000

SND3260
DI-n-BUTYLDILAURYLTIN, tech-95 631.55 1.066
DIBUTYLTIN DILAURATE
TOXICITY-orl rat, LD50: 175-1600mg/kg
$C_{32}H_{64}O_4Sn$ flashpoint: 231°C (448°F)
viscosity, 25°: 31-4 cSt
widely used catalyst for two-component condensation RTVs
moderate activity, longer pot life, employed in silicone emulsions
FDA allowance as curing catalyst for silicones- 21CFR121.2514
use level: 0.2-0.6%
[77-58-7] TSCA HMIS: 2-1-1-X 100g / ¥7,500 2.5kg / ¥36,500

SND4220
DIMETHYLDINEODECANOATETIN, tech-95 491.26 1.136
DIMETHYLTIN DINEODECANOATE
TOXICITY- oral rat, LD50: 1470mg/kg
$C_{22}H_{44}O_4Sn$ flashpoint: 153°C (307°F)
catalyst for one- and two-component condensation RTVs
use level: 0.5-0.8%
[68928-76-7] TSCA HMIS: 2-1-0-X 50g / ¥7,500 250g / ¥15,500

SND4240
DIMETHYLHYDROXY(OLEATE)TIN, 85% 447.23 1.15
$C_{20}H_{40}O_3Sn$ viscous liquid
TOXICITY - oral rat, LD50: 800mg/kg
elevated temperature catalyst for condensation cure silicones
use level: 0.8-1.2%
[43136-18-1] TSCA HMIS: 2-1-0-X 25g / ¥7,500 100g / ¥14,500

SND4430
DIOCTYLDILAURYLTIN tech-95 743.76 0.998
DIOCTYLTINDILAURATE
TOXICITY - oral rat, LD50: 6450mg/kg
$C_{40}H_{80}O_4Sn$ flashpoint: 70°C (158°F)
low toxicity tin catalyst
moderate activity, longer pot life
applications in silicone emulsions and solvent based adhesives
use level: 0.8-1.3%
[3648-18-8] TSCA HMIS: 2-2-1-X 25g / ¥7,000 2kg / inquire

SNT7955
TIN II OLEATE, tech-90 681.61 1.06
$C_{36}H_{66}O_4Sn$ contains free oleic acid
[1912-84-1] HMIS: 2-1-0-X 100g / ¥16,500

Titanate Catalysts for Alkoxy and Oxime Neutral Cure RTVs

name	MW	b.p./mm(m.p.)	d^{20}	n^{20}

AKT853
TITANIUM DI-n-BUTOXIDE (BIS-2,4-PENTANEDIONATE) — 392.32 — d^{20} 1.085
flashpoint: >110°C(230°F)
$C_{18}H_{32}O_6Ti$
[16902-59-3] TSCA HMIS: 2-3-1-X — 100g / ¥12,000 — 500g / ¥34,500

AKT855
TITANIUM DIISOPROPOXIDE(BIS-2,4-PENTANEDIONATE), 75% in isopropanol — 364.26 — d^{20} 0.992 — n^{20} 1.4935
TOXICITY- oral rat, LD50: 2,870mg/kg
$C_{16}H_{28}O_6Ti$ *TIACA*
flashpoint: 12°C (54°F)
miscible: aqueous acetone, most organics
viscosity, 25°: 8-11 cSt
[17927-72-9] TSCA HMIS: 2-3-1-X — 100g / ¥7,500 — 2kg / ¥25,500

AKT865
TITANIUM DIISOPROPOXIDE BIS(ETHYLACETOACETATE), 95% — 424.33 — d^{20} 1.05
TOXICITY - oral rat, LD50: 23,020 mg/kg
$C_{18}H_{32}O_8Ti$ 11.0 - 11.2% Ti
viscosity, 25°: 45-55 cSt
flashpoint: 27°C (80°F)
[27858-32-8] TSCA HMIS: 2-3-1-X — 100g / ¥8,500 — 500g / ¥20,500

AKT867
TITANIUM 2-ETHYLHEXOXIDE — 564.79 — 194°/0.25 — d^{20} 0.937 — n^{20} 1.482
TETRAOCTYLTITANATE 8.4-8.6% Ti
viscosity, 25°: 120-130 cSt.
$C_{32}H_{68}O_4Ti$
flashpoint: 71°C (160°F)
catalyst for silicone condensation RTVs
[1070-10-6] TSCA HMIS: 2-2-1-X — 100g / ¥7,500 — 2kg / ¥25,500

SIT7305.0
TITANIUM TRIMETHYLSILOXIDE — 404.66 — 110°/10 — d^{20} 0.900 — n^{20} 1.4278
TETRAKIS(TRIMETHYLSILOXY)TITANIUM
flashpoint: 51°C (124°F)
$C_{12}H_{36}O_4Si_4Ti$
[15990-66-6] HMIS: 2-2-1-X — 25g / ¥14,600 — 100g / ¥39,500

Peroxide Catalysts for Heat-Cured Silicone Rubber

SID3352.0
2,4-DICHLOROBENZOYL PEROXIDE, — MW: 380.00 — density: 1.26
50% in polydimethylsiloxane paste consistency
silicone compounding temp. <50°; cure temp. >90°; recommended cure temp: 105-120°
[133-14-2] TSCA HMIS: 3-4-1 — 100g / ¥13,300 — 500g / ¥43,800

SID3379.0
DICUMYL PEROXIDE, 25% — MW: 270.36
in polydimethylsiloxane, 40% w/ calcium carbonate, 35%
silicone compounding temp. <60°; cure temp. >125°; recommended cure temp: 155-175°
$C_{18}H_{22}O_2$
[80-43-3] TSCA HMIS: 2-3-2-X — 100g / ¥13,800 — 500g / ¥45,900

Pigments and Coloration

Pigment concentrates in silicone oil are readily dispersed in all silicone cure systems. Pigments are generally mixed at 1-4 parts per hundred with the A part of two part vinyl addition silicones. Silicone coatings generally employ 2-6 parts per hundred.

Pigment Concentrates (dispersed in silicone)

Code	Color	Concentration	Pigment Type	Price/100g	Price/1kg
PGWHT01	White	45%	titanium dioxide	¥12,700	¥61,600
PGRED01	Red	50%	cadmium sulfoselenide	¥12,700	¥61,600
PGORR01	Orange-Red	45%	iron oxide	¥12,700	¥61,600
PGORA01	Orange	15-25%	diarylide pyrazolone	¥12,700	¥61,600
PGYLW01	Yellow	55%	bismuth vanadate	¥12,700	¥61,600
PGGRN01	Green	30-40%	cobalt titanate	¥12,700	¥61,600
PGBLU01	Blue	45%	sodium aluminosulfosilicate	¥12,700	¥61,600
PGFLS01	Beige	50-60%	mixed Fe-Mg-Ti oxides	¥12,700	¥61,600
PGBRN01	Brown	55%	mixed Fe-Cr-Cu oxides	¥12,700	¥61,600
PGBLK01	Black - nonconductive	55%	manganese ferrite	¥12,700	¥61,600
PGBLK02	Black - conductive	45%	carbon	¥12,700	¥61,600
PGXRA01	X-Ray Opaque	35%	barium sulfate	¥12,700	¥61,600

Dyes in silicone oils provide coloration without compromising transparency. The fluids may be used directly in applications such as gauges or as tints for silicone elastomers.

DMS-T21BLU (Blue dye in 100cSt. silicone)	100g / ¥8,800	1kg / ¥25,800
DMS-T21RED (Red dye in 100cSt. silicone)	100g / ¥8,800	1kg / ¥25,800

Fillers and Reinforcements

Hexamethyldisilazane treated silica is the preferred filler for silicones. The material is very fine and hydrophobic. Enclosed high-shear compounding equipment is required for adequate dispersion.

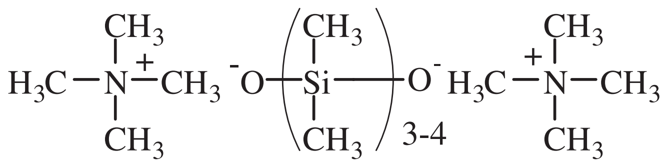
Product Code | M.W. | density

SIC2050.0
CALCIUM METASILICATE — 116.16 — 2.69
WOLLASTONITE — hardness: 4.5-5
CaO_3Si
weakly reinforcing filler for silicone rubbers- suitable for putty
[13983-17-0] TSCA HMIS: 1-0-0-X — 500g / ¥7,400 — 2.5kg / ¥17,400

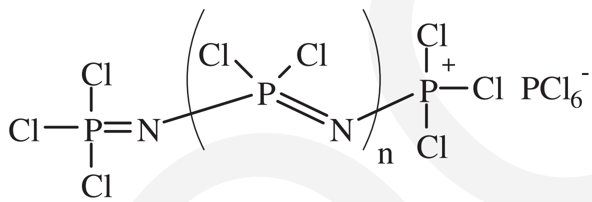
SIS6962.0
SILICON DIOXIDE, AMORPHOUS — 60.09 — 2.2
HEXAMETHYLDISILAZANE TREATED
FUMED SILICA, HMDZ TREATED — surface area, 150-200m^2/g
SiO_2 ultimate article size: 0.02m
reinforcing filler for high tear strength silicone rubbers
[168909-20-6]/[7631-86-9] TSCA HMIS: 2-0-0-X — 500g / ¥17,300 — 2kg / ¥50,000

SIS6964.0
SILICON DIOXIDE, CRYSTALLINE — 60.09 — 2.65
QUARTZ POWDER — TOXICITY- oral- rat, LD50: 3160mg/kg
SiO_2 hardness: 7.0
[7631-86-9] TSCA HMIS: 1-0-0-X — 500g / ¥7,200 — 10kg / ¥47,000

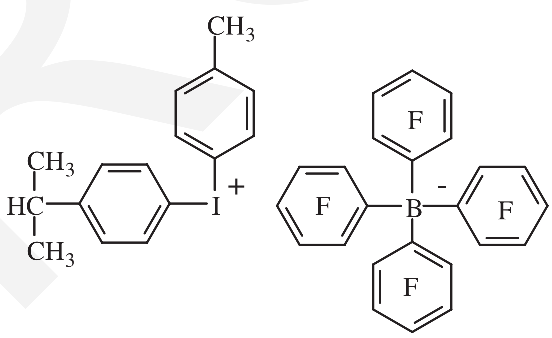
Polymerization Catalysts



SIT7520.0
TETRAMETHYLAMMONIUM SILOXANOLATE density: 0.98
1.5-2.0% nitrogen as endcapped polydimethylsiloxane
catylyst for ring opening polymerization of cyclic siloxanes at 85-100°;
decomposes >120°C with release of trimethylamine
[68440-88-0] TSCA HMIS: 3-3-1-X 25g / ¥12,500 100g / ¥32,600



INPH055
POLYPHOSPHONITRILIC CHLORIDE, 95% mp 60-80°
$Cl_3(NPCl_2)_nNOCl_3 \cdot PCl_6$
for silanol oligomer polymerization[1,2,3]
1. Nitzsche, S.; et al, US Pat. 3,839,388, **1974**
2. Nye, S.; et al, US Pat. 5,753,751, **1988**
3. Dittrich, U.; et al, US Pat. 5,919,883, **1999**
[31550-05-7] HMIS: 3-1-1-X 10g / ¥35,500



OMBO037
(p-ISOPROPYLPHENYL)(p-METHYLPHENYL)-
IODONIUM TETRAKIS(PENTAFLUOROPHENYL) BORATE mp 120-133°
UV initiator for cationic polymerizations, e.g. cycloaliphatic epoxides
[178233-72-2] TSCA HMIS: 2-1-0-X 5g / ¥16,500 25g / ¥52,500

Product Code Definitions for Reactive Fluids

Note: All comonomer % are in mole %
All block copolymer % are in weight %

3 Character Suffix for Functional Termination 4 Character Suffix for Functional Copolymers

Prefix:
DMS = DiMethylSiloxane

Suffix:
1st character describes termination
A = Amino
B = CarBoxy
C = Carbinol
D = Diacetoxy
E = Epoxy
F = TriFluoropropyl
H = Hydride
I = Isocyanate
K = Chlorine (hydrolyzeable)
L = ChLorine (non-hydrolyzeable)
M = Methyl
N = DimethylamiNe
R = MethacRylate
S = Mercapto
T = Trimethylsily
U = Acrylate (UV) or UV stabilizer
V = Vinyl
X = MethoXy or EthoXy
Y = Polar Aprotic (cYano, pYrrolidone)
Z = Anhydride

2nd character = viscosity in decades, i.e. 10x
3rd character = viscosity to 1 significant figure

Example: DMS-V41

Prefix = DMS = DiMethylSiloxane
Suffix = V41 = Vinyl Terminated (104 x 1) cSt
or Vinyl Terminated polyDimethylsiloxane, 10,000 cSt

Prefix:
1st character describes non-methyl substitution

A = Amino
C = Carbinol
D = Dimethyl
E = Epoxy
EC = Epoxy Cyclohexy
F = TriFluoropropyl
H = Hydride
L = ChLorine (non-hydrolyzeable)
M = Methyl
P = Phenyl
R = MethacRylate
S = Mercapto
U = Acrylate (UV) or UV stabilizer
V = Vinyl
X = MethoXy or EthoXy
Y = Polar Aprotic (cYano, pYrrolidone)
Z = Anhydride

2nd character = substitution type for 1st digit
B = Block
D = Difunctional
M = Monofunctional
3rd character = termination type including block
E = Ethylene oxide block
P = Propylene oxide block
S = Silanol
V = Vinyl

Suffix:
1st 2 characters = mole % non-dimethyl monomer

3rd character = viscosity in decades, i.e. 10x
4th character = viscosity to 1 significant figure

Example: PDS – 1615
Prefix = PDS P = Phenyl
D = Di (i.e. Diphenyl)
S = Silanol
Suffix = 1615 1st 2 digits = 16%
2nd 2 digits = (10 1 x 5) cSt
or 16% Diphenylsiloxane-Dimethylsiloxane

Silicones Product Code Index

Reactive	DMS-NB25 - DMS-NB32	Bicycloheptenyl terminated polydimethylsiloxane	522
Inert	DMS-NL04	Limonenyltrisiloxane	484
Reactive	DMS-R05 - DMS-R31	polyDimethylsiloxane, methacryloxypropyl terminated	520
Reactive	DMS-S12 - DMS-S51	polyDimethylsiloxane, silanol terminated	509
Reactive	DMS-S33M50	polyDimethylsiloxane, silanol terminated - emulsion	533
Reactive	DMS-SM21	polyDimethylsiloxane, mercaptopropyl terminated	524
Inert	DMS-T00 - DMS-T72	polyDimethylsiloxane, trimethylsiloxy terminated	466
Inert	DMS-T07R - DMS-T31R	polyDimethylsiloxanes, reduced volatility	472
Inert	DMS-T21M50 - DMST51M35	polyDimethylsiloxane emulsions	473
Inert	DMS-T23E - DMS-T41.2E	polyDimethylsiloxanes, extreme low volatility	472
Reactive	DMS-U21	polyDimethylsiloxane, 3-acryloxy-2-hydroxypropyl terminated	521
Reactive	DMS-V00 - DMS-V52	polyDimethylsiloxane, vinyl terminated	495
Reactive	DMS-Vm31 - DMS-Vm35	polyDimethylsiloxane, vinyl terminated; mono disperse	495, 526
Reactive	DMS-V25R - DMS-V35R	polyDimethylsiloxane, vinyl terminated, reduced volatility	495
Reactive	DMS-V31S15	polyDimethylsiloxane, vinyl terminated - silica reinforced	495
Reactive	DMS-XE11	polyDimethylsiloxane, ethoxy terminated	525
Reactive	DMS-XM11	polyDimethylsiloxane, methoxy terminated	525
Reactive	DMS-XT11	polyDimethylsiloxane, triethoxysilylethyl terminated	525
Reactive	DMS-Z21	polyDimethylsiloxane, anhydride terminated	523
Reactive	EBP-234	(Epoxycyclohexylethyl)Methylsiloxane-MethoxypolyethyleneoxypropylMethylsiloxane-	517
Reactive	ECMS-127 - ECMS-424	EpoxycyclohexylethylMethylsiloxane - Dimethylsiloxane copolymer	517
Reactive	EDV-2022	DiEthylsiloxane-Dimethylsiloxane, vinyl terminated	497
Reactive	EMS-622	Epoxypropoxypropylmethylsiloxane - Dimethylsiloxane copolymer	516
Inert	FMS-121 - FMS-141	polyTrifluoropropylmethylsiloxane homopolymers	478
Inert	FMS-221 - FMS-222R - FMS411	Trifluoropropylmethylsiloxane-Dimethylsiloxane copolymer	478
Inert	FMS-736	TridecafluorooctylMethylsiloxane-Dimethylsiloxane copolymer	478
Reactive	FMS-9921-FMS-9922	polyTrifluoropropylmethylsiloxane, silanol terminated	510
Reactive	FMS-K11	polyNonafluorohexylmethylsiloxane - Dimethylsiloxane copolymer, chlorine terminated	525
Reactive	FMV-4035 - FMV-4042	TrifluoropropylMethylsiloxane-Dimethylsiloxane copolymer, vinyl terminated	496
Reactive	HAM-301	MethylHydrosiloxane-OctylMethylsiloxane copolymer	505
Reactive	HAM-3012	MethylHydrosiloxane-OctylMethylsiloxane - Dimethylsiloxane terpolymer	505
Reactive	HDP-111	poly(DimethylHydrosiloxy)Phenylsiloxane, hydride terminated	506
Reactive	HMS-013 - HMS-501	MethylHydrosiloxane-Dimethylsiloxane copolymers	504
Reactive	HMS-991 - HMS-993	polyMethylHydrosiloxanes, trimethylsiloxy terminated	504
Reactive	HMS-H271 - HMS-HM271	MethylHydrosiloxane-Dimethylsiloxane copolymer, Hydride Terminated	505
Reactive	HPM-502	MethylHydrosiloxane-PhenylMethylsiloxane, hydride terminated	506
Reactive	HQM-105 - HQM-107	Hydride Q Resin	505
Reactive	LMS-152	(Chloropropyl)Methylsiloxane-Dimethylsiloxane copolymer	524
Reactive	MCR-A11 - MFS-M15	Macromers	526-532
Reactive	MCR-A11 - MCR-A12	polyDimethylsiloxane, aminopropyl (mono) terminated	527
Reactive	MCR-B12	polyDimethylsiloxane, carboxylic acid (mono) terminated	529
Reactive	MCR-C12 - MCR-C22	polyDimethylsiloxane, carbinol (mono) terminated	528
Reactive	MCR-C61 - MCR-C62	polyDimethylsiloxane, dicarbinol (mono) terminated	528
Reactive	MCR-E11 - MCR-E21	polyDimethylsiloxane, epoxy (mono) terminated	529
Reactive	MCR-H07 - MCR-H21	polyDimethylsiloxane, hydride (mono) terminated	529
Inert	MCR-NA07	polyDimethylsiloxane, anisyl (mono) terminated	484
Inert	MCR-NL07	MonoLimonenyl terminated Polydimethylsiloxane	484
Reactive	MCR-M07 - MCR-M22	polyDimethylsiloxane, methacryloxypropyl (mono) terminated	531
Reactive	MCR-V21 - MCR-V41	polyDimethylsiloxane, vinyl (mono) terminated	500, 532
Reactive	MCS-C11 - MCS-C13	polyDimethylsiloxane, carbinol (mono) terminated - symmetric	520, 528

Inert	MMA-131	monoHexacosyl terminated Polydimethylsiloxane	476
Inert	MTT-1015	Methylsilsesquioxane-Dimethylsiloxane copolymer	481
Reactive	MTV-112	Methyl T branched polydimethylsiloxane, vinyl terminated	499
Reactive	OMBO037	Photoinitiator	551
Inert	OTT-1012 - OTT-1023	Octyl T-branched silsesquioxane	482
Reactive	PAN-040	poly(Antimony Ethylene Glycoxide)	536
Inert	PDM-0421 - PDM-1922	DiPhenyl-Dimethylsiloxane copolymer	474
Inert	PDM-7040 - PDM-7050	Diffusion Pump Fluids	474
Reactive	PDS-0338 - PDS-1615	DiPhenyl-Dimethylsiloxane copolymer, silanol terminated	510
Reactive	PDS-9931	polyDiphenylsiloxane, silanol terminated	510
Reactive	PDV-0325 - PDV-2335	DiPhenylsiloxane-Dimethylsiloxane copolymer, vinyl terminated	496
Reactive	PGWHT01-PGXRA01	Pigment concentrates in silicone	550
Inert	PMM-0011 - PMM-0025	polyPhenylmethylsiloxanes, trimethylsiloxy terminated	474
Inert	PMM-1015 - PMM-6025	PhenylMethylsiloxane-Dimethylsiloxane copolymer	474
Reactive	PMM-HV12	polyDimethylsiloxane, vinyl (mono) - phenyl (mono) - hydride (mono) terminated	499, 526
Inert	PMP-5025	Phenylmethylsiloxane-DiPhenylsiloxane copolymer	474
Reactive	PMS-E11 - PMS-E15	polyPhenylmethylsiloxane, epoxypropoxypropyl terminated	516
Reactive	PMS-H03 - PMS-H11	PhenylMethylsiloxane, hydride terminated	506
Reactive	PMV-9925	polyPhenylMethylsiloxane homopolymer, vinyl terminated	496
Reactive	PVV-3522	VinylPhenylsiloxane - PhenylMethylsiloxane, VinylPhenylMethyl Terminated	496
Inert	PP1-LUB01	Fluorocarbon-Fluorosilicone Grease	478
Reactive	PSI-021 - PSITI-019	polyDiEthoxysiloxane homopolymers and copolymers	536
Reactive	PSI-026	polyDiMethoxysiloxane homopolymer	536
Reactive	PSIAL-007	polyDiEthoxysiloxane - s-Butylaluminate copolymer	536
Reactive	PSN-2H01.2 - PSN-2M11	polySilazanes	541
Reactive	PSS-1C01 - PSS-1P11	polySilanes	541
Reactive	PTI-008 - PTI-023	polyAlkoxytitanate polymers and copolymers	536
Inert	PTT-1012 - PTT-1025	Phenyl T-branched silsesquioxane	482
Inert	PTT-1117	Tetrachlorophenylsilsesquioxane-Dimethylsiloxane copolymer	474,482
Reactive	RMS-033 - RMS-083	(Methacryloxypropyl)Methylsiloxane-Dimethylsiloxane copolymer	522
Reactive	RTT-1011	Methacryloxypropylsilsesquioxane-Dimethylsiloxane copolymer	522
Reactive	SIB1660.0 - SIB1824.82	Silicone-Organic Hybrids with Hydrolyzable Functionality	542
Inert	SIB1816.0	1,3-Bis(Tridecafluorooctyl)Tetramethyldisiloxane	478
Inert	SID2650.0 - SIO6700.0	Volatile Cyclic Dimethylsiloxanes	472
Reactive	SID3352.0 - SID3379.0	Peroxide catalysts dispersed in silicone	549
Reactive	SIP6829.2 - SIP6833.2	Platinum catalysts	545
Reactive	SMS-022 - SMS-992	(Mercaptopropyl)Methylsiloxane-Dimethylsiloxane copolymer	524
Reactive	SNB1100 - SNT7955	Tin catalysts	548
Reactive	SQD-225 - SQT-221	Silanol-Trimethylsilyl Modified Q resins	510
Reactive	SSP-040	polyBoroDiPhenylsiloxane	544
Reactive	SSP-050	polyEthylene, trimethoxysilyl modified	543
Reactive	SSP-055 - SSP-056	poly1,2-Butadiene, triethoxysilyl modified	543
Reactive	SSP-058	poly1,2-Butadiene, diethoxymethylsilyl modified	543
Reactive	SSP-060	polyEthyleneimine, trimethoxysilylpropyl modified	543
Reactive	SSP-065	polyEthyleneimine, dimethoxymethylsilyl modified	543
Reactive	SSP-070	poly(Trimethylsilylpropyne)	544
Reactive	SSP-080	(Dimethylsiloxane)-(Bisphenol-A carbonate) copolymer	544
Reactive	SSP-085	poly(Dimethylsiloxane)Etherimide copolymer	544
Reactive	SLT-3A101 - SLT-3A802	T-resins (Silsesquioxanes polymers), liquid	538
Reactive	SSP-255	polyTriethoxysilylethylene - 1.4-BUTADIENE - STYRENE terpolymer	543

General Index and Search Functions

An interactive data base with the ability to search by name,
CAS#, Product Code, Structure, Substructure and Empirical formula
is available on the Gelest website: **www.Gelest.com**

An explanation of the website functionality is found on pages 13-15.

Gelest

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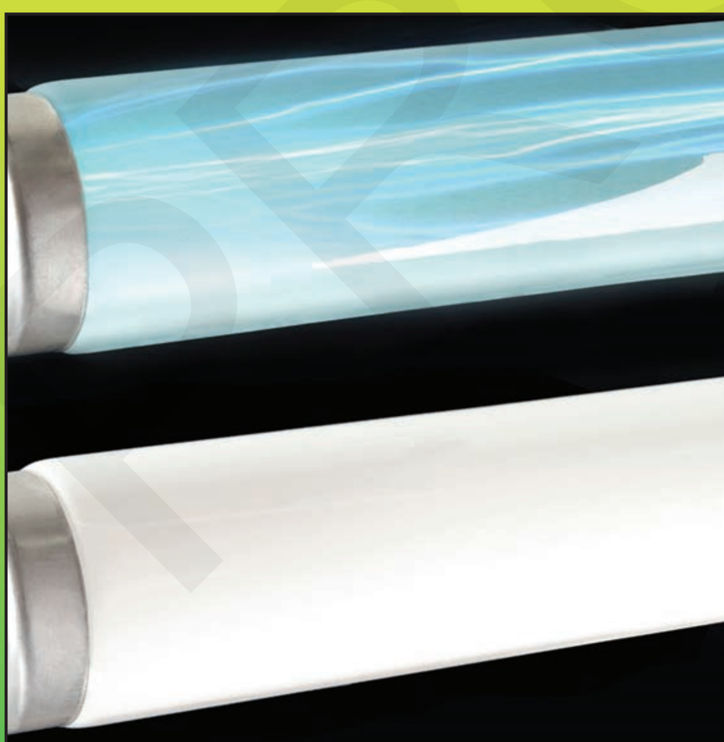
PERFORMANCE PRODUCTS



- *Molecular and Thin Film Coatings*
- *Thick Film Coatings for Thermal, Mechanical and Optical Properties*
- *Clear Gels*
- *Clear Encapsulants*
- *Microfluidic Elastomers*
- *High Strength Encapsulants*

Pt

Gelest

Enabling Your Technology

Performance Products

Contents

Gelest Aquaphobe® CM

Hydrophobic Treatments For Glass and Ceramics

Features: Provides water-repellent silicone, molecular films with high durability for glass and vitreous surfaces. Acidic byproducts remove surface alkali from soda-lime glass substrates.

Applications:

- **Laboratory Glassware** - improves drainage, reduce breakage.
- **Optical Fibers** - reduces moisture adsorption and surface fracture.
- **Clinical Analysis** - reduces protein and lipid adsorption. (Not for food or drug use.)
- **Glass Plate and Glazing** - provides high water contact angle, facilitate forced air blow-off.

Capsular Description:	Thickness	Cure	Hardness	Type
	molecular	air/moisture	low	100% active 1-part

Aquaphobe® CM chlorinated polydimethylsiloxane

Description

Aquaphobe® CM is a chlorine terminated polydimethylsiloxane oligomer. The chlorines react with hydroxy and silanol groups of glass, siliceous surfaces and other metal oxide surfaces to form a chemically bound polydimethylsiloxane "siliconized" surface.

Properties of Treated Surfaces

(Values reported are for glass slides dipped in 1% solutions of Aquaphobe® CM and cured at 100°C.)

Critical Surface Tension

untreated	γc = 78 dynes/cm
treated (hydrophobic)	γc = 25 dynes/cm

Typical Properties of Aquaphobe™ CM

% active	100%
flashpoint	15°C
specific gravity	0.99-1.01
viscosity	3-6 cSt.

Standard Packaging

PP1-AQCM **Aquaphobe® CM**
100g / ¥10,300
1kg / ¥57,900
18kg/commercial package / inquire

Cautions

Aquaphobe® is a mixture of corrosive chlorinated polysiloxanes. Avoid skin and eye contact. Use in a well ventilated area. Wear gloves and safety glasses.

Application Methods

1. Aquaphobe® coatings are most frequently applied as a 2-10% solution in dry solvents such as hexane, methylene chloride or toluene. Articles are dipped or wiped. Articles can be cured by air drying for 24 hours at conditions of <75% relative humidity. Heat curing at 110°C for 15-20 minutes in an exhausted oven provides the most effective surface treatment.
2. A master batch of Aquaphobe® in isopropanol or ethanol is desirable when large areas are to be treated and the acidic byproducts are difficult to handle. A 0.5-2.0% solution in isopropanol is prepared in a well-ventilated area. Hydrogen chloride fumes issue during this stage. Acidic character is reduced for subsequent surface treatment.

Over treatment results in a cloudy surface. The concentration should be reduced to eliminate this effect.

Gelest Aquaphobe® CF

Hydrophobic and Oleophobic Treatments For Glass and Ceramics

Features: Provides water-repellent, fluorinated silicone molecular films with high durability for glass and vitreous surfaces. Acidic byproducts remove surface alkali from soda-lime glass substrates.

Applications:

Microcontact Printing - provides durable release films for photocureable resins.
Optical Fibers - reduces moisture adsorption and surface fracture.
Clinical Analysis - reduces protein and lipid adsorption. (Not for food or drug use.)
Glass Plate and Glazing - provides high water contact angle, facilitate forced air blow-off.

Capsular Description:	Thickness	Cure	Hardness	Type
	molecular	air/moisture	low	100% active 1-part

Aquaphobe® CF chlorinated fluoroalkylmethylsiloxane

Description
Aquaphobe® CF is a chlorine terminated polyfluoroalkyl-methylsiloxane oligomer. The chlorines react with hydroxy and silanol groups of glass, siliceous surfaces and other metal oxide surfaces to form a chemically bound, low surface energy, fluorinated silicone surface.

Properties of Treated Surfaces
(Values reported are for glass slides dipped in 1% solutions of Aquaphobe® CF and cured at 100°C.)

Critical Surface Tension

untreated	γc = 78 dynes/cm
treated (hydrophobic)	γc = 16-19 dynes/cm

Typical Properties of Aquaphobe® CF

% active	100%
flashpoint	65°C
specific gravity	1.40-1.43
refractive index	1.358
viscosity	6-10 cSt.

Application and Reference Data:
J. Taniguchi et al, *Jpn. Soc. Appl. Phys.* **2002**, *41*, 4194, Part 1, No. 6B.

Standard Packaging

PP1-AQCF **Aquaphobe® CF**
25g / ¥25,200
100g / ¥73,700

Cautions

Aquaphobe® is a mixture of corrosive chlorinated polysiloxanes. Avoid skin and eye contact. Use in a well ventilated area. Wear gloves and safety glasses.

Application Methods

1. Aquaphobe® coatings are most frequently applied as a 2-10% solution in dry solvents such as hexane, methylene chloride or toluene. Articles are dipped or wiped. Articles can be cured by air drying for 24 hours at conditions of <75% relative humidity. Heat curing at 110°C for 15-20 minutes in an exhausted oven provides the most effective surface treatment.
2. A master batch of Aquaphobe® in isopropanol or ethanol is desirable when large areas are to be treated and the acidic byproducts are difficult to handle. A 0.5-2.0% solution in isopropanol is prepared in a well-ventilated area. Hydrogen chloride fumes issue during this stage. Acidic character is reduced for subsequent surface treatment.

Over treatment results in a cloudy surface. The concentration should be reduced to eliminate this effect.

Gelest Glassclad®18

Hydrophobic Water-Dispersible Coatings For Glass and Ceramics

Features: Provides water-repellency, lubricity, surface resistivity to glass and vitreous surfaces.

Applications:

- **Laboratory Glassware** - improves drainage, reduces breakage.
- **Optical Fibers** - provides lubricity and reduces breakage during fabrication and operational flexing.
- **Clinical Analysis** - decreases protein adsorption of analytical and diagnostic equipment, decreases hemolysis and increases clotting time of blood. Glassclad®18 is not for food or drug use.
- **Fluorescent Light Bulbs** - increases scratch resistance, reducing breakage, increases surface resistivity.
- **Porcelain Ware** - provides a glide surface and reduces adhesion to other porcelain ware.

Capsular Description:	Thickness	Cure	Hardness	Type
	molecular	air/moisture	low	solvent-borne 1-part

Glassclad®18 Hydrophobic Coating

Description
Glassclad®18 is a monomeric octadecylsilane derivative in a mixture of t-butanol and diacetone alcohol that reacts with water to form a silanol-rich prepolymer. The silanol-rich prepolymer condenses with available hydroxyl groups of siliceous substrates to form a chemically bound alkylsilicone.

Properties of Treated Surfaces
Values reported are for glass slides dipped in 1% solutions of Glassclad®18 and cured 5 minutes at 100°C.

Critical Surface Tension	
untreated	γc = 78 dynes/cm
treated (hydrophobic)	γc = 31 dynes/cm
Surface Resistivity	
untreated	1×10^{12} ohms
treated	1.2×10^{13} ohms
Coefficient of Friction, Static (glass slide on glass slide)	
untreated	0.9-1.0
treated	0.2-0.3
Blood Protein Adsorption (comparative 100 hour adsorption value for whole human blood on borosilicate glass surfaces)	
untreated	0.13mg/mm^2
treated	0.01-0.02mg/mm^2

Solution Properties of Glassclad®18

solids	20%
color, gardner scale	8
specific gravity	0.88
flashpoint	10°C
viscosity	8-20 cSt.
pour point	4°C

Application and Reference Data:
B. Arkles et al in "Silanes, Surfaces, Interfaces" D. Leyden ed, Gorden & Breach, **1986**, p91.

Shelf Life of Glassclad®18
The shelf life of Glassclad®18 is six months in sealed containers. The product is normally hazy. A small amount of precipitate does not affect the performance of the solution.

Standard Packaging

PP1-GC18 Glassclad®18
100g / ¥8,800
1.5kg / ¥51,100
15kg/commercial package / ¥206,000
180kg/commercial package / inquire

Application Methods
Glassclad®18 is most frequently used as a dilute aqueous dispersion containing 0.1-1.0% of reactive silane. A 0.2% solution of active chemical can be easily prepared by adding one part by weight of the product as supplied to 99 parts of water while stirring. The following treatment method is frequently employed.
1. Thoroughly clean objects with an alkaline detergent. Used or old glass surfaces may require immersion in 2-3% sodium hydroxide. All detergent and alkali should be removed with a final rinse.
2. Prepare a 1% solution of Glassclad®18 in water. Ordinary tap water is acceptable. "Hard water" or "fluoridated water," is not acceptable.
3. Immerse the glass or vitreous surface in the solution for 5-10 seconds, ensuring that all surfaces are wetted by the solution. Agitation of the solution or the object generally results in more uniform deposition. After immersion, remove the part and gently but thoroughly rinse with water to remove excess Glassclad®18 from the surface.
4. Cure Glassclad®18 by bringing surface temperature to 100°C for 3-5 minutes. Room temperature cure may be accomplished by air drying for 24 hours if relative humidity is 65% or less.

Each liter of solution will coat approximately 80 one liter beakers, 600 15cm test tubes, or approximately 250 m^2 of surface.

Stability of Glassclad®18 Solutions
Aqueous solutions are not stable and will turn cloudy and precipitate after standing for several days. The solution stability can be optimized by adjusting pH to 4.5-5.

Gelest Siliclad®

Hydrophobic Water-Dispersible Coatings For Glass and Ceramics

Features: Provides water-repellency, lubricity, surface resistivity to glass and vitreous surfaces.

Applications:

Semiconductor Substrates - provides hydrophobic anti-stiction coatings for silicon.
Laboratory Glassware - improves drainage, reduces breakage.
Optical Fibers - provides lubricity and reduces breakage during fabrication and operational flexing.
Clinical Analysis - decreases protein adsorption of analytical and diagnostic equipment decreases hemolysis and increases clotting time of blood. Siliclad® is not for food or drug use.
Porcelain Ware - provides a glide surface and reduces adhesion to other porcelain ware.

Capsular Description:	Thickness	Cure	Hardness	Type
	molecular	air/moisture	low	solvent-borne 1-part

Siliclad® Hydrophobic Coating

Description
Siliclad® is a monomeric octadecylsilane derivative in a mixture of tertiary alcohols and diacetone alcohol that reacts with water to form a silanol-rich prepolymer. The silanol-rich prepolymer condenses with available hydroxyl groups of siliceous substrates to form a chemically bound alkylsilicone.

Properties of Treated Surfaces
Values reported are for glass slides dipped in 1% solutions of Siliclad® and cured 5 minutes at 100°C.

Critical Surface Tension	
untreated	γc = 78 dynes/cm
treated (hydrophobic)	γc = 31 dynes/cm
Surface Resistivity	
untreated	1 x 10^{12} ohms
treated	1.2 x 10^{13} ohms
Coefficient of Friction, Static (glass slide on glass slide)	
untreated	0.9-1.0
treated	0.2-0.3
Blood Protein Adsorption (comparative 100 hour adsorption value for whole human blood on borosilicate glass surfaces)	
untreated	0.13mg/mm^2
treated	0.01-0.02mg/mm^2

Solution Properties of Siliclad®

solids	20%
color, gardner scale	7
specific gravity	0.88
flashpoint	25°C
viscosity	8-20 cSt.

Application and Reference Data:
Almanza-Workman, A. et al. *J. Electrochem. Soc.* **2002** *149*, H6.
Rojas, E. et al. *J. Coll. and Interface Sci.* **2006**, *301*, 617.

Shelf Life of Siliclad®
The shelf life of Siliclad® is six months in sealed containers. The product is normally hazy.
A small amount of precipitate does not affect the performance of the solution.

Standard Packaging

SIS6952.0 Siliclad®
100g / ¥8,800
1.5kg / ¥54,000
15kg/commercial package / ¥213,000

Application Methods
Siliclad® is most frequently used as a dilute aqueous dispersion containing 0.1-1.0% of reactive silane. A 0.2% solution of active chemical can be easily prepared by adding one part by weight of the product as supplied to 99 parts of water while stirring. The following treatment method is frequently employed.
1. Thoroughly clean objects with an alkaline detergent. Used or old glass surfaces may require immersion in 2-3% sodium hydroxide. All detergent and alkali should be removed with a final rinse.
2. Prepare a 1% solution of Siliclad® in water. Ordinary tap water is acceptable. "Hard water" or "fluoridated water," is not acceptable.
3. Immerse the glass or vitreous surface in the solution for 5-10 seconds, ensuring that all surfaces are wetted by the solution. Agitation of the solution or the object generally results in more uniform deposition. After immersion, remove the part and gently but thoroughly rinse with water to remove excess Siliclad® from the surface.
4. Cure Siliclad® by bringing surface temperature to 100°C for 3-5 minutes. Room temperature cure may be accomplished by air drying for 24 hours if relative humidity is 65% or less.

Each liter of solution will coat approximately 80 one liter beakers, 600 15cm test tubes, or approximately 250 m^2 of surface.

Stability of Siliclad® Solutions
Aqueous solutions are not stable and will turn cloudy and precipitate after standing for several days. The solution stability can be optimized by adjusting pH to 4.5-5.

Siliglide™ 10

Release and Slip Coating For Glass, Ceramics and Nonferrous Metals

Features: Provides a low coefficient of friction molecular film with a "glide" surface for glass, vitreous and metal substrates.

Applications:

Display Glass - provides a smooth tactile surface, low surface conductivity and improved scratch resistance.
Ceramic Parts - reduces contact binding and adhesion, reduces scratching.
Nonferrous - provides a clear high water contact angle with excellent release properties.

Capsular Description:	Thickness	Cure	Hardness	Type
	molecular	air/moisture	high	solvent-borne 1-part

Siliglide™ 10

Description
Siliglide™ 10 is a siloxane modified polysilazane that reacts with glass, siliceous surfaces and other metal oxide surfaces to form a chemically bound polymethylsiloxane resin "siliconized" surface. The cure is activated by small quantities of water normally found on the surfaces of substrates.

Properties of Treated Surfaces
(Values reported are for glass slides dipped in 5% solutions of Siliglide™ 10 and cured at room temperature for 30 minutes)

Critical Surface Tension

untreated	γc = 78 dynes/cm
treated (hydrophobic)	γc = 25 dynes/cm

Typical Properties of Siliglide™ 10

% active	5%
flashpoint	26°C
specific gravity	0.89-0.90
viscosity	1-2 cSt.

PP1-SG10 Siliglide™ 10
100g / ¥10,300
1kg / ¥57,900

Cautions

Siliglide™ 10 is a dispersion in flammable solvents. Avoid skin and eye contact. Use in a well ventilated area wearing gloves and safety glasses.

Application Methods

1. Siliglide™ 10 coatings are most frequently applied as supplied or diluted to a 1-2% solution in dry solvents such as mineral spirits or esters such as isobutyl acetate. Articles are dipped or wiped. Articles can be cured by air drying for 25 minutes at conditions of <75% relative humidity. Buffing or wiping the surface with a soft rag during cure optimizes release by insuring a thin film covers surface imperfections. Over treatment results in a cloudy surface. The concentration should be reduced to eliminate this effect.

Gelest Aquaphile™ AQ

Hydrophilic Treatment For Glass and Ceramics

Features: Provide water-wettable silicone molecular films with high durability for glass and vitreous surfaces.

Applications:

Optical Lenses - provides an anti-fog coating.
Clinical Analysis - provides non-specific (albumin-like) binding of proteins and DNA.
(Not for food or drug use.)

Capsular Description:	Thickness	Cure	Hardness	Type
	molecular	air/moisture	low	solvent-borne 1-part

Gelest Aquaphile™ AQ
Polyamine functional silane that provides low-contact angle surfaces

Description
Aquaphile™ AQ is a partially quaternized polyamine functional silane in isopropanol. Air-dried films bond tenaciously to glass and ceramic substrates by reacting with hydroxy and silanol groups.

Properties of Treated Surfaces
(Values reported are for glass slides dipped in solutions of Aquaphile™ AQ and cured at room emperature for 4 hours.)

Typical Properties of Aquaphile™ AQ

% active	25%
flashpoint	12°C
specific gravity	0.84-0.86
viscosity	

PP1-AQAQ **Aquaphile™ AQ**
100g / ¥9,800
1kg / ¥50,500

Cautions

Aquaphile™ AQ is dispersed in isopropanol, a flammable solvent. Avoid skin and eye contact. Use in a well ventilated area wearing gloves and safety glasses.

Application Methods

Aquaphobe™ coatings are most frequently applied directly or as a 10-20% mixture with dry alcohol . Articles are dipped or wiped. Articles can be cured by air drying for 4 hours at conditions of <75% relative humidity. Heat curing at 90-100°C for 10-15 minutes in an exhausted oven provides the most effective surface treatment.

Over treatment results in a cloudy surface. The concentration should be reduced to eliminate this effect

Gelest Seramic™ SI

High Density Silicon Dioxide Films

Features: Provides thermally resistant dielectric coatings by dip or spin-on application.

Applications:

Electronics - provides dielectric layers for capacitors and other critical insulation applications.
Optics - provides overcoats for glass and quartz for index matching applications and as diffusion barriers.

Capsular Description:	Thickness		Cure		Hardness		Type
		thin		thermal or UV		high	solvent-borne 1-part

Seramic™ SI Silicon Dioxide Precursor

Description
Seramic™ SI is a β-chloroethylsilsesquioxane solution in methoxypropanol.

Film Properties

color	clear
dielectric constant	3.2-3.6
refractive index	
uncured films:	1.51
cured films:	2.1-2.2

Solution Properties

form	solution
solids	14-16%
density	0.96 g/cc
viscosity	3-5 cSt.
flashpoint	35°C

Shelf life: 6 months when stored below 5°C in sealed containers. Containers should be warmed to 15°C before opening to reduce condensation of water.

Standard Packaging

PP1-SESI Seramic™ SI
100g / ¥24,100
750g / ¥102,800

Cautions

Use in a well ventilated area.
Flammable.
Avoid contact with skin and eyes.

Application Methods

Thermal- Gelest Seramic™ SI is applied as a coating by dipping or spin-on. After solvent evaporation, the system cures in 30-60 minutes at 300°C. As supplied, typical film deposition is 1500-2000 Å by spin-on application. Thinner films may be prepared by diluting with methoxypropanol or diglyme. The cure process liberates small amounts of ethylene and hydrogen chloride.

UV- Gelest Seramic™ SI is converted to silicon dioxide on exposure to deep UV (<210nm). Exposed areas are insoluble, while unexposed areas may be removed by a solvent wash.

Gelest Seramic™ SI-A

High Density Silicon Dioxide Films

Features: Provides thermally resistant dielectric coatings by dip or spin-on application.

Applications:

Electronics - provides dielectric layers for capacitors and other critical insulation applications.
Optics - provides overcoats for glass and quartz for index matching applications and as diffusion barriers.

Capsular Description:	Thickness	Cure	Hardness	Type
	thin	thermal	high	solvent-borne 1-part

Seramic™ SI-A Silicon Dioxide Precursor

Description
Seramic™ SI-A is a β-acetoxyethylsilsesquioxane solution in methoxypropanol.

Film Properties

color	clear
dielectric constant	3.2-3.6
refractive index	
uncured films:	1.40-1.45
cured films:	2.1-2.2

Solution Properties

form	solution
solids	18-20%
density:	0.97g/cc
viscosity:	3-5 cSt.
flashpoint	35°C

Application and Reference Data:
Ezbiansky, K. et al. *MRS. Symposium Proc.* **2000**, *606*, 251.

Shelf life: 6 months when stored below 5°C in sealed containers. Containers should be warmed to 15°C before opening to reduce condensation of water.

Standard Packaging

PP1-SESIA Seramic™ SI-A

100g / ¥25,700
750g / ¥132,500

Cautions

Use in a well ventilated area.
Flammable. Avoid contact with skin and eyes.

Application Methods

Thermal- Gelest Seramic™ SI-A is applied as a coating by dipping or spin-on. After solvent evaporation, the system cures in 30-60 minutes at 350°C. The conversion temperature can be reduced to below <250°C by incorporation of 2% tetrabutylammonium fluoride. Films cured by catalysis have no absorption >190nm. As supplied typical film deposition is 1500-2000 Å by spin-on application. Thinner films may be prepared by diluting with methoxypropanol or diglyme. The cure process liberates small amounts of ethylene and acetic acid.

UV- Gelest Seramic™ SI-A is converted to silicon dioxide on exposure to deep UV (<240nm). Exposed areas are insoluble, while unexposed areas may be removed by a solvent wash.

Gelest Seramic™ BST

High Dielectric Constant Barium Strontium Titanate Films

Features: Provide thermally resistant dielectric coatings by dip or spin-on application.

Applications:

Electronics - provides high dielectric constant layers for capacitors and electroluminescent applications.
Optics - provide overcoats for glass and quartz for index matching applications and as diffusion barriers.

MEMS - reduces driving voltage in electrowetting applications.

Capsular Description:	Thickness	Cure	Hardness	Type
	thin	thermal	high	solvent-borne 1-part

Seramic™ BST Barium Strontium Titanate Precursor

Description
Seramic™ BST is mixed barium strontium and titanium double metal alkoxides in a solution of higher alcohols. Cure is two-stage, moisture followed by thermal.

Film Properties

color	clear
metal atom ratio	0.5:0.5:1.0 Ba:Sr:Ti
refractive Index:	1.8-1.9

Solution Properties

form	amber solution
solids	36-40%
flashpoint:	39°C
density:	1.00g/cc
grams of $BaSr_{0.5}Ti_{0.5}O_3$ per 100 grams sol'n	11.0-12.0

Application and Reference Data:
Vasudev, A. et al, *J. Micromech. And Microeng.*, **2009**, *19*, 075005.

Shelf life: 6 months when stored below 5°C in sealed containers. Containers should be warmed to 15°C before opening to reduce condensation of water.

Standard Packaging

PP1-SEBS Seramic™ BST
100g / ¥32,600
1kg / ¥175,500

Cautions

Use in a well ventilated area.
Flammable.
Avoid contact with skin and eyes:

Application Methods

Gelest Seramic™ BST is applied as a coating by dipping or spin-on. After solvent evaporation at 40-60% RH, the system cures in 15 minutes at 650°C. As supplied, typical film deposition is 1200-1500 Å by spin-on application at 3000rpm. Thinner films may prepared by diluting with methoxypropanol or diglyme.

Gelest HardSil™ AM

Silicone Resin Hard Coatings

Features: Provides clear silicone hard coat with excellent optical properties. HardSil™ A series are curable poly-silsesquioxane T-resins with excellent abrasion resistance.

Applications:

Optical Thermoplastics - provides effective scratch-resistant coatings with good weather resistance for polycarbonates and polyacrylates. Examples include glazing, windscreen, computer screen and ophthalmic applications.

Laminated Structures - hard, heat resistant impregnants for continuous exposures up to 360°C.

Capsular Description:	Thickness	Cure	Hardness	Type
	thin-thick	thermal	high	solvent-borne 1-part

HardSil™ AM Abrasion Resistant Coating - Thermal Cure

Description

HardSil™ AM is a primerless acrylated silicone nanocomposite dispersed in a mixture of alcohols including methanol, n-butanol and isopropanol. The nanocomposite structure imparts scratch resistance to a clear film structure.

Film Properties

Color	clear
Abrasion Resistance, Taber 500 cycles 500g CS10F	5

Solution Properties

Form	solution
Solids	19-21%
Flashpoint	19°C
Specific Gravity	0.91
Viscosity	5-15 cSt.

Shelf life: 3 months when stored below 5°C in sealed containers. Containers should be warmed to 15°C before opening to reduce condensation of water.

Standard Packaging

PP1-HSAM HardSil™ AM
100g / ¥13,800
750g / ¥60,900
10kg/commercial package / inquire

Cautions

Use in a well ventilated area.
Flammable.
Avoid contact with skin and eyes.

Application Methods

Gelest HardSil™ AM is applied as a coating by spraying, dipping or brushing. After solvent evaporation, the system cures in 30-60 minutes at 125-140°C. As supplied, typical film deposition is 6-8 microns. Thinner films may be prepared by diluting with methoxypropanol or isopropanol.

Gelest HardSil™ AP

Silicone Resin Hard Coatings

Features: Provides clear silicone hard coat with excellent optical properties. HardSil™ AP series are curable polysilsesquioxane T-resins with excellent abrasion resistance.

Applications:

Optical Thermoplastics - provides effective scratch-resistant coatings with good weather resistance for polycarbonates and polyacrylates. Examples include glazing, windscreen, computer screen and ophthalmic applications.

Laminated Structures - hard, heat resistant impregnants for continuous exposures up to 360°C.

Microfluidics - Forms bonded silsesquioxane layers which may be plasma treated.

Capsular Description:	Thickness	Cure	Hardness	Type
	thin-thick	thermal	high	solvent-borne 1-part

HardSil™ AP Abrasion Resistant Coating - Thermal Cure

Description
HardSil™ AP is a primerless phenyl modified silicone dispersed in methoxypropanol for continuous use at temperatures up to 360°C.

Film Properties	
Color	clear
Hardness, Rockwell R	120R
Tensile Strength	3500psi
Refractive Index	1.54-1.56

Solution Properties	
Form	liquid
Solids	20%
Flashpoint	35°C
Specific Gravity	0.95
Viscosity	3-5 cSt.

Application and Reference Data:
Leichle, T. et al, *Sensors and Actuators B: Chemical*, **2012**, *161*, 805.

Shelf life: 12 months when stored below 25°C in sealed containers.
Keep container sealed after dispensing product.

Standard Packaging
PP1-HSAP HardSil™ AP
100g / ¥11,100
750g / ¥45,000
10kg/commercial package / inquire

Cautions

Use in a well ventilated area.
Flammable.
Avoid contact with skin and eyes.

Application Methods

Gelest HardSil™ AP is applied as a coating by spraying, dipping or brushing. Material is allowed to dry for 1 hour and then cured at 240°C for 20-30 minutes. Thinner films may be prepared by diluting with methoxypropanol. Cure can be accelerated by adding 0.5% zinc 2-ethylhexanoate.

Gelest HardSil™ AR

Electrical and Optical Barrier Silicone Resin Coating

Features: A clear silicone hard coat with excellent thermal and optical properties that provides a mechanical and oxidation barrier. HardSil™ AR is a curable polysilsesquioxane T-resin modified to provide sufficient flexibility to withstand thermal cycling associated with power-up of electrical and optical circuit components.

Applications:

Optical Components - provides effective scratch-resistant coatings with good adhesion to glass. High refractive index provides a step-index cladding.

Electrical components - hard, heat resistant coating for thermal cycling from room temperature to 290°C. Examples include resistor and capacitor coatings.

Capsular Description:	Thickness	thin-thick	Cure	thermal	Hardness	high	Type	solvent-borne 1-part

HardSil™ AR High Temperature Electrical Coating - Thermal Cure

Description

HardSil™ AR is a primerless modified phenyl silicone resin for continuous use at temperatures up to 325°C, dispersed in methoxypropanol.

Film Properties

Color	clear
Hardness, Rockwell R	110
Refractive Index	1.56-1.58
Volume Resistivity	$1x10^{13}$ ohm-cm

Solution Properties

Form	liquid
Solids	20%
Flashpoint	35°C
Specific Gravity	0.92
Viscosity	3-5 cSt.

Shelf life: 12 months when stored below 25°C in sealed containers.
Keep container sealed after dispensing product.

Standard Packaging

PP1-HSAR HardSil™ AR
100g / ¥11,100
1kg / ¥57,900
10kg/commercial package / inquire

Cautions

Use in a well ventilated area.
Flammable.
Avoid contact with skin and eyes.

Application Methods

Gelest HardSil™ AR is applied as a coating by spraying, dipping or brushing. Material is allowed to dry for 1 hour and then cured at 220°C for 20-25 minutes. Thinner films may be prepared by diluting with methoxypropanol. Cure can be accelerated by adding 0.5% zinc 2-ethylhexanoate, although this will reduce volume resistivity.

Gelest Sibrid® TI

Thermoplastic Silicone-Block Polymers

Features: Provides thin film high strength coatings and films. Sibrid® T series are fully cured thermoplastic silicone block polymers with the ability to form thin film sections combined with high permeability allowing maximum transport of water and oxygen.

Applications:

Electronic Devices - strippable low dielectric constant coatings.
Microelectrodes - electrolyte confinement with high gas transport.
Membranes - form high strength, high O_2 and H_2O transport rate films.

Capsular Description:	Thickness	Cure	Hardness	Type
	thin	air/moisture	medium	solvent-borne 1-part

Sibrid®TI Thermoplastic Silicone-Polyimide

Description
Sibrid® TI is a fully cured thermoplastic silicone-polyimide block copolymer dissolved in N-methylpyrrolidone solvent. It is suitable for casting or coating.

Film Properties

Color	light gold-amber
Tensile Strength	>3500 psi
Dielectric Constant	2.56
Specific Gravity	1.18
Glass Transition	168°C
Permeability, O_2	35 $\frac{(10^{-9}\,cc\ O_2(RTP)\,cm)}{s.,\ cm^2,\ cmHg\ \Delta P}$

Solution Properties

Form	solution
Solids	14-16%
Flashpoint	86°C
Specific Gravity	1.1
Refractive Index	1.49

Standard Packaging

PP1-SBTI Sibrid® TI
100g / ¥8,500
1kg / ¥41,500
10kg/commercial package / inquire

Caution

Use in a well ventilated area.
Flammable.
Avoid contact with skin and eyes.

Application Methods
Gelest Sibrid® TI is applied as a coating by spraying, dipping or brushing. The solvent is removed by evaporation at 75°C-125°C in an exhausted oven. As supplied, typical film deposition is 25-50 microns. Thinner films (<10 micron) may be prepared by diluting with THF, NMP or dioxane.

Gelest Zipcone™ CE

Conformal Coating Pure Silicone Elastomer

Features: Provides conformal silicone elastomer films with excellent electrical properties that may be removed mechanically or by solvent systems. Systems are high-speed moisture cure.

Applications:

Electronic Devices - forms a soft conformal coating.
Temporary Conformable Gaskets and Seals - may be applied by dipping or brushing.

Capsular Description:	Thickness	Cure	Hardness	Type
	thin-thick	air/moisture	low	100% active 1-part

Gelest Zipcone™ CE low viscosity, solvent-free polydimethylsiloxane RTV

Description
Zipcone™ CE is a moisture activated silicone RTV containing no fillers. In the presence of atmospheric moisture, a condensation of silicone prepolymers occurs. The byproduct of the cure reaction is acetone. The system is designed as a physical and moisture barrier for electrical and optical assemblies which can be debonded for maintenance. A UV tracer dye has been incorporated to enable inspection of coating integrity.

Cured Properties

Tensile Strength	50psi
Elongation	40%
Durometer, Shore A	30
Volume Resistivity, ohm-cm	$1x10^{14}$

Uncured Properties of Zipcone™ CE

Solids	97%
Viscosity	60-70 cSt.
Skin-over time	4-6 minutes
Cure time (0.25mm)	6-9 hours
Specific gravity	0.97

Standard Packaging
PP1-ZPCE Zipcone™ CE
100g / ¥13,500
750g / ¥53,000
17kg/commercial package / inquire

Application Methods

Zipcone™ C series is applied by dipping, brushing, flow-coat or spin-on. Cure is at room temperature. After opening, containers should be inerted with dry air or nitrogen before sealing, to avoid cure in the container.

Gelest Zipcone™ CG

Conformal Coating Pure Silicone Elastomers

Features: Provides conformal silicone elastomer films with excellent electrical properties that may be removed mechanically or by solvent systems. Systems are high-speed moisture cure.

Applications:

Electronic Devices - forms a soft conformal coating.
Temporary Conformable Gaskets and Seals - may be applied by dipping or brushing.
MEMS - Ultrasonic Coupling.

Capsular Description:	Thickness	Cure	Hardness	Type
	thin-thick	air/moisture	low	100% active 1-part

Gelest Zipcone™ CG medium viscosity, solvent-free polydimethylsiloxane RTV

Description
Zipcone™ CG is a moisture activated 100% solids silicone RTV. In the presence of atmospheric moisture, a condensation of silicone prepolymers occurs. The byproduct of the cure reaction is acetone. The system is designed as a physical and moisture barrier for electrical and optical assemblies which can be debonded for maintenance. A UV tracer dye has been incorporated to enable inspection of coating integrity.

Cured Properties

Tensile Strength	>110psi
Elongation	>100%
Durometer, Shore A	25
Volume Resistivity, ohm-cm	$3x10^{14}$

Uncured Properties of Zipcone™ CG

Solids	100%
Viscosity	2500 cSt.
Skin-over time	5-6 minutes
Cure time (0.25mm)	6-9 hours
Specific gravity	1.03

Application and Reference Data:
Oppenheim, Z. et al, *IEEE Trans. Ultrason., Ferroelectr., Freq. Control*, **2003**, *50(3)*, 805.

Standard Packaging
PP1-ZPCG Zipcone™ CG
100g / ¥15,400
1kg / ¥77,500
17kg/commercial package / inquire

Application Methods

Zipcone™ C series is applied by dipping, brushing, flow-coat or spin-on. Cure is at room temperature. After opening, containers should be inerted with dry air or nitrogen before sealing, to avoid cure in the container.

Gelest Zipcone™ FA
Filler-Free Fast-Cure Pure Silicone Elastomers

Features: Provides thick film rapid-cure pure silicone elastomers with good adhesion to metals, glass and solvent compatible plastics and fibers. Products are free of abrasive-silica. Systems are high-speed moisture cure.

Applications:

Electronic Devices - forms a soft conformal coating, free of abrasive silica.
Rubber and Plastic Overcoat - provides a uniform low-roughness coating suitable for release and with an exceptionally smooth touch.
Supported Membranes - filler-free silicone allows maximum transport of gases.
Thin Film Seals and Conformable Gaskets - may be applied by dipping or brushing.

Capsular Description:	Thickness	Cure	Hardness	Type
	thin-thick	air/moisture	low	solvent-borne 1-part

Gelest Zipcone™ FA polydimethylsiloxane RTV
for maximum adhesion to polar substrates

Description
Zipcone™ FA is a moisture activated filler-free silicone RTV dispersed in a solution of methyltetrahydrofuran. In the presence of atmospheric moisture, a condensation of silicone prepolymers occurs. The byproduct of the cure reaction is acetic acid which imparts a vinegar-like odor. The system is designed for wet out and adhesion to polar substrates.

Cured Properties

Tensile Strength	>100psi
Elongation	>150%
Durometer, Shore A	>8
Tear Strength	>5pli

Uncured Properties of Zipcone™ FA

Solids	48-52%
Viscosity	200-400 cSt.
Skin-over time	30-45 minutes
Cure time (0.25mm)	6-9 hours
Specific gravity	1.05
Flashpoint	-11°C

Standard Packaging

PP1-ZPFA Zipcone™ FA
100g / ¥9,300
750g / ¥40,200
10kg/commercial package / inquire

Cautions

Zipcone™ F series contain flammable solvents and cure released byproducts which are eye irritants. Avoid skin and eye contact. Use in a well ventilated area wearing gloves and safety glasses. Consult MSDS of the specific product used for additional safety information.

Application Methods

Zipcone™ F series is applied by dipping, brushing or spin-on. Solvent is allowed to evaporate in an exhausted area. Cure is at room temperature. After opening, containers should be inerted with dry air or nitrogen before sealing to avoid cure in the container.

Gelest Zipcone™ FN

Filler-Free Fast-Cure Pure Silicone Elastomer for Maximum Release

Features: Provides thick film rapid-cure pure silicone elastomers with good adhesion to metals, glass and solvent compatible plastics and fibers. Products are free of abrasive-silica. Systems are high-speed moisture cure.

Applications:

Electronic Devices - forms a soft conformal coating, free of abrasive silica.
Rubber and Plastic Overcoat - provides a uniform low-roughness coating suitable for elease and with an exceptionally smooth touch.
Supported Membranes - filler-free silicone allows maximum transport of gases.
Thin Film Seals and Conformable Gaskets - may be applied by dipping or brushing.

Capsular Description:	Thickness	Cure	Hardness	Type
	thin-thick	air/moisture	low	solvent-borne 1-part

Gelest Zipcone™ FN polydimethylsiloxane RTV
for rapid, neutral cure, maximum release

Description
Zipcone™ FN is a moisture activated filler-free silicone RTV dispersed in odorless hydrocarbon. In the presence of atmospheric moisture, a condensation of silicone prepolymers occurs. The byproduct of the cure reaction is an amine. Amine byproducts have little or no corrosive effects on most metals, but copper is affected.

Cured Properties

Tensile Strength	>50psi
Elongation	>150%
Durometer, Shore A	>5
Tear Strength	>5pli
Refractive Index	1.403

Uncured Properties of Zipcone™ FN

Solids	32-35%
Viscosity	100-150 cSt.
Skin-over time	15 minutes
Cure time (0.25mm)	2 hours
Specific gravity	0.81
Flashpoint	0°C

Standard Packaging

PP1-ZPFN Zipcone™ FN
100g / ¥10,900
650g / ¥42,100
10kg/commercial package / inquire

Cautions

Zipcone™ F series contain flammable solvents and cure released byproducts which are eye irritants. Avoid skin and eye contact. Use in a well ventilated area wearing gloves and safety glasses. Consult MSDS of the specific product used for additional safety information.

Application Methods

Zipcone™ F series is applied by dipping, brushing or spin-on. Solvent is allowed to evaporate in an exhausted area. Cure is at room temperature. After opening, containers should be inerted with dry air or nitrogen before sealing to avoid cure in the container.

Gelest Zipcone™ TC

Fast-Cure Thermal Control White Silicone Elastomer

Features: Provides highly thermal conductivity silicone elastomeric coatings with excellent heat resistance, electrical insulation and good adhesion to a variety of substrates.

Applications:

Appliances - soft white insulating coatings with a comfortable touch.
Electrical Devices and Connectors - insulating coatings with heat dissipation properties.

Capsular Description:	Thickness	Cure	Hardness	Type
	thick	air/moisture	medium	solvent-borne 1-part

Zipcone™ TC Thermally Conductive Coating

Description
Zipcone™ TC is a high magnesium oxide load, oxime cure RTV dispersed in odorless mineral spirits.

Film Properties

Color	white
Durometer, Shore A	20-25
Specific Gravity	1.2
Tensile strength	>250psi
Elongation	>250%

Solution Properties

Form	Liquid Dispersion
Solids	65%
Viscosity	400-600 cSt.
Flashpoint	57°C

Standard Packaging

PP1-ZPTC Zipcone™ TC
100g / ¥14,600
1kg / ¥57,400

Cautions

Use in a well ventilated area.
Combustible -Avoid flame and ignition sources.

Application Methods

Zipcone™ TC is applied by brushing or dipping. Recommended coating thickness is 100 microns (4-5mils). Room temperature cure profile at 50% R.H. is skin over: 20 min; tack free: 90 min; full cure 5 days. Thinner coatings may be applied by diluting with dry solvents such as toluene, naptha, or hexane.

Gelest Zipcone™ TR

Fast-Cure Highlight Reflectivity White Silicone Elastomers

Features: Provides high light reflectivity silicone elastomeric coatings with excellent heat resistance, electrical insulation and good adhesion to a variety of substrates.

Applications:

Aerospace - reflective/conductive coatings withstand weather and thermal extremes.
Electrical Devices and Connectors - insulating silicones with heat dissipation properties.
Silicone Rubber Fabrication - marking inks and seals.

Capsular Description:	Thickness	Cure	Hardness	Type
	thick	air/moisture	medium	solvent-borne 1-part

Zipcone™ TR Reflective Thermal Control Coating

Description
Zipcone™ TR is a high titanium dioxide load, oxime cure RTV dispersed in odorless mineral spirits.

Film Properties

Color	white
Durometer, Shore A	25-30
Specific Gravity	1.54
Tensile strength	>250psi
Elongation	>250%

Solution Properties

Form	Liquid Dispersion
Solids	70%
Viscosity	500-700 cSt.
Flashpoint	57°C

Standard Packaging

PP1-ZPTR Zipcone™ TR
100g / ¥14,600
1kg / ¥72,800

Caution

Use in a well ventilated area.
Combustible - Avoid flame and ignition sources.

Application Methods

Zipcone™ TR is applied by brushing or dipping. Recommended coating thickness is 100 microns (4-5mils). Room temperature cure profile at 50% R.H. is skin over: 20 min; tack free: 90 min; full cure 5 days. Thinner coatings may be applied by diluting with dry solvents such as toluene, naptha, or hexane.

Gelest Zipcone™ UA

Ultraviolet Cure Clear Silicone Elastomer for Polymethacrylates

Features: Provide UV cure silicone elastomer coatings with high transparency and refractive index control.

Applications:

Optical Component Coating - effective cladding and elastomeric seals.

Optical Thermoplastics - provides index matching (UA) for polymethacrylates. Applications include glazing, windscreens and computer screens.

Capsular Description:	Thickness	Cure	Hardness	Type
	thin to thick	UV	medium	1-part

Zipcone™ UA Index matching - UV Cure

Description
Zipcone™ UA is a clear acrylate modified silicone designed for UV cure.

Film Properties

Color	clear
Refractive Index	1.464
Hardness, Shore A	>60
Tensile Strength	80-120psi
Elongation	1%

Uncured Properties

Form	liquid
Solids	100%
Viscosity	40-180 cSt.
Specific Gravity	1.10
Flashpoint	>65°C

Shelf life: 3 months when stored below 15°C in sealed, light-protected containers.

Standard Packaging

PP1-ZPUA Zipcone™ UA
100g / ¥32,600
1kg / ¥175,500

Caution

Use in a well-ventilated area.
Avoid contact with skin and eyes.

Application Methods

Zipcone™ UA is applied as a coating by dipping, brushing or syringing. Exposure to UV irradiation at 250-364 nm (mercury lamp) cures the coating in <1 minute. Oxygen inhibits film formation. Nitrogen blanket or other methods of air exclusion are recommended.

Gelest Zipcone™ UE

Ultraviolet Cure Clear Silicone Elastomers

Features: Provides an abrasion resistant UV cure silicone elastomer coatings with high transparency and refractive index control.

Applications:

Optical Component Coating - effective cladding and elastomeric seals.

Optical Thermoplastics - provides scratch resistance for polycarbonates and polymethacrylates. Applications include glazing, windscreens and computer screens.

Capsular Description:	Thickness	Cure	Hardness	Type
	thin to thick	UV	medium	1-part

Zipcone™ UE Abrasion Resistant - UV Cure

Description

Zipcone™ UE is a primerless epoxycyclohexyl modified silicone designed for UV cure.

Film Properties

Color	clear
Abrasion Resistance, Taber 500 cycles 500g CS10F	4-9
Refractive Index	1.470

Uncured Properties

Form	liquid
Solids	100%
Viscosity	25-75 cSt.
Specific Gravity	0.99
Flashpoint	57°C

Shelf life: 3 months when stored below 25°C in sealed, light-protected containers.

Standard Packaging

PP1-ZPUE Zipcone™ UE
100g / ¥17,000
1kg / ¥101,400

Caution

Use in a well-ventilated area.
Combustible.
Avoid contact with skin and eyes.

Application Methods

Zipcone™ UE is applied as a coating by spraying, dipping or brushing. Exposure to UV irradiation at 250-300 nm (type H lamp preferred with a minimum energy density of 150mj/cm^2 cures the coating in <1 minute. Thinner coatings may be applied by diluting with dry methoxypropanol or isopropanol.

Gelest® GEL Series

Clear Dimethylsilicone Gel Elastomers

Features: Gels are solids with fluid characteristics. They provide mechanical protection and dampening with good cohesion, high instantaneous deformation.

Applications:

Shock Absorption - provide a property range extending from vibration dampening to sound absorption.
Electrical Devices - provide low stress protection to delicate components.

Capsular Description:	Thickness	Cure	Hardness	Type
	thick	Pt catalyst	low	100% active 2-part

Gelest® Gel D200 2-Part Silicone Gel

Description
Gel D200 is a temporarily deformable medium penetration gel with typical dimethylsilicone properties and a refractive index of 1.41.

Gel Properties

Color	clear
Refractive Index	1.407
Penetration	150-250mm
Specific Gravity	0.97

Uncured Properties

Form	liquid
Viscosity	1000 cSt

Processing
Gel D200 is a 2-part addition cure system. Each system comprises an "A" part and a "B" part which are mixed in a 10:1 ratio. After thoroughly mixing 10 parts "A" to 1 part "B", allow mix to de-air. Pot life is 3-4 hours. Pour or syringe around part or into cavity. Cure at 115-120°C for 30-60 minutes or at room temperature for 48 hours. If the gel is too firm (low penetration), increase the ratio of A to B to 11:1, 12:1 etc.

Caution: Avoid contact with skin and eyes

Shelf life: 12 months when stored below 25°C in sealed containers.

Standard Packaging

PP2-D200 Gelest® Gel D200
1kg (910g D200A, 90g D200B) / ¥21,800

Gelest® Gel D300 2-Part Silicone Gel

Description
Gel D300 is a temporarily deformable high penetration gel with typical dimethylsilicone properties and a refractive index of 1.41.

Gel Properties

Color	clear
Refractive Index	1.407
Penetration	200-400mm
Specific Gravity	0.97

Uncured Properties

Form	liquid
Viscosity	350 cSt

Processing
Gel D300 is a 2-part addition cure system. Each system comprises an "A" part and a "B" part which are mixed in a 10:1 ratio. After thoroughly mixing 10 parts "A" to 1 part "B", allow mix to de-air. Pot life is 3-4 hours. Pour or syringe around part or into cavity. Cure at 115-120°C for 30-60 minutes or at room temperature for 48 hours. If the gel is too firm (low penetration), increase the ratio of A to B to 11:1, 12:1 etc.

Caution: Avoid contact with skin and eyes

Shelf life: 12 months when stored below 25°C in sealed containers.

Standard Packaging

PP2-D300 Gelest® Gel D300
1kg (910g D300A, 90g D300B) / ¥23,200

Gelest® GEL Series

Clear Specialty Silicone Gel Elastomers

Features: Gels are solids with fluid characteristics. They provide mechanical protection and dampening with good cohesion, high instantaneous deformation and good resilience with a wide range of chemical resistance and refractive index control.

Applications:

Optical Component Coating - coupling media and elastomeric seals.
Shock Absorption - provide a property range extending from vibration dampening to sound absorption.
Electrical Devices - provide low stress protection to delicate components.

Capsular Description:	Thickness	Cure	Hardness	Type
	thick	Pt catalyst	low	100% active 2-part/1-part

Gelest® Gel P065 2-Part Silicone Gel

Description
Gel P065 is a temporarily deformable material with excellent low temperature properties and a refractive index of 1.43. It performs as a dielectric gel from 115° to 235°C.

Gel Properties

Color	clear
Refractive Index	1.430
Penetration	60-80mm
Specific Gravity	0.99
Dielectric Constant	2.8

Uncured Properties

Form	liquid
Viscosity (initial mix)	700-800 cSt

Processing
Gel P065 is a 2-part addition cure system. It is comprised of "A" and "B" parts which are mixed in a 1:1 ratio. After thoroughly mixing 1 part "A" to 1 part "B", allow mix to de-air. Pot life is 3-4 hours. Pour or syringe around part or into cavity. Cure at 115-120°C for 30-60 minutes or at room temperature for 48 hours. If the gel is too firm (low penetration) increase the ratio of A to B to 1.1:1, 1.2:1 etc.

Caution: Avoid contact with skin and eyes

Shelf life: 12 months when stored below 25°C in sealed containers.

Standard Packaging
PP2-P065 Gelest® Gel P065
100g / ¥20,700
1kg / ¥109,400

Gelest® Gel F065 1-Part Silicone Gel

Description
Gel F065 is a temporarily deformable material with fluorosilicone properties, providing fuel resistant properties and a low refractive index. The one part addition cure system is technically achieved by incorporating a fugitive inhibitor to the catalyzed mix.

Gel Properties

Color	clear
Refractive Index	1.384
Penetration	60-80mm
Specific Gravity	1.27

Uncured Properties

Form	liquid
Viscosity	1200-1500 cSt

Processing
Gel F065 is a 1-part addition cure system. Pour or syringe around part or into cavity. Cure at 100-150°C for 20-30 minutes. If the gel is too firm (low penetration), FMV-4035 fluorosilicone polymer can be added at 5-20% levels prior to cure.

Caution: Avoid contact with skin and eyes

Shelf life: 6 months when stored below <0°C in sealed containers.

Standard Packaging
PP1-F065 Gelest® Gel F065
100g / ¥45,900

Gelest HardSil™ CC

High Modulus Clear Casting and Impregnation Resin

Features: Provides rigid silicone resins with excellent optical properties. HardSil™ C is a curable phenyl silicone resin with excellent thermal stability and good electrical properties.

Applications:

Electrical Components - high temperature, high power encapsulating and mounting resin.
Laminated Structures - hard, heat resistant impregnants for continuous exposures up to 300°C.
X-ray Equipment - radiation resistant encapsulating resin.

Capsular Description:	Thickness	Cure	Hardness	Type
	thick	thermal	high	2-part

HardSil™ CC Clear Casting and Impregnation Resin

Description
HardSil™ CC is a peroxide curable solventless silicone resin supplied with catalyst.

Bulk Properties

Color	clear-straw transparent
Dielectric Strength (1/8")	350 volts/mil
Volume Resistivity	5×10^{15} ohm-cm
Refractive Index	1.530

Resin Properties

Form	liquid
Flashpoint	>180°C
Specific Gravity	1.10
Viscosity	80-150 cSt.

Application Methods
Gelest HardSil™ CC Part A (resin) and 1 wgt % Part B (peroxide) are combined and mixed thoroughly. The mix is poured or applied as an an encapsulant or impregnant. Cure is for 6 hours at 150°C followed by two hours at 200°C. If the component is operating above 200°C, it should be cured for three hours at the maximum operating temperature before entering service.

Cautions
Use in a well ventilated area.
Avoid contact with skin and eyes.
Part B catalyst is an oxidizer and should be stored away from flammables.

Shelf life: 12 months when stored below 25°C in sealed containers.

Standard Packaging

PP2-HSCC HardSil™ CC 99:1 kit
100g / ¥40,600
1kg / ¥206,000

Gelest® Flexible Optical Encapsulant Series

Filler-Free 2-part Silicone Elastomers

Features: Provide rapid-cure pure silicone elastomers with high optical transmission They have relatively low viscosity and extended pot-life, allowing potting, embedding and coating. Systems are vinyl-addition (platinum) cure.

Applications:

Electronic Devices - provide mechanical and chemical protection to electronic components, free of abrasive silica.
Optical Devices - index matching, cladding or transmission media applications.
Supported Membranes - filler-free silicone allows maximum transport of gases.
Microfluidics - employed as a mold master.[1]

Capsular Description:	Thickness	Cure	Hardness	Type
	thick	Pt catalyst	medium	100% active 2-part

Gelest® OE 41 1.41 refractive index 2-part silicone RTV encapsulant, supplied as 1:1 kit

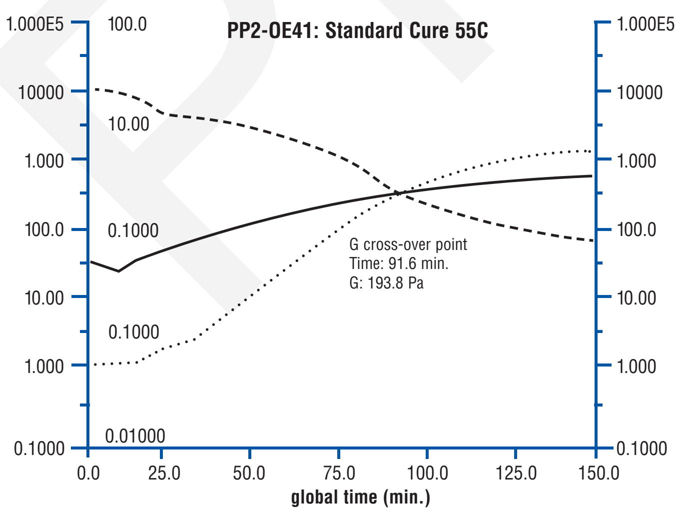
Description
Gelest® OE 41 is a flexible, optically clear molding, encapsulation and coating compound. The low viscosity of the catalyzed mix, long pot-life at room temperature and moderate cure temperature make this extremely useful in laboratory, prototype and small production run applications.

Cured Properties

Refractive Index	1.407
Tensile Strength	>300psi
Elongation	140-200%
Durometer, Shore A	15-30
Tear Strength	5-15pli

Uncured Properties of Gelest® OE 41
Viscosity (1:1) catalyzed: 1750-2500 cSt.

Application Methods
Thoroughly mix Part A with Part B in a 1:1 ratio. De-air mix under vacuum for about 20 minutes. The pot-life is 18 hours at 25°C. Pot-life may be extended by storing at 5°C. Pour into mold or apply to substrate. Avoid entrapping air. Cure at 55°C for 4 hours or at room temperature over 72 hours.



Standard Packaging
PP2-OE41 **Gelest® OE 41**

1 kg kit (500g OE41A, 500g OE41B)	¥28,200
6 kg kit (3kg OE41A, 3kg OE41B)	¥147,000

Gelest® OE 41 is available in other versions in which cure speed or volatile content has been varied to match special requirements.

Gelest® OE 41.2 Accelerated Cure
Rapid cure version of standard Gelest® OE 41, cures in less than 1 hour at room temperature, has a working time of about 10 minutes.
PP2-OE41.2 **Gelest® OE 41.2**

1 kg kit (500g OE41.2A, 500g OE41.2B)	¥31,400
6 kg kit (3kg OE41.2A, 3kg OE41.2B)	¥147,000

Gelest® OE 41.4 Extended Cure
Slow cure version of standard Gelest® OE 41, offers a pot-life of 48 hours at room temperature. Cures in one hour at 120°C
PP2-OE41.4 **Gelest® OE 41.4**

1 kg kit (500g OE41.4A, 500g OE41.4B)	¥31,400
6 kg kit (3kg OE41.4A, 3kg OE41.4B)	¥147,000

Gelest® OE 41.6 Low Volatility
Low volatility content of **Gelest® OE 41.6** offers advantages in electrical and high vacuum where bleed or migration of low molecular weight species can have deleterious effects.
PP2-OE41.6 **Gelest® OE 41.6**
1 kg kit (500g OE41.6A, 500g OE41.6B) ¥48,400

Gelest® OE 41.7 Low Volatility in solution
A single component solution version in toluene which cures after evaporation of solvent i 24 ours to form optically clear films.
Product must be stored <5°C
PP1-OE41.7 **Gelest® OE 41.7** 100g / ¥26,000

Application and Reference Data:
1. Lien, V. et al. *IEEE Photon. Technol. Lett.*, **2004**, *16(6)*, 1525.
2. Jeong, J. et al. *Organic Electronics*, **2011**, *12*, 2095.

Gelest® Flexible Optical Encapsulant Series

Filler-Free 2-part Silicone Elastomers

Features: Provide rapid-cure pure silicone elastomers with high optical transmission They have relatively low viscosity and extended pot-life, allowing potting, embedding and coating. Systems are vinyl-addition (platinum) cure.

Applications:

Electronic Devices - provide mechanical and chemical protection to electronic components, free of abrasive silica.
Optical Devices - index matching, cladding or transmission media applications.
Supported Membranes - filler-free silicone allows maximum transport of gases.

Capsular Description:	Thickness	Cure	Hardness	Type
	thick	Pt catalyst	medium	100% active 2-part

Gelest® OE 42 1.42 refractive index
2-part silicone RTV encapsulant,
supplied as 1:1 kit

Description
Gelest® OE 42 is a flexible, optically clear molding, encapsulation and coating compound, offering improved adhesion to substrates compared to Gelest OE™ 41. The low viscosity of the catalyzed mix, long pot-life at room temperature and moderate cure temperature make this extremely useful in laboratory, prototype and small production run applications.

Cured Properties

Refractive Index	1.420
Tensile Strength	>200psi
Elongation	90-150%
Durometer, Shore A	10-25
Tear Strength	5-10pli

Uncured Properties of Gelest® OE 42
Viscosity (1:1) catalyzed: 1500-2000 cSt.

Standard Packaging
PP2-OE42 **Gelest® OE 42**

1 kg kit (500g OE42A, 500g OE42B)	¥53,700
6 kg kit (3kg OE42A, 3kg OE42B)	¥228,000

Gelest® OE 43 1.43 refractive index
2-part silicone RTV encapsulant,
supplied as 1:1 kit

Description
Gelest® OE 43 is a flexible, optically clear molding, encapsulation and coating compound, offering improved adhesion to substrates compared to Gelest® OE 41. The low viscosity of the catalyzed mix, long pot-life at room temperature and moderate cure temperature make this extremely useful in laboratory, prototype and small production run applications.

Cured Properties

Refractive Index	1.430
Tensile Strength	>200psi
Elongation	75-100%
Durometer, Shore A	5-15
Tear Strength	5-10pli

Uncured Properties of Gelest® OE 43
Viscosity (1:1) catalyzed: 800-1500 cSt.

Application and Reference Data:
Employed in microfluidics waveguides.
Kee, J. et al, *Optics Express*, **2009**, *17(14)*, 11739.

Standard Packaging
PP2-OE43 **Gelest® OE 43**

1 kg kit (500g OE43A, 500g OE43B)	¥53,700
6 kg kit (3kg OE43A, 3kg OE43B)	¥228,000

Application Methods
Thoroughly mix Part A with Part B in a 1:1 ratio. De-air mix under vacuum for about 20 minutes. The pot-life is 18 hours at 25°C. Pot-life may be extended by storing at 5°C. Pour into mold or apply to substrate. Avoid entrapping air. Cure at 55°C for 4 hours or at room temperature over 72 hours.

Gelest® Reprographic and Microfluidic Elastomers

Reinforced Silicone Elastomers

Features: Provide low surface roughness silicone elastomers with high definition in thin sections with moderate viscosity and extended pot-life for accurate reprographic and prototype transfer technologies. Systems are vinyl-addition (platinum) cure.

Applications:

Micro-Contact Printing - provides stamp and transfer detail to dimensions of 1 micron.
Design Transfer - high definition allows accurate image transfer from prototypes.

Capsular Description: Thickness: thick | Cure: Pt catalyst | Hardness: medium | Type: 100% active 2-part

Gelest® RG 01 2-part reprographic silicone elastomer, supplied as 10:1 kit

Description
Gelest® RG 01 is a flexible, clear molding and encapsulation compound. The moderate viscosity of the catalyzed mix and long pot-life at room temperature make this extremely useful in microcontact printing, prototype and small production run applications.

Cured Properties

Refractive Index	1.43
Dielectric Constant	2.7
Critical Surface Tension	23-24 dynes/cm
Tensile Strength	800-1000psi
Elongation	80-100%
Durometer, Shore A	45-60
Tear Strength	10-15pli
Specific Gravity	1.04
Contact Angle, water	105°

Uncured Properties of Gelest® RG
Viscosity (10:1) catalyzed: 3500-4500 cSt
Viscosity- Part A (base): 5000-5500 cSt
Part B (crosslinker): 50-75 cSt

Application Methods
Thoroughly mix Part A with Part B in a 10:1 ratio. Try to avoid introducing bubbles. For critical applications, de-air mix under vacuum for about 20 minutes. The pot-life is 12 hours at 25°C. Avoid entrapping air. Cure at 55°C for 4 hours or at room temperature over 36 hours.

Standard Packaging
PP2-RG01 Gelest® RG 01
1.1 kg kit (1000g RG01-A, 100g RG01-B) ¥53,900

Gelest® RG 02 2-part oleophilic reprographic silicone elastomer, supplied as 10:1 kit

Description
Gelest® RG 02 is a clear to translucent molding and encapsulation compound with greater adsorption of hydrocarbons than conventional silicones making it able to transfer a wider range of chemicals for self-assembly techniques.

Cured Properties

Refractive Index	1.43
Dielectric Constant	2.6
Critical Surface Tension	27-29 dynes/cm
Tensile Strength	600-800psi
Elongation	80-100%
Durometer, Shore A	25-35
Tear Strength	10-12pli
Specific Gravity	1.04

Uncured Properties of Gelest® RG
Viscosity (10:1) catalyzed: 3000-4000 cSt
Viscosity- Part A (base): 5000-5500 cSt
Part B (crosslinker): 75-125 cSt

Application Methods
Thoroughly mix Part A with Part B in a 10:1 ratio. Try to avoid introducing bubbles. For critical applications, de-air mix under vacuum for about 20 minutes. The pot-life is 12 hours at 25°C. Pot-life may be extended by storing at 5°C. Apply to substrate. Avoid entrapping air. Cure at 55°C for 4 hours or at room temperature over 36 hours.

Standard Packaging
PP2-RG02 Gelest® RG 02
1.1 kg kit (1000g RG02-A, 100g RG02-B) ¥69,800

Gelest® RG 03 2-part hydrophilic silicone elastomer supplied as a 10:1 kit

Description
Gelest® RG 03 is a clear to translucent molding and encapsulation compound with lower water contact angle, reduced coefficient of friction and improved surface wettability compared to conventional silicones. Microfluidic features exhibit lower hydrodynamic pressures.

Cured Properties

Refractive Index	1.43
Contact Angle, water	85°
Coefficient of Friction (aqueous environment, 37°C)	~1-1.5
Tensile Strength	500-800psi
Elongation	100-200%
Durometer, Shore A	40-60
Tear Strength	10-12pli
Specific Gravity	1.04

Uncured Properties of Gelest® RG
Viscosity (10:1) catalyzed: 3000-4000 cSt
Viscosity- Part A (base): 3500-4500 cSt
Part B (crosslinker): 50-75 cSt

Application Methods
Thoroughly mix Part A with Part B in a 10:1 ratio. Try to avoid introducing bubbles. For critical applications, de-air mix under vacuum for about 20 minutes. The pot-life is 12 hours at 25°C. Pot-life may be extended by storing at 5°C. Apply to substrate. Avoid entrapping air. Cure at 55°C for 4 hours or at room temperature over 36 hours.

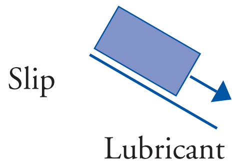
Standard Packaging
PP2-RG03 Gelest® RG 03
1.1 kg kit (1000g RG03-A, 100g RG03-B)

Gelest PP1-LUB01

Fluorocarbon-Fluorosilicone Light Grease

Features: Provides a clean nonstick/slip boundary lubricant for electrical contact and precision timing devices.

Capsular Description:



Description
Gelest PP1-LUB01 is a highly lubricious gel consisting of submicron particles of fluoropolymer dispersed in a fluorinated silicone copolymer. The gel has the unusual property of exhibiting increased slip as higher shear force is applied.

Addition of 5wt% antimony dialkyldithiocarbamate EP additive enables aerospace grease application.[1]

Lubrication Properties

4-ball wear, mm, 232°C:	
(1200 rpm, 40 kg, 2hrs, M-10 steel)	1.60-1.65
Dropping-point, °C:	200-210
Penetration, 60 stroke:	320-340
Coefficient of friction, static	
carbon steel after break-in	0.10-0.12

Bulk Properties

Viscosity, cSt:	8000-9000
Specific gravity:	1.41

Application and Reference Data:
1. Christian, J. et al. *Lubrication Engineering*, **1974**, *30*, 136.

Standard Packaging
PP1-LUB01
100g / ¥44,600
1kg / ¥231,000

Gelest Sibrid® Primer A1

Hybrid Silicone Primer for Low Polarity Surfaces

Features: Provide thin adhesive films that act as primers for organic resins on metal and glass substrates. Sibrid® Primer A1 is a silane modified organic polymer with the ability to form thin films on siliceous and metal substrates and then crosslink with subsequently applied organic resins at room or moderately elevated temperatures.

Applications:

- optical-electronic interface device assembly and packaging.
- thin film adhesive protective coatings.
- primer on metals, glass and concrete for organic coatings.

Capsular Description:	Thickness	Cure	Hardness	Type
	thin-thick	air/moisture	medium	solvent-borne 1-part

Gelest® Primer A1 Adhesive/primer for low polarity resins

Description
Gelest® Primer A1 is a linear polymer containing reactive alkoxysilane, anhydride and unsaturation functionality dissolved in toluene. It is suitable for nonpolar resins including silicones and polyolefins. The primer is normally applied to the inorganic substrate and after drying the polymer is applied.

Solution Properties

Form	amber solution
Solids	12-14%
Flashpoint	5°C
Specific Gravity	0.85
Viscosity	2-5 cSt.

Shelf life: 12 months when stored below 25°C in sealed containers. Keep container sealed after dispensing product.

Standard Packaging
PP1-SBPA1 Gelest® Primer A1
100g / ¥11,100
1kg / ¥52,100

Caution

Use in a well ventilated area.
Flammable. Avoid contact with skin and eyes.
Product is moisture sensitive. Containers should be tightly sealed.

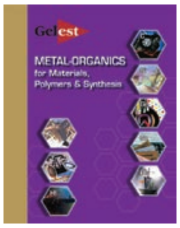
Application Methods

Gelest® Primer A1 is applied as a coating by spraying, dipping or brushing. The solvent is removed by evaporation in an exhausted area Simultaneous with evaporation, moisture induced cross-linking is initiated. After drying, maximum bond strength with the substrate is achieved by heating to 80°C for 30 minutes, but normally this is not necessary.

Enabling Your Technology

Gelest

METAL-ORGANICS
for Materials, Polymers & Synthesis



Metal-Organics
(Abbreviated Listing)

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
ALUMINIUM					
OMAL005	ALANE-DIMETHYLETHYLAMINE COMPLEX	25g	inquire		
OMAL006	ALANE-DIMETHYLETHYLAMINE COMPLEX, 0.5M in toluene (~12 wgt %)	25g	inquire	100g	inquire
OMAL008	ALANE-TRIMETHYLAMINE COMPLEX	5g	inquire	25g	inquire
AKA005	ALUMATRANE, tech-90	25g	¥11,800	100g	¥28,000
CXAL012	ALUMINUM ACETATE, DIBASIC, tech-90	100g	¥8,000	2kg	¥44,500
CXAL015	ALUMINUM ACRYLATE	25g	¥18,000		
AKA010	ALUMINUM n-BUTOXIDE, tech-95	10g	¥14,500	50g	¥44,500
AKA020.5	ALUMINUM s-BUTOXIDE, 75% in s-butanol	250g	¥7,500	1.5kg	¥18,500
AKA020	ALUMINUM s-BUTOXIDE, 96%	250g	¥7,500	2kg	¥21,500
AKA020.1	ALUMINUM s-BUTOXIDE, 99+%	250g	¥16,500		
AKA023	ALUMINUM s-BUTOXIDE BIS(ETHYLACETOACETATE), tech-95	25g	¥14,000	100g	¥35,500
AKA030	ALUMINUM t-BUTOXIDE, tech-95	10g	¥13,300	50g	¥39,500
AKA036	ALUMINUM 5-CHLORO-8-HYDROXYQUINOLINATE	5g	¥76,000		
AKA040	ALUMINUM DI-s-BUTOXIDE ETHYLACETOACETATE, tech-95	100g	¥8,500	500g	¥20,500
AKA050	ALUMINUM DIISOPROPOXIDE ETHYLACETOACETATE	100g	¥8,500	500g	¥20,500
AKA054	ALUMINUM DIISOPROPYLDITHIOCARBAMATE, tech-95	10g	¥39,500		
AKA060	ALUMINUM ETHOXIDE	25g	¥13,500	100g	¥33,500
AKA061	ALUMINUM ETHOXYETHOXYETHOXIDE, 15% in ethoxydiethyleneglycol	50g	¥11,500		
CXAL045	ALUMINUM FORMATE, trihydrate	25g	¥10,500		
AKA062	ALUMINUM 3,5-HEPTANEDIONATE	10g	¥13,500	50g	¥40,500
AKA063	ALUMINUM HEXAFLUORO-2,4-PENTANEDIONATE	5g	¥22,500	25g	¥76,500
AKA065	ALUMINUM 3-HYDROXY-2-METHYL-4-PYRONATE	5g	¥36,500		
AKA067	ALUMINUM 8-HYDROXYQUINOLINATE, 99+%	5g	¥26,500		
AKA070	ALUMINUM ISOPROPOXIDE	100g	¥7,500	1kg	¥13,500
AKA071	ALUMINUM ISOPROPOXIDE (99.9%)	25g	¥13,600	100g	¥35,500
AKA074	ALUMINUM MAGNESIUM ISOPROPOXIDE	10g	¥41,000		
CXAL050	ALUMINUM METHACRYLATE	10g	¥13,500		
AKA076	ALUMINUM N-NITROSOPHENYLHYDROXYLAMINE	25g	¥14,000	100g	¥35,500
AKA078	ALUMINUM 9-OCTADECENYLACETOACETATE DIISOPROPOXIDE, tech-90	100g	¥11,800	500g	¥33,500
W-ALO-51-50	ALUMINUM OXIDE WAFER	Each	¥55,200		
CXAL073	ALUMINUM OXYSTEARATE, tech-85	500g	¥12,500		
AKA080	ALUMINUM(III) 2,4-PENTANEDIONATE	100g	¥8,500	500g	¥20,500
AKA081	ALUMINUM 2,4-PENTANEDIONATE BIS(ETHYLACETOACETATE)	25g	¥9,500	100g	¥24,500
AKA082	ALUMINUM PHENOXIDE 96%	5g	¥19,500		
AKA085	ALUMINUM(III) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥10,500	5g	¥28,500
DALTI50	ALUMINUM TITANIUM DOUBLE METAL ALKOXIDE, (0.85 M)	100g	¥10,800	500g	¥28,500
CXAL080	ALUMINUM TRIFLUOROACETATE, monohydrate	25g	¥34,500		
CXAL083	ALUMINUM TRIFLUOROMETHANESULFONATE	10g	¥18,000		
DALY080	ALUMINUM YTTRIUM DOUBLE METAL ALKOXIDE	25g	¥13,000	100g	¥32,000
DALZR50	ALUMINUM ZIRCONIUM DOUBLE METAL ALKOXIDE (0.67 M)	100g	¥11,800	500g	¥33,500
SID2780.0	DI-s-BUTOXYALUMINOXYTRIETHOXYSILANE	25g	¥11,900	100g	¥31,000
PSIAL-007	DIETHOXYSILOXANE -s-BUTYLALUMINATE COPOLYMER	100g	¥24,100	500g	¥87,300
OMAL021.2	DIISOBUTYLALUMINUM HYDRIDE, 1M in heptane (19-20 wgt%)	1.5kg	inquire	14kg	inquire
OMAL021.4	DIISOBUTYLALUMINUM HYDRIDE, 1M in methylene chloride (11-12 wgt%)	2kg	inquire		
OMAL021.5	DIISOBUTYLALUMINUM HYDRIDE, 1M in tetrahydrofuran (16-17 wgt%)	1.5kg	inquire		
OMAL021.7	DIISOBUTYLALUMINUM HYDRIDE, 1M in toluene (16-17 wgt%)	1.5kg	inquire		
OMAL020	DIMETHYLALUMINUM CHLORIDE	100g	inquire		
OMAL020.2	DIMETHYLALUMINUM CHLORIDE, 1M in heptane	1.5kg	inquire		
OMAL025	DIMETHYLISOPROPOXYALUMINUM	10g	inquire		
OMAL033.2	ETHYLALUMINUM DICHLORIDE, 1M in heptane (16-18 wgt%)	1.5kg	inquire		
OMAL033.7	ETHYLALUMINUM DICHLORIDE, 1.8M in toluene (24-26 wgt%)	1.5kg	inquire		
INLI009	LITHIUM ALUMINUM HYDRIDE, pellets	25g	¥14,500	250g	¥61,500
DMGAL30	MAGNESIUM ALUMINUM DOUBLE METAL ALKOXIDE, (0.75M)	25g	¥9,000	100g	¥19,300
DMGAL50	MAGNESIUM ALUMINUM DOUBLE METAL ALKOXIDE, (1.0M)	25g	¥9,000	100g	¥19,300
PAL-008	POLY(OXOALUMINUM 2-ETHYLHEXANOATE), 60% in isopropyl 2-ethylhexanoate, 8-9% Al	25g	¥9,300	100g	¥20,000
AKS725.5	SODIUM ALUMINUM DICAPROLACTAM BIS(2-METHOXYETHOXIDE), 80% in toluene	25g	¥22,500		
AKS726	SODIUM ALUMINUM HYDRIDE BIS(METHOXYETHOXIDE), 70% (3.4M) in toluene	100g	¥15,800	2kg	¥47,500
OMAL082	TRIISOBUTYLALUMINUM	1.5kg	inquire		
OMAL082.2	TRIISOBUTYLALUMINUM, 1M in heptane (25-28 wgt%)	1.5kg	inquire		
OMAL086.2	TRIMETHYLALUMINUM, 2M in heptane (20-21 wgt%)	250g	inquire	1.5kg	inquire
OMAL086.4	TRIMETHYLALUMINUM, 2M in toluene (17-18 wgt%)	1.5kg	inquire		
OMAL088	TRIOCTYLALUMINUM, 25% in heptane	500g	inquire		
OMAL090	TRIS(DIETHYLAMIDO)ALUMINUM, dimer	10g	inquire		

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
ANTIMONY					
CXAN010	ANTIMONY ACETATE	100g	¥8,500	2kg	¥45,500
AKA090	ANTIMONY(III) n-BUTOXIDE	25g	¥21,500	100g	¥59,750
AKA100	ANTIMONY(III) ETHOXIDE	2.5g	¥12,500	10g	¥30,500
CXAN052	METHACRYLOXYDIPHENYLANTIMONY, 96%	10g	¥22,500		
OMAN071	p-(OCTYLOXYPHENYL)PHENYLIODONIUM HEXAFLUOROANTIMONATE	25g	¥24,000	100g	¥67,800
PAN-040	Poly(ANTIMONY ETHYLENE GLYCOXIDE)	25g	¥9,000	100g	¥19,000
OMAN076	(THIOPHENOXYPHENYL)DIPHENYLSULFONIUM HEXAFLUOROANTIMONATE- BLEND	25g	inquire	100g	inquire
OMAN078	TRIPHENYLANTIMONY	25g	¥9,300	100g	¥20,000
OMAN079	TRIPHENYLANTIMONY DICHLORIDE	5g	¥14,500		
OMAN080	TRIS(DIMETHYLAMINO)ANTIMONY	10g	¥34,500		
SIT8717.7	TRIS(TRIMETHYLSILOXY)ANTIMONY	5g	¥28,400		
ARSENIC					
AKA115	ARSENIC TRIETHOXIDE	5g	¥49,500		
W-GAL-51-0.5	GALLIUM ARSENIDE WAFER	Each	¥81,700		
OMAS078	TRIPHENYLARSINE	5g	¥9,300	25g	¥23,500
OMAS080	TRIS(DIMETHYLAMINO)ARSINE	25g	¥94,500		
BARIUM					
CXBA010	BARIUM ACETATE	100g	¥8,300		
CXBA015	BARIUM ACRYLATE, hydrate	25g	¥19,500		
AKB118	BARIUM(II) 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE, dihydrate	5g	¥41,500		
AKB119	BARIUM HEXAFLUORO-2,4-PENTANEDIONATE	5g	¥16,500		
AKB120	BARIUM ISOPROPOXIDE	2.5g	¥11,000	10g	¥25,800
AKB121	BARIUM ISOPROPOXIDE, 20% in isopropanol	25g	¥11,800	100g	¥28,000
CXBA050	BARIUM METHACRYLATE, dihydrate	25g	¥12,500		
AKB130	BARIUM(II) METHOXYPROPOXIDE, 25% in methoxypropanol	25g	¥9,500	100g	¥20,800
CXBA060	BARIUM NEODECANOATE	10g	¥16,500		
AKB140	BARIUM 2,4-PENTANEDIONATE, hydrate	25g	¥12,000	100g	¥29,000
AKB144	BARIUM(II) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE, hydrate	5g	¥25,800	25g	¥88,500
AKB144.1	BARIUM(II) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE, anhydrous	5g	¥28,500		
DBATI50	BARIUM TITANIUM DOUBLE METAL ALKOXIDE (0.5 M)	25g	¥9,500	100g	¥22,500
CXBA080	BARIUM TRIFLUOROACETATE	25g	¥15,000		
CXBA083	BARIUM TRIFLUOROMETHANESULFONATE	10g	¥16,500		
DBAY060	BARIUM YTTRIUM DOUBLE METAL ALKOXIDE (0.3 M)	25g	¥15,500	100g	¥40,300
DBAZR50	BARIUM ZIRCONIUM DOUBLE METAL ALKOXIDE (0.33 M)	25g	¥10,000	100g	¥22,500
BERYLLIUM					
AKB150	BERYLLIUM 2,4-PENTANEDIONATE	10g	¥14,300	50g	¥43,500
BISMUTH					
CXBI010	BISMUTH(III) ACETATE	25g	¥19,500		
CXBI040	BISMUTH 2-ETHYLHEXANOATE, 80-85% in mineral spirits	100g	¥9,300		
GEB1700	BISMUTH GERMANATE	10g	¥14,500		
AKB151	BISMUTH HEXAFLUORO-2,4-PENTANEDIONATE	2.5g	¥14,300	10g	¥36,000
AKB152	BISMUTH(III) ISOPROPOXIDE	2.5g	¥41,500		
CXBI060	BISMUTH NEODECANOATE, 99+%	10g	¥19,500		
CXBI061	BISMUTH NEODECANOATE, 70% in neodecanoic acid	25g	¥10,500		
CXBI074	BISMUTH SALICYLATE	25g	¥10,500		
AKB153.5	BISMUTH(III) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	5g	¥36,500		
CXBI083	BISMUTH TRIFLUOROMETHANESULFONATE, hydrate	5g	¥15,000		
OMBI078	TRIPHENYLBISMUTH	25g	¥16,500		
BORON					
INBO022	BORANE-TRIETHYLAMINE complex	100g	¥47,000		
AKB153.8	BORATRANE	25g	¥9,500	100g	¥20,800
INBO009	BORAZINE	50g	inquire		
AKB154	BORON ALLYLOXIDE	25g	¥25,500		
AKB155	BORON n-BUTOXIDE	100g	¥8,000	1.5kg	¥36,500
AKB156	BORON t-BUTOXIDE	25g	¥18,500	100g	¥50,000
AKB156.2	BORON ETHOXIDE	100g	¥12,000	500g	¥34,500
AKB156.5	BORON ISOPROPOXIDE	25g	¥9,300	100g	¥22,500
AKB157	BORON METHOXIDE	25g	¥7,000	2kg	¥20,500
AKB157.1	BORON METHOXIDE, 70% in methanol	100g	¥7,500	2kg	¥13,500
AKB158	BORON METHOXYETHOXIDE	25g	¥9,000	100g	¥19,300
AKB158.5	BORON n-PROPOXIDE	100g	¥8,000	500g	¥18,500
INBO060	BORON TRIFLUORIDE ETHERATE	25g	¥8,300	750g	¥16,500
AKB159.5	BORON VINYLDIMETHYLSILOXIDE	10g	¥22,300		
SID3354.0	N-(DICHLOROBORYL)HEXAMETHYLDISILAZANE	10g	¥35,300		
OMBO028	DIMETHYLANILINIUM TETRAKIS(PENTAFLUOROPHENYL) BORATE	2.5g	¥50,500		
AKB156.4	DIPHENYLBORANE 8-HYDROXYQUINOLINATE	5g	¥52,000		
OMBO037	(p-ISOPROPYLPHENYL)(p-METHYLPHENYL)IODONIUM TETRAKIS(PENTAFLUOROPHENYL) BORATE	5g	¥16,500	25g	¥52,500
OMBO039	LITHIUM TETRAKIS(PENTAFLUOROPHENYL)BORATE DIETHYL ETHER COMPLEX	5g	¥53,500		
OMBO073	POTASSIUM HYDROTRIS(1-PYRAZOLATO)BORATE, hydrate	5g	¥62,500		
SIS6968.0	SILICON HEXABORIDE	25g	¥35,300		
SNT7942	TIN(II) FLUOROBORATE, 47% in water	250g	¥10,000		
INTI027	TITANIUM BORIDE, powder	50g	¥13,300		
OMBO061	1,3,5-TRIMETHYLBORAZINE	25g	inquire		
OMBO078	TRIPHENYLBORANE, 95%	10g	¥28,000		

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
OMBO087	TRIS(PENTAFLUOROPHENYL)BORON	1.0g	¥18,000	5g	¥58,500
OMBO087.4	TRIS(PENTAFLUOROPHENYL)BORON, 10% in toluene	25g	¥77,000		
SIT8718.0	TRIS(TRIMETHYLSILOXY)BORON	25g	¥13,500	100g	¥36,300
CADMIUM					
CXCD010	CADMIUM ACETATE, dihydrate	25g	¥7,500	100g	¥14,300
AKC159.8	CADMIUM DIETHYLDITHIOCARBAMATE, 96%	25g	¥14,300	100g	¥43,500
CXCD045	CADMIUM FORMATE	25g	¥24,000		
INCD070	CADMIUM IODIDE	25g	¥12,500		
AKC160	CADMIUM 2,4-PENTANEDIONATE, hydrate	10g	¥20,500	50g	¥68,500
OMCD020	DIMETHYLCADMIUM	25g	inquire		
OMCD020.2	DIMETHYLCADMIUM, 10% in heptane	250g	inquire		
CALCIUM					
CXCA010	CALCIUM ACETATE, monohydrate	100g	¥7,000	2kg	¥24,000
CXCA015	CALCIUM ACRYLATE, tech-90	25g	¥9,300	2kg	¥102,000
AKC162	CALCIUM ETHOXIDE	10g	¥15,800	50g	¥49,500
CXCA040	CALCIUM 2-ETHYLHEXANOATE	5g	¥10,500		
CXCA045	CALCIUM FORMATE	100g	¥10,000		
CXCA046	CALCIUM D-GLUCONATE, hemihydrate	100g	¥7,500		
AKC162.5	CALCIUM 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	5g	¥34,500		
AKC163	CALCIUM HEXAFLUORO-2,4-PENTANEDIONATE	5g	¥16,500	25g	¥52,500
CXCA049	CALCIUM LACTATE, pentahydrate	250g	¥11,800		
SIC2050.0	CALCIUM METASILICATE	500g	¥7,400	2.5kg	¥17,400
CXCA050	CALCIUM METHACRYLATE, hydrate	25g	¥12,500		
AKC165	CALCIUM METHOXIDE, 95%	25g	¥15,000	100g	¥38,500
AKC167	CALCIUM METHOXYETHOXIDE, 20% in methoxyethanol	25g	¥14,300	100g	¥43,500
AKC170	CALCIUM 2,4-PENTANEDIONATE dihydrate, 95%	25g	¥10,500	100g	¥24,000
SIC2054.0	CALCIUM SILICIDE, tech-95, powder	250g	¥11,900		
SNC2060	CALCIUM STANNATE	25g	¥13,500		
AKC172	CALCIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥11,500	5g	¥32,500
CXCA083	CALCIUM TRIFLUOROMETHANESULFONATE	10g	¥19,500		
CXCA085	CALCIUM UNDECYLENATE	25g	¥14,000		
CERIUM					
CXCE010	CERIUM(III) ACETATE, hydrate	25g	¥8,500	100g	¥17,500
AKC176	CERIUM(IV) t-BUTOXIDE	2.5g	¥28,500		
CXCE040	CERIUM(III) 2-ETHYLHEXANOATE	25g	¥11,500	100g	¥27,300
CXCE041	CERIUM(III) 2-ETHYLHEXANOATE, 50% in mineral spirits (38%) / 2-ethylhexanoic acid (12%)	100g	¥9,300	2kg	¥32,000
AKC178	CERIUM(III) 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	5g	¥53,500		
AKC180	CERIUM(IV) ISOPROPOXIDE	1.0g	¥13,000	5g	¥38,500
AKC186	CERIUM(IV) METHOXYETHOXIDE, 18-20% in methoxyethanol	25g	¥21,500	100g	¥59,500
CXCE070	CERIUM(III) OXALATE, nonahydrate	25g	¥9,300		
AKC190	CERIUM(III) 2,4-PENTANEDIONATE, hydrate	25g	¥13,500	100g	¥33,800
AKC191	CERIUM(IV) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥19,500	5g	¥64,500
AKC191.5	CERIUM(IV) THENOYLTRIFLUOROACETONATE, 95%	1.0g	¥38,500		
CXCE082	CERIUM(III) TRIFLUOROMETHANESULFONATE, hydrate	5g	¥12,500		
CXCE083	CERIUM(IV) TRIFLUOROMETHANESULFONATE, hydrate	5g	¥14,300		
SIC2264.6	CERIUM(III) TRIS[BIS(TRIMETHYLSILYL)AMIDE]	5g	¥77,700		
CESIUM					
CXCS010	CESIUM ACETATE	25g	¥14,500		
CXCS045	CESIUM FORMATE, monohydrate	100g	¥25,000		
AKC192	CESIUM METHOXIDE, 10% in methanol	25g	¥31,500		
GEC2150	CESIUM TRICHLOROGERMANATE, 95%	5g	¥15,800	25g	¥49,500
CXCS080	CESIUM TRIFLUOROACETATE	10g	¥12,000		
CHROMIUM					
CXCR012	CHROMIUM(III) ACETATE HYDROXIDE	100g	¥9,000		
AKC195	CHROMIUM(III) BENZOYLACETONATE	2.5g	¥23,500		
CXCR036	CHROMIUM(III) DICHLORIDE HYDROXIDE - METHACRYLIC ACID - AQUA COMPLEX, 40% soln.	100g	¥14,500		
CXCR042	CHROMIUM(III) 2-ETHYLHEXANOATE, 65-70% in mineral spirits	100g	¥11,000		
AKC198	CHROMIUM(III) HEXAFLUORO-2,4-PENTANEDIONATE- TETRAHYDROFURAN COMPLEX	1.0g	¥20,500		
AKC205	CHROMIUM(III) METHOXYPROPOXIDE, 10-12% in methoxypropanol	10g	¥19,500	50g	¥64,500
AKC210	CHROMIUM(III) 2,4-PENTANEDIONATE	100g	¥10,500	500g	¥28,500
AKC216	CHROMIUM(III) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥13,800	5g	¥41,500
AKC218	CHROMIUM(III) 1,1,1-TRIFLUORO-2,4-PENTANEDIONATE	1.0g	¥27,000		
COBALT					
CXCO010	COBALT(II) ACETATE, tetrahydrate	25g	¥7,000		
AKC225	COBALT(II) BENZOYLACETONATE	5g	¥19,500		
INCO030	COBALT CARBONYL	25g	¥27,000		
AKC230	COBALT(II) 2,4-PENTANEDIONATE, hydrate	50g	¥11,500	250g	¥32,500
AKC235	COBALT(III) 2,4-PENTANEDIONATE	50g	¥13,500	250g	¥40,500
AKC238	COBALT(II) PHTHALOCYANINE	10g	¥32,000		
AKC240	COBALT(III) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	5g	¥42,000		
INCO032	COBALT TRICARBONYL NITROSYL	10g	¥77,000		
OMCO018	CYCLOPENTADIENYLCOBALT DICARBONYL	10g	¥49,500		
COPPER					
CXCU010	COPPER(II) ACETATE, monohydrate	100g	¥9,000	2kg	¥37,500
AKC242	COPPER(II) ALLYLOXYETHOXYTRIFLUOROACETOACETATE	1.0g	¥32,000		

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
AKC246	COPPER(II) BENZOYLACETONATE	5g	¥16,500		
AKC247	COPPER(II) BENZOYLTRIFLUOROACETONATE	5g	¥33,500		
AKC248	COPPER(II) DIMETHYLAMINOETHOXIDE	5g	¥49,500		
AKC248.5	COPPER(II) DIMETHYLDITHIOCARBAMATE	25g	¥11,000		
AKC249	COPPER 1,3-DIPHENYL-1,3-PROPANEDIONATE	5g	¥16,500	25g	¥52,500
AKC250	COPPER(II) ETHOXIDE	5g	¥18,500	25g	¥60,500
AKC252	COPPER(II) ETHYLACETOACETATE	10g	¥15,000	50g	¥46,500
CXCU040	COPPER(II) 2-ETHYLHEXANOATE	25g	¥20,500		
CXCU045	COPPER(II) FORMATE, tetrahydrate	100g	¥11,500	500g	¥32,500
AKC252.4	COPPER(II) 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	1.0g	¥12,300	5g	¥35,500
AKC252.5	COPPER(I) HEXAFLUORO-2,4-PENTANEDIONATE 2-BUTYNE COMPLEX	2.5g	¥20,500		
AKC252.7	COPPER(I) HEXAFLUORO-2,4-PENTANEDIONATE CYCLOOCTADIENE COMPLEX	2.5g	¥18,300		
AKC252.8	COPPER(I)/(II) HEXAFLUORO-2,4-PENTANEDIONATE - VINYLTRIMETHYLSILANE COMPLEX	10g	¥20,500	50g	¥68,500
AKC253	COPPER(II) HEXAFLUORO-2,4-PENTANEDIONATE, dihydrate	5g	¥12,500	50g	¥59,500
AKC253.2	COPPER 8-HYDROXYQUINOLINATE	50g	¥9,500	250g	¥24,500
CXCU050	COPPER(II) METHACRYLATE, monohydrate	25g	¥16,500		
AKC253.5	COPPER(II) METHACRYLOXYETHYLACETOACETATE	10g	¥16,500		
AKC254	COPPER(II) METHOXIDE	5g	¥17,500		
AKC255	COPPER(II) METHOXYETHOXYETHOXIDE, 10-12% in methoxyethoxyethanol	25g	¥15,800	100g	¥41,000
AKC260	COPPER(II) 2,4-PENTANEDIONATE	50g	¥8,500	250g	¥20,500
AKC261	COPPER(II) PHTHALOCYANINE	25g	¥17,500		
SIC2435.0	COPPER SILICIDE	25g	¥26,300		
AKC262	COPPER(II) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥9,800	5g	¥25,500
AKC263	COPPER(1) THIOPHENOXIDE	10g	¥13,000		
CXCU080	COPPER(II) TRIFLUOROACETATE, hydrate	5g	¥16,500		
CXCU083	COPPER(II) TRIFLUOROMETHANESULFONATE	5g	¥14,500		
AKC264	COPPER(II) 1,1,1-TRIFLUORO-2,4-PENTANEDIONATE	10g	¥15,000	50g	¥46,500
AKI362.2	INDIUM COPPER BIS(ETHYLTHIOLATE)TRIPHENYLPHOSPHINE COMPLEX	10g	¥39,500		
AKI362.4	INDIUM COPPER BIS(PHENYLSELENATE)TRIPHENYLPHOSPHINE COMPLEX	5g	¥59,500		
DYSPROSIUM					
CXDY010	DYSPROSIUM ACETATE, hydrate	25g	¥11,500		
AKD270	DYSPROSIUM 2,4-PENTANEDIONATE, hydrate	5g	¥16,000		
AKD272	DYSPROSIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥11,500	5g	¥32,500
CXDY083	DYSPROSIUM TRIFLUOROMETHANESULFONATE	5g	¥13,500		
ERBIUM					
CXER010	ERBIUM(III) ACETATE, tetrahydrate	25g	¥16,500		
AKE274	ERBIUM(III) 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	1.0g	¥10,500	5g	¥28,500
AKE275	ERBIUM HEXAFLUORO-2,4-PENTANEDIONATE	5g	¥35,500		
AKE276	ERBIUM 8-HYDROXYQUINOLINATE	1.0g	¥32,500		
AKE277	ERBIUM METHOXYETHOXIDE, 15-16% in methoxyethanol	25g	¥16,500	100g	¥43,500
AKE280	ERBIUM 2,4-PENTANEDIONATE	5g	¥15,800	25g	¥49,500
AKE282	ERBIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥11,000	5g	inquire
CXER083	ERBIUM TRIFLUOROMETHANE SULFONATE	5g	¥14,500		
SIE4885.0	ERBIUM TRIS(HEXAMETHYLDISILAZIDE)	5g	¥80,400		
EUROPIUM					
CXEU010	EUROPIUM ACETATE, hydrate	5g	¥20,500		
AKE286	EUROPIUM 1,3-DIPHENYL-1,3-PROPANEDIONATE	5g	¥50,000		
AKE286.5	EUROPIUM 1,3-DIPHENYL-1,3-PROPANEDIONATE-1,10-PHENANTHROLINE	1.0g	¥94,500		
AKE287	EUROPIUM(III) 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	1.0g	¥11,000	5g	¥30,500
CXEU050	EUROPIUM(III) METHACRYLATE	5g	¥28,500		
AKE290	EUROPIUM 2,4-PENTANEDIONATE	1.0g	¥15,000	5g	¥46,500
AKE295	EUROPIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥11,500	5g	¥32,500
AKE297	EUROPIUM(III) THENOYLTRIFLUOROACETONATE, 95%	1.0g	¥16,500	5g	¥52,500
SIE4907.0	EUROPIUM(III) TRIS(HEXAMETHYLDISILAZIDE)	5g	¥59,100		
GADOLINIUM					
CXGD010	GADOLINIUM ACETATE, tetrahydrate	10g	¥12,500		
CXGD024	GADOLINIUM(III) DIETHYLENETRIAMINEPENTAACETIC ACID, hydrate	10g	¥21,500		
AKG299	GADOLINIUM 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	1.0g	¥20,000		
AKG300	GADOLINIUM 2,4-PENTANEDIONATE, trihydrate	2.5g	¥10,000	10g	¥23,500
AKG306	GADOLINIUM(III) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	5g	¥33,500		
SIG4994.0	GADOLINIUM TRIS(HEXAMETHYLDISILAZIDE)	5g	¥85,700		
GALLIUM					
OMGA025	DIETHYLGALLIUM CHLORIDE	10g	inquire		
OMGA038	DIMETHYLGALLIUM 2,4-PENTANEDIONATE	25g	¥242,000		
W-GAL-51-0.5	GALLIUM ARSENIDE WAFER	Each	¥81,700		
AKG320	GALLIUM(III) ETHOXIDE	2.5g	¥39,500		
AKG308	GALLIUM 8-HYDROXYQUINOLINATE, 99+%	5g	¥25,000		
AKG321	GALLIUM ISOPROPOXIDE	5g	¥49,500		
AKG310	GALLIUM(III) 2,4-PENTANEDIONATE	2.5g	¥9,500	10g	¥20,800
AKG322	GALLIUM(III) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	5g	¥49,500		
INGA070	GALLIUM TRIIODIDE	10g	¥25,500		
SIG4998.0	GALLIUM TRIS(HEXAMETHYDISILAZIDE)	5g	¥77,700		
OMGA079	TRIMETHYLGALLIUM	100g	inquire		
OMGA080	TRIS(DIMETHYLAMINO)GALLIUM	2.5g	¥49,500		

METAL ORGANICS

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
GERMANIUM					
GEA0515	ALLYLTRICHLOROGERMANE	5g	¥53,500		
GEA0530	ALLYLTRIETHYLGERMANE	5g	¥53,000		
GEA0550	ALLYLTRIMETHYLGERMANE	2.5g	¥53,000		
GEA0600	3-AMINOPROPYLTRIBUTYLGERMANE	2.5g	¥59,500		
GEA0700	AMMONIUM HEXAFLUOROGERMANATE	5g	¥16,800		
GEB0969	BENZYLTRICHLOROGERMANE	5g	¥43,500		
GEB1025	BIS[BIS(TRIMETHYLSILYL)AMINO]GERMANIUM(II)	2.5g	¥25,500		
GEB1026	BIS[BIS(TRIMETHYLSILYL)METHYL]GERMANIUM(II)	1.0g	¥37,500		
GEB1050	BIS(CHLOROMETHYL)DIMETHYLGERMANE, 95%	2.5g	¥57,000		
GEB1700	BISMUTH GERMANATE	10g	¥14,500		
GEB1933	t-BUTYLDIMETHYLCHLOROGERMANE	2.5g	¥26,000		
GEB1969.5	n-BUTYLGERMANE	5g	¥28,500	25g	¥101,000
GEB1970	t-BUTYLGERMANE	5g	¥37,500		
GEB1975	n-BUTYLTRICHLOROGERMANE	5g	¥19,500	25g	¥64,500
GEB1980	t-BUTYLTRICHLOROGERMANE	5g	¥21,500	25g	¥72,500
GEC2100	CARBOXYETHYLGERMANIUM SESQUIOXIDE	5g	¥11,500	25g	¥32,500
GEC2262	CARBOXYETHYLTRICHLOROGERMANE	5g	¥33,500		
GEC2150	CESIUM TRICHLOROGERMANATE, 95%	5g	¥15,800	25g	¥49,500
GEC2289.8	CHLOROMETHYLMETHYLDICHLOROGERMANE	2.5g	¥47,500		
GEC2300	CHLOROMETHYLTRIMETHYLGERMANE	2.5g	¥39,500		
GEC2400	3-CHLOROPROPYLTRICHLOROGERMANE, 95%	5g	¥63,500		
GEC2550	CYCLOPENTADIENYLTRIMETHYLGERMANE	1.0g	¥32,000		
GED3150	DI-n-BUTYLDIACETOXYGERMANE, tech-90	1.0g	¥16,500		
GED3200	DI-n-BUTYLDICHLOROGERMANE, 95%	2.5g	¥16,800	10g	¥44,500
GED3300	DI-n-BUTYLGERMANE	5g	¥74,500		
GED3365	DICHLOROMETHYLTRIMETHYLGERMANE, 95%	2.5g	¥43,500		
GED3400	DIETHYLDICHLOROGERMANE	2.5g	¥21,800	10g	¥60,500
GED3404	DIETHYLDIETHOXYGERMANE	10g	¥52,000		
GED3410	DIETHYLGERMANE	5g	¥76,000		
GED3450	DIGERMANE, 60 wgt.% in hydrogen	2.5g	¥76,000		
GED3600	DIMETHYLAMINOTRIMETHYLGERMANE	2.5g	¥45,500		
GED4100	DIMETHYLDICHLOROGERMANE	2.5g	¥17,500	10g	¥46,800
GED4150	DIMETHYLGERMANE	10g	inquire		
GED4500	DIPHENYLDICHLOROGERMANE	2.5g	¥24,000	10g	¥63,000
GED4538	DIPHENYLDIMETHYLGERMANE	2.5g	¥18,300	10g	¥49,300
GED4550	DIPHENYLGERMANE	1.0g	¥16,800	5g	¥53,500
GEE4695	ETHYLGERMANE	10g	inquire		
GEE4700	ETHYLTRICHLOROGERMANE	5g	¥26,500	25g	¥92,500
GEE4710	ETHYLTRIETHOXYGERMANE	1.0g	¥13,000	5g	¥38,500
GEG5000	GERMANE	10g	¥13,000	50g	¥38,500
GEG5001	GERMANE 99.99+%	10g	¥13,000	50g	¥38,500
GEG5001-H1	GERMANE, 10% in hydrogen (v/v)	10g	inquire		
GEG5020	GERMANIUM, 99.99%	10g	¥24,500	50g	¥84,500
W-GE-25-1.0	GERMANIUM WAFER	Each	¥45,900		
GEG5180	GERMANIUM DICHLORIDE-DIOXANE COMPLEX	5g	¥16,500	25g	¥52,500
GEG5200	GERMANIUM DIIODIDE	2.5g	¥24,500	10g	¥69,500
GEG5300	GERMANIUM DIOXIDE, 99.99%	10g	¥17,500	50g	¥56,500
GEG5350	GERMANIUM DISELENIDE	5g	¥38,500		
GEG5355	GERMANIUM DISULFIDE	5g	¥32,000		
GEG5420	GERMANIUM NITRIDE	5g	¥37,500		
GEG5430	GERMANIUM(II) SULFIDE	5g	¥39,500		
GEG5480	GERMANIUM TELLURIDE	5g	¥44,500		
GEG5500	GERMANIUM TETRABROMIDE	5g	¥24,500	25g	¥84,500
GEG5600	GERMANIUM TETRACHLORIDE, 99.9+%	25g	¥23,500	100g	¥66,500
GEG5601	GERMANIUM TETRACHLORIDE 99.999%	100g	inquire		
GEG5700	GERMANIUM TETRAFLUORIDE, 99.9+%	10g	inquire		
GEG5800	GERMANIUM TETRAIODIDE	10g	¥24,000	50g	¥82,500
GEH6000	HEXAETHYLDIGERMANE	2.5g	¥35,500		
GEH6066	HEXAETHYLDIGERMOXANE	10g	¥36,500		
GEH6100	HEXAMETHYLDIGERMANE	2.5g	¥36,000		
GEH6150	HEXAPHENYLDIGERMANE	1.0g	¥15,800	5g	¥49,500
GEH6160	HEXAPHENYLDIGERMOXANE	2.5g	¥26,500		
GEH6170	HYDROXYGERMATRANE, monhydrate	5g	¥14,500	25g	¥44,500
GEI6480	ISOBUTYLGERMANE	5g	¥49,500		
GEL6467	LITHIUM METAGERMANATE	25g	¥35,500		
GEM6485	METHACRYLOXYMETHYLTRIMETHYLGERMANE	2.5g	¥23,500	10g	¥66,500
GEM6490	METHACRYLOXYTRIETHYLGERMANE	5g	¥45,500		
GEM6499	METHYLGERMANE	10g	inquire		
GEM6500	METHYLTRICHLOROGERMANE	2.5g	¥15,000	10g	¥38,500
GEM6550	METHYLTRIETHOXYGERMANE	5g	¥37,500		
GEP6727	PHENYLDIMETHYLCHLOROGERMANE	1.0g	¥15,000	5g	¥46,500
GEP6749	PHENYLGERMANE	5g	¥69,500		
GEP6800	PHENYLTRICHLOROGERMANE	2.5g	¥20,500	10g	¥56,500
GEP6806	PHENYLTRIMETHYLGERMANE	5g	¥26,000		

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
GEP6894	POTASSIUM HEXAFLUOROGERMANATE	5g	¥24,500		
GES6940	SODIUM METAGERMANATE, hydrate, 95%	5g	¥16,800	25g	¥53,500
GET7000	TETRAALLYLGERMANE	1.0g	¥14,500	5g	¥44,500
GET7060	TETRA-n-BUTOXYGERMANE	5g	¥14,000	25g	¥42,500
GET7080	TETRA-n-BUTYLGERMANE	5g	¥13,500	25g	¥40,500
GET7100	TETRAETHOXYGERMANE	10g	¥15,000	50g	¥46,500
GET7101	TETRAETHOXYGERMANE, 99.999%	25g	¥84,500		
GET7150	TETRAETHYLGERMANE	2.5g	¥14,500	10g	¥37,000
GET7280	TETRAISOPROPOXYGERMANE	2.5g	¥12,500	10g	¥30,500
GET7277	TETRAKIS(DIMETHYLAMINO)GERMANE	5g	¥26,500		
GET7296	TETRAKIS(TRIMETHYLSILOXY)GERMANE	2.5g	¥44,500		
GET7500	TETRAMETHOXYGERMANE	10g	¥18,300	50g	¥59,500
GET7550	TETRAMETHYLGERMANE	2.5g	¥11,800	10g	¥28,000
GET7750	TETRAPHENYLGERMANE	5g	¥13,500		
GET7850	TETRA-n-PROPYLGERMANE	10g	¥43,500		
GET8075	TRI-n-BUTYLBROMOGERMANE, 95%	5g	¥32,500		
GET8080	TRI-n-BUTYLCHLOROGERMANE, tech-90	5g	¥18,000	25g	¥58,500
GET8100	TRI-n-BUTYLGERMANE, 99%	2.5g	¥23,500	10g	¥66,300
GET8150	TRICHLOROGERMANE	10g	¥52,000		
GET8160	3-(TRICHLOROGERMYL)PROPIONYLCHLORIDE	2.5g	¥39,000		
GET8200	TRIETHYLBROMOGERMANE	10g	¥37,500		
GET8240	TRIETHYLCHLOROGERMANE	5g	¥30,500		
GET8300	TRIETHYLGERMANE	5g	¥49,500		
GET8360	TRIFLUOROMETHYLTRIIODOGERMANE	2.5g	¥77,000		
GET8383	TRIISOPROPYLCHLOROGERMANE	5g	¥33,500		
GET8440	TRIMETHYLBROMOGERMANE	5g	¥25,800	25g	¥89,500
GET8500	TRIMETHYLCHLOROGERMANE	5g	¥24,500	25g	¥84,500
GET8560	TRIMETHYLGERMANE	2.5g	¥33,500	10g	¥99,000
GET8561	TRIMETHYLGERMYLTRICHLOROSILANE	10g	¥41,500		
GET8562	TRIMETHYLIODOGERMANE	2.5g	¥26,800		
GET8595.5	TRIMETHYLSILYLMETHYLTRIMETHYLGERMANE	5g	¥40,500		
GET8630	TRIPHENYLBROMOGERMANE, tech-95	5g	¥27,500		
GET8640	TRIPHENYLCHLOROGERMANE, tech-95	2.5g	¥16,800	10g	¥44,300
GET8660	TRIPHENYLGERMANE	2.5g	¥21,500	10g	¥59,500
GET8717	TRIS(TRIFLUOROMETHYL)IODOGERMANE	2.5g	¥72,000		
GET8721.5	TRIS(TRIMETHYLSILYL)GERMANE	1.0g	¥49,500		
GEV9200	VINYLTRIETHYLGERMANE, 95%	2.5g	¥33,500	10g	¥76,000
GOLD					
W-GOG-75-1.1	GOLD COATED GLASS SLIDES	5 slides	¥88,300		
OMGO017	TRIETHYLPHOSPHINE GOLD(I) CHLORIDE	1.0g	¥30,800	5g	¥110,000
OMGO019	TRIETHYLPHOSPHINOGOLD(I) DIETHYLDITHIOCARBAMATE	0.5g	¥49,500		
HAFNIUM					
OMHF016	BIS(PENTAMETHYLCYCLOPENTADIENYL)HAFNIUM DICHLORIDE	2.5g	¥34,500		
AKH325	HAFNIUM n-BUTOXIDE	25g	¥18,000	100g	¥48,500
AKH325.1	HAFNIUM n-BUTOXIDE, 45% in hexane	25g	¥8,500	100g	¥17,500
AKH326	HAFNIUM t-BUTOXIDE	5g	¥29,500		
AKH328	HAFNIUM DI-n-BUTOXIDE (BIS-2,4-PENTANEDIONATE), tech, 50% in toluene/n-butanol	100g	¥20,800		
OMHF075	HAFNIUM DIETHYLAMIDE	5g	¥34,500		
OMHF080	HAFNIUM DIMETHYLAMIDE	5g	¥41,000		
AKH330	HAFNIUM ETHOXIDE	5g	¥16,800	25g	¥53,500
AKH332	HAFNIUM 2-ETHYLHEXOXIDE, 95%	25g	¥19,500		
AKH333	HAFNIUM 2-METHOXYMETHYL-2-PROPOXIDE	5g	¥33,500		
AKH334	HAFNIUM n-OCTOXIDE, 95%	25g	¥20,500		
AKH335	HAFNIUM 2,4-PENTANEDIONATE	10g	¥16,000	50g	¥50,500
INHF065	HAFNIUM TETRACHLORIDE	100g	¥34,500		
INHF070	HAFNIUM TETRAIODIDE	10g	¥40,800		
OMHF083	HAFNIUM TETRAKIS(ETHYLMETHYLAMIDE)	5g	¥30,500	25g	¥109,000
CXHF083	HAFNIUM TETRAKIS(TRIFLUOROMETHANESULFONATE), hydrate	2.5g	¥23,300		
AKH345	HAFNIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	5g	¥38,500		
AKH350	HAFNIUM 1,1,1-TRIFLUORO-2,4-PENTANEDIONATE	2.5g	¥14,000	10g	¥35,500
OMHF085	HAFNOCENE DICHLORIDE	5g	¥27,000		
OMHF050	PENTAMETHYLCYCLOPENTADIENYLHAFNIUM TRICHLORIDE	5g	¥84,500		
OMHF077	TETRABENZYLHAFNIUM	1.0g	¥32,000		
HOLMIUM					
CXHO010	HOLMIUM(III) ACETATE, monohydrate	5g	¥11,500		
AKH358	HOLMIUM(III) 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	5g	¥57,000		
AKH360	HOLMIUM 2,4-PENTANEDIONATE	2.5g	¥20,500		
AKH362	HOLMIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥12,500	5g	¥36,500
INDIUM					
OMIN020	DIMETHYLINDIUM CHLORIDE	5g	inquire		
AKI362.2	INDIUM COPPER BIS(ETHYLTHIOLATE)TRIPHENYLPHOSPHINE COMPLEX	10g	¥39,500		
AKI362.4	INDIUM COPPER BIS(PHENYLSELENATE)TRIPHENYLPHOSPHINE COMPLEX	5g	¥59,500		
AKI363	INDIUM DIISOPROPYLDITHIOCARBAMATE	10g	¥32,000		
AKI364	INDIUM HEXAFLUORO-2,4-PENTANEDIONATE, 95%	5g	¥53,500		
AKI365	INDIUM METHOXYETHOXIDE, 15-18% in methoxyethanol	5g	¥12,500	25g	¥36,500

METAL ORGANICS

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
AKI373	INDIUM METHYL(TRIMETHYLACETYL)ACETATE	5g	¥34,500		
AKI370	INDIUM 2,4-PENTANEDIONATE	2.5g	¥11,500	10g	¥27,300
W-INP-51-0.3	INDIUM PHOSPHIDE WAFER	Each	¥168,500		
AKI374	INDIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥21,800		
AKI375	INDIUM 1,1,1-TRIFLUORO-2,4-PENTANEDIONATE	1.0g	¥24,000		
DINSN20	INDIUM TIN	25g	¥22,000	100g	¥61,500
W-ITO-75-1.1	INDIUM TIN OXIDE COATED GLASS SLIDES	5 slides	¥25,700		
OMIN079	TRIMETHYLINDIUM	25g	inquire		
IRIDIUM					
OMIR017	IRIDIUM(I) CYCLOOCTADIENE CHLORIDE, dimer	2.5g	¥59,500		
AKI378	IRIDIUM(I) DICARBONYL 2,4-PENTANEDIONATE	1.0g	¥49,500		
AKI380	IRIDIUM(III) 2,4-PENTANEDIONATE	0.5g	¥21,500	2.5g	¥72,500
AKI383	IRIDIUM(I) 2,4-PENTANEDIONATE-CYCLOOCTADIENE COMPLEX	1.0g	¥57,000		
IRON					
SIB1088.0	1,1'-BIS(DIMETHYLSILYL)FERROCENE	1.0g	¥31,000		
OMFE022	1,1'-BIS(DIPHENYLPHOSPHINO)FERROCENE	10g	¥28,500	50g	¥101,000
SIF4908.0	2-FERROCENYLETHYLTRIETHOXYSILANE	1.0g	¥61,800		
SIF4910.0	FERROSILICON	500g	¥10,900		
CXFE010	IRON(II) ACETATE	10g	¥16,500		
CXFE015	IRON(III) ACRYLATE, 95%	25g	¥26,000		
AKI396	IRON(III) BENZOYLACETONATE	5g	¥15,800	25g	¥49,500
AKI396.5	IRON(III) t-BUTOXIDE	2.5g	¥94,500		
INFE030	IRON CARBONYL, tech-95	25g	¥10,500	100g	¥22,500
CXFE030	IRON(III) CITRATE, hydrate, tech-95	100g	¥9,300		
AKI397	IRON(III) DIMETHYLDITHIOCARBAMATE	25g	¥19,500		
AKI398	IRON(III) DIPHENYLPROPANEDIONATE	5g	¥41,500		
AKI400	IRON(III) ETHOXIDE	5g	¥16,500	25g	¥53,500
AKI402	IRON(III) ETHOXIDE, 22-25% in tetrahydrofuran	100g	¥33,500		
AKI405	IRON(III) HEXAFLUORO-2,4-PENTANEDIONATE	1.0g	¥25,000		
CXFE050	IRON(III) METHACRYLATE, 95%	50g	¥26,000		
INFE043	IRON(II,III) OXIDE MAGNETOFLUID, 1.8% dispersed in light mineral oil	10g	¥27,000	50g	¥94,500
INFE044	IRON(II,III) OXIDE MAGNETOFLUID, 3.6% dispersed in water	5g	¥26,000	25g	¥90,500
AKI410	IRON(III) 2,4-PENTANEDIONATE	100g	¥9,000	1kg	¥36,000
AKI412	IRON(III) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	10g	¥37,500		
AKI415	IRON(III) 1,1,1-TRIFLUORO-2,4-PENTANEDIONATE	5g	¥15,800	25g	¥49,500
AKI411	IRON(II) TRIS(1,10-PHENANTHROLINE) HEXAFLUOROPHOSPHATE	5g	¥75,500		
INSR036	STRONTIUM FERRITE, powder	100g	¥8,500		
OMFE090	VINYLFERROCENE	5g	¥64,500		
LANTHANUM					
CXLA010	LANTHANUM ACETATE, sesquihydrate	50g	¥9,300		
AKL418	LANTHANUM 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	1.0g	¥19,500		
AKL420	LANTHANUM ISOPROPOXIDE, 95%	2.5g	¥17,500	10g	¥46,800
AKL424	LANTHANUM METHOXYETHOXIDE, 10-12% in methoxyethanol	25g	¥16,000	100g	¥42,000
AKL430	LANTHANUM 2,4-PENTANEDIONATE, hydrate	10g	¥9,500	50g	¥24,500
AKL435	LANTHANUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥12,000	5g	¥34,500
CXLA083	LANTHANUM TRIFLUOROMETHANESULFONATE	5g	¥15,800		
SIL6464.0	LANTHANUM TRIS(HEXAMETHYLDISILAZIDE)	5g	¥77,700		
LEAD					
PBL6180	LEAD, powder	250g	¥7,500		
PBL6190	LEAD(II) ACETATE, trihydrate	250g	¥12,500		
PBL6193	LEAD(II) ACRYLATE	25g	¥16,800		
PBL6195	LEAD BISILICATE	250g	¥14,000		
PBL6210	LEAD(II) CARBONATE	250g	¥8,500		
PBL6220	LEAD(II) CHLORIDE	250g	¥11,800		
PBL6280	LEAD(II) 2-ETHYLHEXANOATE, 95%	250g	¥21,800		
PBL6285	LEAD(II) FLUORIDE	100g	¥13,000		
PBL6286	LEAD(II) 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	2.5g	¥18,000		
PBL6287	LEAD(II) HEXAFLUORO-2,4-PENTANEDIONATE	5g	¥18,500	25g	¥60,500
PBL6295	LEAD(II) METHACRYLATE	25g	¥14,500		
PBL6298	LEAD METHANESULFONATE, 50% in water	25g	¥12,500	250g	¥30,500
PBL6300	LEAD MONOSILICATE	250g	¥12,500		
PBL6340	LEAD(II) NEODECANOATE, 60% in heptane	25g	¥20,500		
PBL6360	LEAD(II) NITRATE	250g	¥11,500		
PBL6380	LEAD(II) OXIDE	500g	¥10,500		
PBL6400	LEAD(IV) OXIDE	250g	¥15,800		
PBL6420	LEAD(II) 2,4-PENTANEDIONATE, tech-95	25g	¥14,000	100g	¥35,500
PBL6430	LEAD(IV) PROPIONATE, tech-95	25g	¥16,800		
PBL6455	LEAD TETRAACETATE, tech-95	100g	¥16,500		
PBL6458	LEAD(II) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	2.5g	¥15,800	10g	¥41,000
PBL6465	LEAD TITANATE	100g	¥10,800		
PBL6459	LEAD TITANIUM OXOACETOXYETHOXIDE	50g	¥30,500		
PBL6470	LEAD(II) TRIFLUOROACETATE, hemihydrate	10g	¥14,500		
W-PZT-25-02	LEAD ZIRCONATE TITANATE WAFER	Each	¥11,900		
PBL6457	TETRA-n-BUTYLLEAD, tech-95	5g	inquire	25g	inquire
PBL6459.5	TETRAETHYLLEAD	5g	inquire		
PBL6460	TETRAPHENYLLEAD, 95%	5g	¥16,500		

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
LUTETIUM					
AKL480	LUTETIUM 2,4-PENTANEDIONATE, hydrate	0.5g	¥16,500	2.5g	¥52,500
LITHIUM					
OMLI012	n-BUTYLLITHIUM, 2.5M in hexane	1.25kg	inquire		
CXLI010	LITHIUM ACETATE, dihydrate	100g	¥8,000		
CXLI015	LITHIUM ACRYLATE	25g	¥16,500		
INLI009	LITHIUM ALUMINUM HYDRIDE, pellets	25g	¥14,500	250g	¥61,500
AKL454	LITHIUM t-BUTOXIDE	25g	¥18,500	100g	¥50,000
AKL454.4	LITHIUM t-BUTOXIDE, 2M in THF	100g	¥20,500		
AKL458	LITHIUM ETHOXIDE, 2M in ethanol	100g	¥29,000		
CXLI045	LITHIUM FORMATE, monohydrate	25g	¥8,000	25g	¥13,500
SIL6466.5	LITHIUM HEXAFLUOROSILICATE, dihydrate	10g	¥20,400		
SIL6467.0	LITHIUM HEXAMETHYLDISILAZIDE	25g	¥11,400	100g	¥29,400
SIL6467.2	LITHIUM HEXAMETHYLDISILAZIDE, 0.85M in hexane	100g	¥8,300	2.5kg	¥95,000
SIL6467.4	LITHIUM HEXAMETHYLDISILAZIDE, 1.25M in tetrahydrofuran	100g	¥13,500	2kg	¥62,000
AKL459	LITHIUM ISOPROPOXIDE	5g	¥11,500		
GEL6467	LITHIUM METAGERMANATE	25g	¥35,500		
SIL6469.0	LITHIUM METASILICATE	500g	¥26,800		
CXLI050	LITHIUM METHACRYLATE	25g	¥13,000		
AKL460	LITHIUM METHOXIDE	25g	¥14,500	100g	¥37,000
AKL461	LITHIUM METHOXIDE, 2.25M in methanol (9-10 wgt %)	25g	¥7,500	500g	¥32,000
W-NBL-25-01	LITHIUM NIOBATE WAFER	Each	¥80,400		
DLINB050	LITHIUM NIOBIUM DOUBLE METAL ALKOXIDE (0.85 M)	25g	¥25,500	100g	¥72,800
SIL6469.2	LITHIUM ORTHOSILICATE, tech-95	25g	¥67,100		
AKL470	LITHIUM 2,4-PENTANEDIONATE	25g	¥9,500	100g	¥20,800
SIL6469.5	LITHIUM POLYSILICATE, 20% in water	100g	¥6,100	1kg	¥12,300
SIL6469.6	LITHIUM SILICIDE	25g	¥51,200		
DLITA050	LITHIUM TANTALUM DOUBLE METAL ALKOXIDE	10g	¥22,500		
OMBO039	LITHIUM TETRAKIS(PENTAFLUOROPHENYL)BORATE DIETHYL ETHER COMPLEX	5g	¥53,500		
AKL472	LITHIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	5g	¥20,500		
CXLI080	LITHIUM TRIFLUOROACETATE, monohydrate	25g	¥13,300		
CXLI083	LITHIUM TRIFLUOROMETHANESULFONATE	25g	¥15,000	100g	¥38,800
SIL6469.7	LITHIUM TRIMETHYLSILANOLATE	10g	¥22,500		
SIL6470.0	LITHIUM (TRIMETHYLSILYL)ACETYLIDE, 0.5M in tetrahydrofuran	25g	¥13,000	100g	¥34,500
SIT8593.5	TRIMETHYLSILYLMETHYLLITHIUM, 1M in hexane	100g	¥38,500		
MAGNESIUM					
AKA074	ALUMINUM MAGNESIUM ISOPROPOXIDE	10g	¥41,000		
CXMG015	MAGNESIUM ACRYLATE	25g	¥15,000		
DMGAL30	MAGNESIUM ALUMINUM DOUBLE METAL ALKOXIDE, (0.75M)	25g	¥9,000	100g	¥19,300
DMGAL50	MAGNESIUM ALUMINUM DOUBLE METAL ALKOXIDE, (1.0M)	25g	¥9,000	100g	¥19,300
AKM490	MAGNESIUM t-BUTOXIDE, tech-90	25g	¥13,500		
AKM500	MAGNESIUM ETHOXIDE	100g	¥9,500	1kg	¥39,500
AKM502	MAGNESIUM HEXAFLUORO-2,4-PENTANEDIONATE, dihydrate	5g	¥28,500		
SIM6470.5	MAGNESIUM HEXAFLUOROSILICATE	500g	¥10,400	10kg	¥81,000
INMG040	MAGNESIUM HYDRIDE	100g	¥44,500		
CXMG040	MAGNESIUM LACTATE, trihydrate	250g	¥14,500		
CXMG050	MAGNESIUM METHACRYLATE	5g	¥9,000		
AKM503	MAGNESIUM METHOXIDE, 7-8% in methanol	25g	¥7,000	1.5kg	¥16,500
AKM503.5	MAGNESIUM METHOXYETHOXIDE, 25% in methoxyethanol	25g	¥10,500	100g	¥24,000
AKM506	MAGNESIUM METHYL CARBONATE, 2M in dimethylformamide	100g	¥27,500		
SIM6470.7	MAGNESIUM MONTMORILLONATE	500g	¥9,600	10kg	¥48,000
AKM510	MAGNESIUM 2,4-PENTANEDIONATE, dihydrate	100g	¥11,500	1kg	¥53,500
SIM6471.0	MAGNESIUM SILICATE, hydrous	2.5kg	¥17,700	10kg	¥54,000
SIM6472.0	MAGNESIUM SILICIDE, powder	25g	¥19,400		
DMGTI50	MAGNESIUM TITANIUM DOUBLE METAL ALKOXIDE (1.0M)	25g	¥9,800	100g	¥21,500
CXMG083	MAGNESIUM TRIFLUOROMETHANESULFONATE	10g	¥13,500		
AKM524	MAGNESIUM 1,1,1-TRIFLUORO-2,4-PENTANEDIONATE, dihydrate	5g	¥16,800	25g	¥53,500
DMGZR50	MAGNESIUM ZIRCONIUM DOUBLE METAL ALKOXIDE 1.0M)	25g	¥11,000	100g	¥25,500
SIT8594.0	TRIMETHYLSILYLMETHYLMAGNESIUM CHLORIDE, 1.0M in diethyl ether	100g	¥28,400		
SIT8594.1	TRIMETHYLSILYLMETHYLMAGNESIUM CHLORIDE, 3M in methyltetrahydrofuran	100g	¥40,600		
MANGANESE					
CXMN010	MANGANESE(II) ACETATE, tetrahydrate	25g	¥9,000		
AKM528	MANGANESE(II) ETHYLENEBIS(DITHIOCARBAMATE), tech-90	25g	¥16,500		
AKM540	MANGANESE(II) 2,4-PENTANEDIONATE, tech-95	50g	¥14,300	250g	¥43,500
AKM545	MANGANESE(III) 2,4-PENTANEDIONATE	50g	¥15,500	250g	¥48,500
AKM546	MANGANESE(III) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	5g	¥49,500		
OMMN038	METHYLCYCLOPENTADIENYLMANGANESE TRICARBONYL	25g	¥34,500		
MERCURY					
CXHG010	MERCURY(II) ACETATE	25g	¥12,000		
CXHG070	PHENYLMERCURIC ACETATE	100g	¥28,500		
MOLYBDENUM					
SIM6594.8	MOLYBDENUM DISILICIDE, 99+%	100g	¥25,700		
AKM548	MOLYBDENUM(V) ETHOXIDE, 90%	10g	¥35,500		
INMO030	MOLYBDENUM HEXACARBONYL	100g	¥57,000		
AKM550	MOLYBDENUM(VI) OXIDE BIS(2,4-PENTANEDIONATE)	10g	¥10,500	50g	¥28,500
AKM547	MOLYBDENYL DIETHYLDITHIOCARBAMATE	10g	¥16,500	50g	¥47,500

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
NEODYMIUM					
CXND010	NEODYMIUM ACETATE, hydrate	25g	¥9,300	100g	¥20,000
AKN552	NEODYMIUM 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	1.0g	¥15,000		
AKN554	NEODYMIUM HEXAFLUORO-2,4-PENTANEDIONATE, dihydrate	5g	¥18,300		
AKN555	NEODYMIUM ISOPROPOXIDE	5g	¥34,500		
CXND050	NEODYMIUM METHACRYLATE, trihydrate	5g	¥28,500		
AKN556	NEODYMIUM METHOXYETHOXIDE, 16-18% in methoxyethanol	25g	¥21,500		
CXND060	NEODYMIUM NEODECANOATE, 60% in heptane	25g	¥20,500		
CXND061	NEODYMIUM NEODECANOATE, 45% in hexane	25g	¥11,500	2kg	¥94,500
AKN560	NEODYMIUM(III) 2,4-PENTANEDIONATE, monohydrate	1.0g	¥10,500	5g	¥28,500
AKN564	NEODYMIUM 2,2,6,6-TETRAMETHYL-3-5-HEPTANEDIONATE	1.0g	¥12,500	5g	¥36,500
AKN566	NEODYMIUM(III) 1,1,1-TRIFLUORO-2,4-PENTANEDIONATE	2.5g	¥16,500	10g	¥43,500
NICKEL					
INNI023	1,3-BIS(DIPHENYLPHOSPHINO)PROPANE NICKEL(II) CHLORIDE	5g	¥23,000		
CXNI010	NICKEL(II) ACETATE, tetrahydrate	50g	¥7,000	2kg	¥34,500
AKN572	NICKEL DI-n-BUTYLDITHIOCARBAMATE	25g	¥12,500	100g	¥30,500
AKN575	NICKEL DIMETHYLDITHIOCARBAMATE	10g	¥11,000		
CXNI045	NICKEL FORMATE, dihydrate	25g	¥8,300		
AKN578	NICKEL(II) HEXAFLUORO-2,4-PENTANEDIONATE, hydrate	5g	¥15,800	25g	¥49,500
AKN580	NICKEL(II) 2,4-PENTANEDIONATE	25g	¥9,500	100g	¥20,500
AKN584	NICKEL(II) 2,2,6,6-TETRAMETHYL-3-5-HEPTANEDIONATE	5g	¥36,000		
CXNI083	NICKEL(II) TRIFLUOROMETHANESULFONATE	5g	¥25,500		
AKN586	NICKEL(II) 1,1,1-TRIFLUORO-2,4-PENTANEDIONATE, dihydrate	5g	¥36,000		
NIOBIUM					
W-NBL-25-01	LITHIUM NIOBATE WAFER	Each	¥80,400		
DLINB050	LITHIUM NIOBIUM DOUBLE METAL ALKOXIDE (0.85 M)	25g	¥25,500	100g	¥72,800
AKN588	NIOBIUM(V) n-BUTOXIDE	5g	¥17,500	25g	¥56,500
SIN6597.2	NIOBIUM DISILICIDE, 99+%	25g	¥31,600		
AKN590	NIOBIUM(V) ETHOXIDE	5g	¥14,500	50g	¥74,500
CXNB040	NIOBIUM 2-ETHYLHEXANOATE, 95%	10g	¥27,000		
CXNB070	NIOBIUM OXALATE, MONOOXALATE ADDUCT	10g	¥13,300		
PALLADIUM					
INPD024	BIS(BENZONITRILE)DICHLOROPALLADIUM(II)	1.0g	¥13,000	5g	¥36,500
CXPD010	PALLADIUM(II) ACETATE, 99%	1.0g	¥14,500	5g	¥44,500
AKP595	PALLADIUM HEXAFLUORO-2,4-PENTANEDIONATE	1.0g	¥20,800	5g	¥69,500
AKP600	PALLADIUM 2,4-PENTANEDIONATE	1.0g	¥15,000	5g	¥46,500
CXPD080	PALLADIUM TRIFLUOROACETATE	1.0g	¥20,500	5g	¥68,500
OMPD082	TETRAKIS(TRIPHENYLPHOSPHINE)PALLADIUM(0)	5g	¥33,500		
PHOSPHORUS					
SIB1091.0	BIS(2-DIPHENYLPHOSPHINOETHYL)METHYLSILYLETHYLTRIETHOXYSILANE, mixed isomers	1.0g	¥60,700		
OMFE022	1,1'-BIS(DIPHENYLPHOSPHINO)FERROCENE	10g	¥28,500	50g	¥101,000
INTU022	[1,2-BIS(DIPHENYLPHOSPHINO)ETHANE]TUNGSTEN TETRACARBONYL	5g	¥35,500		
OMPH009	1,3-BIS(DIPHENYLPHOSPHINO)PROPANE	25g	¥34,500		
INNI023	1,3-BIS(DIPHENYLPHOSPHINO)PROPANE NICKEL(II) CHLORIDE	5g	¥23,000		
SIB1852.8	BIS(TRIMETHYLSILYL)AMINODIMETHYLPHOSPHINE	10g	¥46,900		
SIB1868.6	BIS(TRIMETHYLSILYL)PHOSPHINE	10g	inquire		
OMPH011	t-BUTYLDICHLOROPHOSPHINE	10g	¥16,500		
SIB1955.0	(t-BUTYLDIMETHYLSILYL)DIPHENYLPHOSPHINE, 95%	2.5g	¥51,200		
OMPH012	1-BUTYL-3-METHYLIMIDAZOLIUM HEXAFLUOROPHOSPHATE	50g	¥59,500		
SID3351.5	DI-tert-BUTYL(TRIMETHYLSILYLMETHYL)PHOSPHINE	2.5g	¥88,300		
OMPH018	DICYCLOHEXYLPHOSPHINE	25g	inquire		
SID3385.0	(2-DICYCLOHEXYLPHOSPHINOETHYL)TRIETHOXYSILANE	5g	¥45,900		
PSIPO-019	DIETHOXYSILOXANE - ETHYLPHOSPHATE COPOLYMER	25g	¥14,100	100g	¥37,900
OMPH020	DIETHYLDODECYLPHOSPHONATE	5g	¥49,500		
OMPH023	DIETHYLOCTADECYLPHOSPHONATE	5g	¥49,500		
SID3411.0	(2-DIETHYLPHOSPHATOETHYL)METHYLDIETHOXYSILANE, tech-95	10g	¥24,100		
SID3412.0	(2-DIETHYLPHOSPHATOETHYL)TRIETHOXYSILANE, tech-95	25g	¥17,200	100g	¥48,300
OMPH027	DIETHYLPHOSPHITE	25g	¥8,000	100g	¥15,800
SID3420.0	DIETHYL(TRIMETHYLSILOXYCARBONYLMETHYL)PHOSPHONATE, 95%	10g	¥53,800		
SID4245.0	O,O'-DIMETHYL(TRIMETHYLSILYL)PHOSPHITE, tech-95	10g	¥24,700		
OMPH025	DIPHENYLCHLOROPHOSPHINE	25g	¥26,000		
OMPH029	DIPHENYLPHOSPHINE	25g	inquire		
OMPH029.2	DIPHENYLPHOSPHINE, 20% in heptane	25g	inquire	100g	inquire
SID4557.5	(2-DIPHENYLPHOSPHINO)ETHYLDIMETHYLETHOXYSILANE	10g	¥41,600		
SID4558.0	2-(DIPHENYLPHOSPHINO)ETHYLTRIETHOXYSILANE	5g	¥15,400	25g	¥51,200
SID4558.2	3-(DIPHENYLPHOSPHINO)PROPYLTRIETHOXYSILANE	1.0g	¥26,300		
SID4558.5	(DIPHENYLPHOSPHINO)TRIMETHYLSILANE, 95%	5g	¥37,400		
OMPH056	DIPHENYLPHOSPHORYL AZIDE	25g	¥18,000		
SID4589.5	DIPHENYL(TRIMETHYLSILYLMETHYL)PHOSPHINE	5g	¥77,700		
OMPH058	DODECYLPHOSPHONIC ACID	5g	¥39,500		
OMPH059	HEXADECYLPHOSPHONIC ACID	5g	¥64,500		
OMPH060	HEXYLPHOSPHONIC ACID	5g	¥64,500		
W-INP-51-0.3	INDIUM PHOSPHIDE WAFER	Each	¥168,500		
SID4245.0	O,O'-DIMETHYL(TRIMETHYLSILYL)PHOSPHITE, tech-95	10g	¥24,700		
OMPH062	OCTADECYLPHOSPHONIC ACID	5g	¥39,500		
OMPH061	OCTYLPHOSPHONIC ACID	5g	¥64,500		

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
INPH050	PHOSPHINE	25g	inquire		
INPH055	POLY(PHOSPHONITRILIC CHLORIDE), 95%	10g	¥35,500		
AKS733	SODIUM DI(ISOBUTYL)DITHIOPHOSPHINATE, 50% in water	25g	¥12,500	100g	¥30,500
OMPH064	TETRABUTYLPHOSPHONIUM CHLORIDE	100g	¥14,500	500g	¥44,500
OMPH064.2	TETRABUTYLPHOSPHONIUM CHLORIDE, 50% in toluene	100g	inquire		
OMPH057	TETRABUTYLPHOSPHONIUM HYDROXIDE, 40% in water	100g	¥14,500	500g	¥44,500
OMPH066	TETRADECYL(TRIHEXYL)PHOSPHONIUM CHLORIDE	25g	¥8,500	100g	¥17,500
SIT7281.0	TETRAKIS(2-DIPHENYLPHOSPHINOETHYL)TETRAMETHYLCYCLOTETRASILOXANE, 95%	1.0g	¥59,100		
OMPD082	TETRAKIS(TRIPHENYLPHOSPHINE)PALLADIUM(0)	5g	¥33,500		
OMPH076	(THIOPHENOXYPHENYL)DIPHENYLSULFONIUM HEXAFLUOROPHOSPHATE - BLEND	25g	¥13,000	2kg	inquire
SNT7980	TIN(II) PYROPHOSPHATE, hydrate	25g	¥10,500		
AKT889.1	TITANIUM TRIS(DIOCTYLPYROPHOSPHATO)ISOPROPOXIDE, tech-90	25g	¥11,500	100g	¥27,300
OMPH072	TRI-tert-BUTYLPHOSPHINE	5g	inquire		
OMPH073	TRI-n-BUTYLTETRADECYLPHOSPHONIUM CHLORIDE, 95%	25g	¥21,500		
OMPH073.4	TRICYCLOHEXYLPHOSPHINE, 20-22% in toluene	100g	inquire		
OMPH074	TRIETHYLPHOSPHATE	25g	¥7,000	100g	¥11,800
OMGO017	TRIETHYLPHOSPHINE GOLD(I) CHLORIDE	1.0g	¥30,800	5g	¥110,000
OMGO019	TRIETHYLPHOSPHINOGOLD(I) DIETHYLDITHIOCARBAMATE	0.5g	¥49,500		
OMPH077	TRIETHYLPHOSPHITE	100g	¥7,000	500g	¥14,500
SIT8378.5	3-(TRIHYDROXYSILYL)PROPYL METHYLPHOSPHONATE, MONOSODIUM SALT, 42% in water	100g	¥8,500	500g	¥24,700
OMPH079	TRIMETHYLPHOSPHITE	100g	inquire		
SIT8606.7	(3-TRIMETHYLSILYL-2-PROPYNYL)TRIPHENYLPHOSPHONIUM BROMIDE	5g	¥62,900		
OMPH080	TRIOCTYLPHOSPHINE, 95%	25g	¥13,500		
OMSE082	TRI-n-OCTYLPHOSPHINE SELENIDE	1.0g	¥32,000		
OMPH081	TRIPHENYLPHOSPHINE OXIDE	100g	¥12,500		
OMPH082	TRIS(2,4-DI-t-BUTYLPHENYL)PHOSPHITE	100g	¥9,300	500g	¥23,500
OMPH088	TRIS(4-ISOCYANATOPHENYL)THIOPHOSPHATE, 25-7% solution in ethyl acetate	25g	¥16,500		
SIT8722.7	TRIS(TRIMETHYLSILYLMETHYL)PHOSPHINE	1.0g	¥54,900		
SIT8723.0	TRIS(TRIMETHYLSILYL)PHOSPHATE	25g	¥14,600	100g	¥39,500
SIT8723.4	TRIS(TRIMETHYLSILYL)PHOSPHINE, 10% in hexane	10g	¥27,300	50g	¥98,900
SIT8723.6	TRIS(TRIMETHYLSILYL)PHOSPHITE, 95%	10g	¥22,500		
INRH082	TRIS(TRIPHENYLPHOSPHINE)RHODIUM(I) CHLORIDE	1.0g	¥21,800	5g	¥73,500
OMRU083	TRIS(TRIPHENYLPHOSPHINE)RUTHENIUM(II) DICHLORIDE	5g	¥39,000		
OMPH081.4	TRI(o-TOLYL)PHOSPHINE	10g	inquire		
SIV9077.0	VINYL(DIPHENYLPHOSPHINOETHYL)DIMETHYLSILANE	5g	¥46,900		
AKZ932.7	ZINC O,O-DI-n-BUTYLPHOSPHORODITHIOATE	25g	¥14,300		
AKZ941	ZIRCONIUM (BIS-2-2-(ALLYLOXYMETHYL)BUTOXIDE)TRIS(DIOCTYLPHOSPHATE), 95%	25g	¥10,500	100g	¥24,000
PLATINUM					
OMPT021	DIMETHYLPLATINUM(II) CYCLOOCTADIENE COMPLEX	1.0g	¥59,500		
SIP6829.2	PLATINUM CARBONYL CYCLOVINYLMETHYLSILOXANE COMPLEX	5g	¥19,400	25g	¥67,100
SIP6832.2	PLATINUM-CYCLOVINYLMETHYLSILOXANE COMPLEX	5g	¥18,000	25g	¥59,100
SIP6830.3	PLATINUM-DIVINYLTETRAMETHYLDISILOXANE COMPLEX	5g	¥16,400	25g	¥55,400
SIP6831.2	PLATINUM-DIVINYLTETRAMETHYLDISILOXANE COMPLEX in xylene	5g	¥19,400	25g	¥67,100
SIP6831.2LC	PLATINUM-DIVINYLTETRAMETHYLDISILOXANE COMPLEX in xylene, LOW COLOR	10g	¥45,900		
SIP6833.2	PLATINUM-OCTANAL/OCTANOL COMPLEX	5g	¥15,100	25g	¥50,100
AKP610	PLATINUM 2,4-PENTANEDIONATE	1.0g	¥28,500	5g	¥101,000
POTASSIUM					
SID4590.0	DIPOTASSIUM TRIS(1,2-BENZENEDIOLATO)O,O' SILICATE	10g	¥20,400		
SIF4906.0	FELDSPAR-POTASSIUM	500g	¥9,600	8kg	¥49,000
CXPO010	POTASSIUM ACETATE	250g	¥8,300	2kg	¥19,500
CXPO015	POTASSIUM ACRYLATE	50g	¥15,500		
CXPO016	POTASSIUM ACRYLATE, hemihydrate	100g	¥15,000		
CXPO017	POTASSIUM ACRYLATE, 18-20% in methanol	250g	¥13,300		
CXPO020	POTASSIUM BENZOATE	100g	¥8,000		
AKP630	POTASSIUM t-BUTOXIDE	50g	¥8,300	250g	¥19,500
AKP631	POTASSIUM t-BUTOXIDE, 1M in tetrahydrofuran (12-14 wgt%)	25g	¥7,000	2kg	¥64,500
AKP632	POTASSIUM t-BUTOXIDE, 1.6M in tetrahydrofuran (19-20 wgt%)	2kg	inquire		
AKP640	POTASSIUM ETHOXIDE, 95%	25g	¥7,000	500g	¥20,000
AKP641	POTASSIUM ETHOXIDE, 20-22% in ethanol	25g	¥7,000	2kg	¥41,000
CXPO045	POTASSIUM FORMATE	100g	¥7,500	2kg	¥38,500
GEP6894	POTASSIUM HEXAFLUOROGERMANATE	5g	¥24,500		
SIP6895.0	POTASSIUM HEXAFLUOROSILICATE	500g	¥23,400		
SIP6890.0	POTASSIUM HEXAMETHYLDISILAZIDE, 11% in toluene, 0.5M	400g	¥37,200	2kg	¥126,500
SIP6890.1	POTASSIUM HEXAMETHYLDISILAZIDE, 20% in THF	400g	¥23,400	2kg	¥79,800
OMBO073	POTASSIUM HYDROTRIS(1-PYRAZOLATO)BORATE, hydrate	5g	¥62,500		
AKP643	POTASSIUM ISOPROPOXIDE, 18 - 20% in isopropanol	25g	¥8,500	2kg	¥89,500
CXPO050	POTASSIUM METHACRYLATE	50g	¥13,500	2kg	inquire
CXPO051	POTASSIUM METHACRYLATE, hemihydrate	100g	¥12,500		
AKP645	POTASSIUM METHOXIDE, 95%	25g	¥9,500	250g	¥24,500
AKP646	POTASSIUM METHOXIDE, 3.4M in methanol (24-26%)	250g	¥10,500	2kg	¥42,000
AKP648	POTASSIUM 2-METHYL-2-BUTOXIDE, 14-16% in cyclohexane	100g	¥13,500	2kg	¥84,500
SIP6898.0	POTASSIUM METHYLSILICONATE, 40% in water	500g	¥13,000		
AKP650	POTASSIUM 2,4-PENTANEDIONATE, hydrate	50g	¥14,000		
SIP6898.5	POTASSIUM PHENYLDIMETHYLSILANOLATE, 95%	10g	¥32,600		
AKP652	POTASSIUM n-PROPOXIDE, 18-20% in n-propanol	100g	¥21,500		
SNP6900	POTASSIUM STANNATE, trihydrate	100g	¥7,500	500g	¥15,500

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
CXPO074	POTASSIUM SULFOPROPYLACRYLATE	25g	inquire	100g	inquire
CXPO076	POTASSIUM SULFOPROPYLMETHACRYLATE	25g	¥9,500	100g	¥20,800
AKP654	POTASSIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	5g	¥19,500		
CXPO077	POTASSIUM THIOACETATE	25g	¥12,500		
SIP6899.0	POTASSIUM TRIETHYLSILANOLATE, 95%	10g	¥19,400	50g	¥67,100
CXPO080	POTASSIUM TRIFLUOROACETATE	25g	¥11,800		
CXPO083	POTASSIUM TRIFLUOROMETHANESULFONATE	10g	¥10,500		
SIP6901.0	POTASSIUM TRIMETHYLSILANOLATE, 95%	25g	¥14,600	100g	¥39,500
SIP6901.2	POTASSIUM TRIMETHYLSILANOLATE, 2M in tetrahydrofuran	25g	¥8,800	2kg	¥90,900
SIP6902.0	POTASSIUM VINYLDIMETHYLSILANOLATE, tech-90	10g	¥18,300		
CXPO091	POTASSIUM poly(VINYLSULFATE)	10g	¥49,500		
PRASEODYMIUM					
CXPR010	PRASEODYMIUM ACETATE, trihydrate	25g	¥11,000		
AKP656	PRASEODYMIUM 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	1.0g	¥16,500	5g	¥52,500
AKP657	PRASEODYMIUM HEXAFLUORO-2,4-PENTANEDIONATE	1.0g	¥14,500	5g	¥44,500
AKP658	PRASEODYMIUM METHOXYETHOXIDE, 15-17% in methoxyethanol	25g	¥22,500		
AKP660	PRASEODYMIUM 2,4-PENTANEDIONATE, hydrate	10g	¥14,500	50g	¥44,500
AKP661	PRASEODYMIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	5g	¥32,500		
SIP6902.1	PRASEODYMIUM TRIS(HEXAMETHYLDISILAZIDE)	5g	¥81,400		
SIP6902.2	PRASEODYMIUM ZIRCONIUM SILICATE	25g	¥14,600		
RHENIUM					
OMRE047	METHYLTRIOXORHENIUM(VII)	0.5g	¥22,500		
INRE030	RHENIUM CARBONYL	1.0g	¥19,500	5g	¥64,500
SIT8598.0	TRIMETHYLSILYL PERRHENATE	2.5g	¥46,400		
RHODIUM					
CXRH010	RHODIUM(II) ACETATE, dimer	0.5g	¥33,500	2.5g	¥121,000
AKR662	RHODIUM (1,5-CYCLOOCTADIENE)-2,4-PENTANEDIONATE	1.0g	¥77,000		
AKR663	RHODIUM(I) DICARBONYL 2,4-PENTANEDIONATE	0.5g	¥32,000	2.5g	¥115,000
INRH065	RHODIUM(I) HYDRIDOCARBONYLTRIS(TRIPHENYLPHOSPHINE)	1.0g	¥36,000	5g	¥125,000
AKR665	RHODIUM(III) 2,4-PENTANEDIONATE	0.5g	¥27,000	2.5g	¥94,500
AKR667	RHODIUM 1,1,1-TRIFLUORO-2,4-PENTANEDIONATE	0.5g	¥36,500		
INRH078	TRIS(DIBUTYLSULFIDE)RHODIUM TRICHLORIDE, 20-22% in toluene	5g	¥28,500	25g	¥101,000
INRH082	TRIS(TRIPHENYLPHOSPHINE)RHODIUM(I) CHLORIDE	1.0g	¥21,800	5g	¥73,500
RUBIDIUM					
CXRB010	RUBIDIUM ACETATE	10g	¥18,300		
AKR668	RUBIDIUM 2,4-PENTANEDIONATE, hydrate	5g	¥50,500		
AKR668.5	RUBIDIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	5g	¥37,500		
RUTHENIUM					
OMRU018	BATHOPHENANTHROLINE RUTHENIUM DICHLORIDE	1.0g	¥49,500		
OMRU027	DIETHYLRUTHENOCENE	5g	¥99,500		
OMRU026	PHENANTHROLINE RUTHENIUM DICHLORIDE, monohydrate	1.0g	¥26,000		
AKR669	RUTHENIUM(II) CYCLOOCTADIENE BIS(2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE)	1.0g	¥35,800		
CXRU010	RUTHENIUM(III) OXOACETATE, trihydrate	1.0g	¥40,500		
AKR670	RUTHENIUM(III) 2,4-PENTANEDIONATE	1.0g	¥16,800	5g	¥53,300
AKR672	RUTHENIUM(III) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥45,800		
OMRU055	RUTHENOCENE	5g	¥93,300		
OMRU083	TRIS(TRIPHENYLPHOSPHINE)RUTHENIUM(II) DICHLORIDE	5g	¥39,000		
SAMARIUM					
CXSM010	SAMARIUM ACETATE, hydrate	25g	¥15,800		
AKS676	SAMARIUM(III) ISOPROPOXIDE	2.5g	¥18,500	10g	¥50,000
AKS680	SAMARIUM 2,4-PENTANEDIONATE, hydrate	10g	¥12,500	50g	¥36,500
AKS686	SAMARIUM(III) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥13,000	5g	¥38,500
AKS687	SAMARIUM(III) THENOYLTRIFLUOROACETONATE	1.0g	¥40,000		
CXSM083	SAMARIUM TRIFLUOROMETHANESULFONATE	5g	¥12,500		
SIS6943.4	SAMARIUM TRIS(HEXAMETHYLDISILAZIDE)	1.0g	¥42,700		
SCANDIUM					
CXSC010	SCANDIUM ACETATE, hydrate	5g	¥59,500		
AKS688	SCANDIUM(III) 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE, hydrate	0.5g	¥15,000	2.5g	¥46,500
CXSC083	SCANDIUM TRIFLUOROMETHANESULFONATE	1.0g	¥15,000	5g	¥46,500
SELENIUM					
SIB1871.0	BIS(TRIMETHYLSILYL)SELENIDE	1.0g	¥86,700	5g	¥167,000
OMSE028	DIPHENYLDISELENIDE	25g	¥32,000		
GEG5350	GERMANIUM DISELENIDE	5g	¥38,500		
OMSE080	PHENYLSELENIUM CHLORIDE	10g	¥32,500		
SIP6745.0	(PHENYLSELENOMETHYL)TRIMETHYLSILANE, 95%	5g	¥52,200		
SIP6747.0	PHENYLSELENOTRIMETHYLSILANE, 95%	5g	¥73,500		
AKS704	SELENIUM DIMETHYLDITHIOCARBAMATE, 95%	25g	¥15,500	100g	¥40,300
OMSE082	TRI-n-OCTYLPHOSPHINE SELENIDE	1.0g	¥32,000		
SILVER					
CXSV010	SILVER ACETATE, 99%	10g	¥13,300	50g	¥39,500
CXSV015	SILVER ACRYLATE	1.0g	¥13,300		
AKS720	SILVER DIETHYLDITHIOCARBAMATE	5g	¥14,300		
AKS723	SILVER(I) 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	1.0g	¥16,500		
AKS724	SILVER(I) HEXAFLUORO-2,4-PENTANEDIONATE - CYCLOOCTADIENE COMPLEX	2.5g	¥32,000		
CXSV049	SILVER LACTATE, monohydrate	5g	¥28,500		
CXSV050	SILVER METHACRYLATE	1.0g	¥13,300		

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
CXSV060	SILVER NEODECANOATE, 95%	10g	¥14,300		
CXSV061	SILVER NEODECANOATE, 25% in xylene	25g	¥9,000	100g	¥19,300
AKS725	SILVER 2,4-PENTANEDIONATE, 95%	5g	¥27,500	25g	¥94,500
CXSV078	SILVER p-TOLUENESULFONATE	10g	¥20,500		
CXSV080	SILVER TRIFLUOROACETATE	10g	¥18,000	50g	¥58,500
CXSV083	SILVER TRIFLUOROMETHANESULFONATE	10g	¥22,500		
SODIUM					
SIF4907.0	FELDSPAR-SODIUM	500g	¥9,600	10kg	¥48,000
CXSO010	SODIUM ACETATE	100g	¥7,500	500g	¥16,500
CXSO008	SODIUM 2-ACRYLAMIDO-2-METHYLPROPANE SULFONATE	25g	¥13,500		
CXSO009	SODIUM 2-ACRYLAMIDO-2-METHYLPROPANE SULFONATE, 50% in water	100g	¥9,300	2.5kg	¥39,500
CXSO015	SODIUM ACRYLATE, anhydrous	50g	¥19,500		
CXSO016	SODIUM ACRYLATE, hemihydrate	100g	¥20,500		
CXSO017	SODIUM polyACRYLATE, 45% in water	100g	¥7,500	4kg	¥25,500
SIS6977.0	SODIUM ALLYLDIMETHYLSILANOLATE, 2M in tetrahydrofuran	10g	¥51,200		
AKS725.2	SODIUM ALLYLOXYETHOXIDE, 20% in allyloxyethanol	25g	¥19,500		
CXSO018	SODIUM ALLYLSULFONATE, 35% in water	25g	¥9,300	100g	¥20,000
AKS725.5	SODIUM ALUMINUM DICAPROLACTAM BIS(2-METHOXYETHOXIDE), 80% in toluene	25g	¥22,500		
AKS726	SODIUM ALUMINUM HYDRIDE BIS(METHOXYETHOXIDE), 70% (3.4M) in toluene	100g	¥15,800	2kg	¥47,500
CXSO019	SODIUM poly-D,L-ASPARTATE, 40-42% in water	25g	¥9,300		
AKS727	SODIUM BIS-2-(ALLYLOXYMETHYL)BUTOXIDE, 10% in toluene	25g	¥11,800	100g	¥28,000
SIS6980.0	SODIUM BIS(TRIMETHYLSILYL)AMIDE, 95%	50g	¥35,300		
SIS6980.2	SODIUM BIS(TRIMETHYLSILYL)AMIDE, 2M in tetrahydrofuran	100g	¥13,000	2kg	¥136,000
AKS728	SODIUM n-BUTOXIDE, 20% in n-butanol	100g	¥9,300	500g	¥23,500
AKS730	SODIUM t-BUTOXIDE	50g	¥9,000	2kg	¥64,500
AKS732	SODIUM DI-n-BUTYLDITHIOCARBAMATE, 47% in water	25g	¥9,300	100g	¥20,000
AKS732.5	SODIUM DIETHYLDITHIOCARBAMATE, 23-25% in water	100g	¥16,500		
AKS733	SODIUM DI(ISOBUTYL)DITHIOPHOSPHINATE, 50% in water	25g	¥12,500	100g	¥30,500
AKS734	SODIUM DIISOPROPYLDITHIOCARBAMATE, tech-90	25g	¥24,500		
AKS735	SODIUM DIMETHYLDITHIOCARBAMATE, hydrate	25g	¥16,500		
AKS736	SODIUM DIMETHYLDITHIOCARBAMATE, 40% in water	100g	¥9,300	2.5kg	¥25,500
AKS740	SODIUM ETHOXIDE. 95%	50g	¥10,500	2kg	¥49,500
AKS741	SODIUM ETHOXIDE, 21% in ethanol	25g	¥7,000	2kg	¥28,500
CXSO045	SODIUM FORMATE, hydrate	100g	¥7,500	500g	¥16,500
CXSO046	SODIUM FUMARATE	100g	¥8,500	2kg	¥49,500
SIS6980.6	SODIUM (2-FURYL)DIMETHYLSILANOLATE	10g	¥49,900		
AKS745	SODIUM HEXAFLUORO-2,4-PENTANEDIONATE	5g	¥15,000	25g	¥46,500
SIS6981.0	SODIUM HEXAFLUOROSILICATE	25g	¥7,400	500g	¥12,500
AKS751	SODIUM ISOPROPOXIDE, 20% in tetrahydrofuran	100g	¥12,500	500g	¥36,500
CXSO048	SODIUM ITACONATE	10g	¥10,500		
CXSO049	SODIUM MALEATE, hydrate	25g	¥11,800		
GES6940	SODIUM METAGERMANATE, hydrate, 95%	5g	¥16,800	25g	¥53,500
SIS6982.0	SODIUM METASILICATE	500g	¥8,800	3kg	¥28,400
CXSO050	SODIUM METHACRYLATE	50g	¥11,500	250g	¥32,500
CXSO051	SODIUM METHACRYLATE, hemihydrate	100g	¥15,000		
CXSO052	SODIUM polyMETHACRYLATE, 40% in water	100g	¥7,000	4kg	¥16,500
AKS760	SODIUM METHOXIDE, 95%	50g	¥7,000	2kg	¥18,000
AKS761	SODIUM METHOXIDE, 25% in methanol	25g	¥7,000	2kg	¥16,500
AKS762	SODIUM METHOXYETHOXIDE, 20% in methoxyethanol	25g	¥10,500	100g	¥24,000
AKS764	SODIUM METHYLACETOACETATE	100g	¥11,800		
AKS768	SODIUM 2-METHYL-2-BUTOXIDE	25g	¥7,500	100g	¥14,500
SIS6983.0	SODIUM (4-METHYLPHENYL)DIMETHYLSILANOLATE, 2M in tetrahydrofuran	10g	¥35,300		
SIS6984.0	SODIUM METHYLSILICONATE, 30% in water	100g	¥6,600	2.5kg	¥26,000
SIS6985.0	SODIUM MONTMORILLONITE CLAY	100g	¥6,600	2kg	¥25,600
CXSO054	SODIUM poly[(NAPHTHALENEFORMALDEHYDE) SULFONATE]	100g	¥11,500		
SIS6986.0	SODIUM ORTHOSILICATE, tech-90	500g	¥23,600		
CXSO070	SODIUM OXALATE, 99%	100g	¥10,500		
AKS770	SODIUM 2,4-PENTANEDIONATE	50g	¥13,500		
AKS775	SODIUM PHENOXIDE, 95%, anhydrous	25g	¥12,500	100g	¥30,500
AKS775.2	SODIUM PHENOXIDE, 20% in methanol	100g	¥9,000	500g	¥22,500
SIS6986.1	SODIUM PHENYLDIMETHYLSILANOLATE, 2M in tetrahydrofuran	10g	¥27,300		
AKS780	SODIUM n-PROPOXIDE, 20% in n-propanol	25g	¥10,500	100g	¥24,000
SNS6950	SODIUM STANNATE, trihydrate	100g	¥8,500	500g	¥20,500
CXSO073	SODIUM p-STYRENE SULFONATE, hydrate, tech-95	100g	¥16,000		
SIS6987.0	SODIUM (2-THIENYL)DIMETHYLSILANOLATE, 2M in tetrahydrofuran	10g	¥49,900		
AKS784	SODIUM THIOPHENOXIDE, tech-95	25g	¥16,500		
SNS6960	SODIUM TIN ETHOXIDE, 95%	10g	¥16,800		
CXSO080	SODIUM TRIFLUOROACETATE	25g	¥10,500		
CXSO083	SODIUM TRIFLUOROMETHANESULFONATE	10g	¥14,000		
SIS6988.0	SODIUM TRIMETHYLSILANOLATE, 96%	25g	¥19,900	100g	¥57,000
CXSO092	SODIUM VINYLSULFONATE, 25% in water	25g	¥12,500		
SIT8378.5	3-(TRIHYDROXYSILYL)PROPYL METHYLPHOSPHONATE, MONOSODIUM SALT, 42% in water	100g	¥8,500	500g	¥24,700
STRONTIUM					
CXSR010	STRONTIUM ACETATE, hemihydrate	25g	¥7,000		
CXSR015	STRONTIUM ACRYLATE, hydrate	25g	¥14,300		
AKS786	STRONTIUM HEXAFLUORO-2,4-PENTANEDIONATE	2.5g	¥10,000	10g	¥20,800

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
INSR036	STRONTIUM FERRITE, powder	100g	¥8,500		
AKS790	STRONTIUM ISOPROPOXIDE	2.5g	¥12,000	10g	¥29,000
AKS793	STRONTIUM METHOXYPROPOXIDE, 18-20% in methoxypropanol	25g	¥9,800	100g	¥21,500
CXSR060	STRONTIUM NEODECANOATE	10g	¥19,500		
AKS800	STRONTIUM 2,4-PENTANEDIONATE, hydrate	25g	¥21,500	100g	¥59,500
AKS802	STRONTIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE, anhydrous	1.0g	¥10,300	5g	¥27,500
DSRTI50	STRONTIUM TITANIUM DOUBLE METAL ALKOXIDE	25g	¥18,500	100g	¥50,000
DSRZR50	STRONTIUM ZIRCONIUM	25g	¥19,500	100g	¥53,300
TANTALUM					
DLITA050	LITHIUM TANTALUM DOUBLE METAL ALKOXIDE	10g	¥22,500		
AKT805	TANTALUM(V) n-BUTOXIDE	5g	¥18,500	25g	¥60,500
AKT810	TANTALUM(V) ETHOXIDE	5g	¥12,500	25g	¥36,500
AKT813	TANTALUM(V) ISOPROPOXIDE	5g	¥44,500		
AKT815	TANTALUM(V) METHOXIDE	2.5g	¥15,500	10g	¥40,300
INTA070	TANTALUM PENTABROMIDE	25g	¥41,500		
INTA075	TANTALUM PENTAFLUORIDE	25g	¥57,000		
OMTA075	TANTALUM PENTAKIS(DIMETHYLAMIDE)	5g	¥47,500	25g	¥177,000
SIT6996.0	TANTALUM SILICIDE, 99.9+%	10g	¥16,200		
AKT816	TANTALUM SODIUM METHOXIDE	2.5g	¥15,800		
AKT817	TANTALUM TETRAETHOXIDE DIMETHYLAMINOETHOXIDE	10g	¥45,500		
AKT818.2	TANTALUM(V) TETRAETHOXIDE 2,4-PENTANEDIONATE	10g	¥24,500	50g	¥84,500
AKT818.5	TANTALUM(V) TRIFLUOROETHOXIDE	25g	¥57,000		
OMTA082	TRIS(DIETHYLAMINO)(t-BUTYLIMINO) TANTALUM	10g	¥84,500		
OMTA084	TRIS(DIMETHYLAMIDO)tert-AMYLIMIDOTANTALUM	25g	¥84,500		
TELLURIUM					
SIB1873.0	BIS(TRIMETHYLSILYL)TELLURIDE	2.5g	¥88,300		
GEG5480	GERMANIUM TELLURIDE	5g	¥44,500		
AKT818.8	TELLURIUM(IV) DIETHYLDITHIOCARBAMATE, 95%	25g	¥10,000	100g	¥22,500
AKT819	TELLURIUM(IV) ETHOXIDE. 85%	10g	¥27,500		
TERBIUM					
AKT821	TERBIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥15,000	5g	¥46,500
AKT820	TERBIUM 2,4-PENTANEDIONATE, trihydrate	1.0g	¥10,000	5g	¥26,500
AKT819.5	TERBIUM 3,5-HEPTANEDIONATE	5g	¥32,000		
CXTB010	TERBIUM ACETATE, hydrate	5g	¥21,500		
SIT6997.0	TERBIUM TRIS(HEXAMETHYLDISILAZIDE)	1.0g	¥48,000		
THALLIUM					
AKT822	THALLIUM BENZOYLACETONATE	5g	¥45,500		
AKT825	THALLIUM(I) ETHOXIDE	25g	¥44,500		
CXTL055	THALLIUM FORMATE	1.0g	¥11,800		
AKT828	THALLIUM HEXAFLUORO-2,4-PENTANEDIONATE	1.0g	¥19,500		
AKT830	THALLIUM 2,4-PENTANEDIONATE	5g	¥21,500		
AKT832	THALLIUM 2,2,6,6-TETRAMETHYL3,5-HEPTANEDIONATE	1.0g	¥19,500		
THULIUM					
CXTM010	THULIUM ACETATE, hydrate	5g	¥34,500		
AKT840	THULIUM 2,4-PENTANEDIONATE, trihydrate	1.0g	¥13,300	5g	¥39,500
AKT840.5	THULIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥15,000	5g	¥46,500
TIN					
SNA0310	ACRYLOXYTRI-n-BUTYLTIN	10g	¥16,500		
SNA0330	ACRYLOXYTRIPHENYLTIN, tech-95	10g	¥19,500		
SNA0500	ALLYLTRI-n-BUTYLTIN	10g	¥12,000	50g	¥34,500
SNA0560	ALLYLTRIMETHYLTIN, tech-95	5g	¥41,500		
SNA0580	ALLYLTRIPHENYLTIN	10g	¥11,000		
SNB1025	BIS[BIS(TRIMETHYLSILYL)AMINO]TIN(II), 95%	5g	¥12,500	25g	¥36,500
SNB1026.6	BIS(CARBOMETHOXYETHYL)DICHLOROTIN, 95%	10g	¥25,800		
SNB1026.8	BIS(CARBOMETHOXYETHYL)DIMETHYLTIN	10g	¥35,500		
SNB1100	BIS(2-ETHYLHEXANOATE)TIN, tech-95	100g	¥7,500	2.5kg	¥34,000
SNB1101	BIS(2-ETHYLHEXANOATE)TIN, 50% in polydimethylsiloxane	100g	¥7,000	1kg	¥23,500
SNB1250	BIS(1R,2S,5R)-MENTHYLDIPHENYLTIN	5g	¥39,500		
SNB1710	BIS(NEODECANOATE)TIN, tech-90	50g	¥9,300	250g	¥23,500
SNB1730	BIS(PENTAMETHYLCYCLOPENTADIENYL)TIN	5g	¥74,500		
SNB1750	BIS(2,4-PENTANEDIONATO)DICHLOROTIN	10g	¥13,300		
SNB1790	BIS(TRI-n-BUTYLSTANNYL)ACETYLENE	1.0g	¥12,000	5g	¥34,500
SNB1794	trans-BIS(TRI-n-BUTYLSTANNYL)ETHYLENE	5g	¥69,500		
SNB1792	BIS(TRI-n-BUTYLTIN)ACETYLENEDICARBOXYLATE, 90%	5g	¥34,500		
SNB1800	BIS(TRI-n-BUTYLTIN)OXIDE	100g	inquire	1kg	inquire
SNB1805	BIS(TRI-n-BUTYLTIN)SULFIDE	25g	¥21,500		
SNB1815.4	BIS(TRICYCLOHEXYLTIN)OXIDE, 95%	5g	¥37,500		
SNB1826	BIS(TRIETHYLTIN)OXIDE	5g	inquire		
SNB1879	BIS(TRINEOPHYLTIN)OXIDE, tech-95	10g	¥36,500		
SNB1900	BIS(TRIPHENYLTIN)OXIDE	25g	¥13,500	100g	¥33,800
SNB1920	BIS(TRIPHENYLTIN)SULFIDE	10g	¥22,500		
SNB1933	BUTYLCHLORODIHYDROXYTIN	100g	¥11,000	500g	¥30,500
SNB1936	n-BUTYLDIMETHYLCHLOROTIN	10g	¥19,500		
SNB1960	n-BUTYLTIN HYDROXIDE OXIDE	100g	¥11,000	500g	¥30,500
SNB1979	t-BUTYLTRI n-BUTYLTIN	10g	¥27,000		
SNB2000	n-BUTYLTRICHLOROTIN	25g	¥7,500	250g	¥24,000

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
SNB2050	n-BUTYLTRIS(2-ETHYLHEXANOATE)TIN	100g	¥8,000	1kg	¥25,500
SNC2060	CALCIUM STANNATE	25g	¥13,500		
SNC2078	CARBOMETHOXYETHYLTRICHLOROTIN	10g	¥26,000		
SNC2308	CHLOROMETHYLTRIMETHYLTIN	5g	¥45,000		
SNC2500	CYCLOPENTADIENYLTRI-n-BUTYLTIN	5g	¥13,500	25g	¥40,500
SND2600	1,3-DIACETOXY-1,1,3,3-TETRABUTYLTIN OXIDE	25g	¥15,000		
SND2700	DIACETOXYTIN, tech-95	10g	¥18,000	50g	¥58,500
SND2730	DIALLYLDIBROMOTIN, tech-95	5g	¥20,500		
SND2740	DIALLYLDI-n-BUTYLTIN	10g	¥25,500		
SND2800	DI-n-BUTYLBIS(DODECYLTHIO)TIN, tech-95	100g	¥8,000	2kg	¥52,500
SND2900	DI-n-BUTYLBIS(2-ETHYLHEXANOATE)TIN, tech-95	25g	¥12,500	100g	¥30,500
SND2901	DI-n-BUTYLBIS(2-ETHYLHEXANOATE)TIN, 50% in xylene	25g	¥7,000	450g	¥20,800
SND2930	DI-n-BUTYLBIS(2-ETHYLHEXYLMALEATE)TIN, tech-95	50g	¥7,000	250g	¥14,500
SND2950	DI-n-BUTYLBIS(2,4-PENTANEDIONATE)TIN, tech-95	25g	¥7,000	2kg	¥44,500
SND2980	DI-n-BUTYLBIS(1-THIOGLYCEROL)TIN	25g	¥9,300	100g	¥20,000
SND3110	DI-n-BUTYLBUTOXYCHLOROTIN, tech-95	25g	¥11,000	100g	¥25,500
SND3160	DI-n-BUTYLDIACETOXYTIN, tech-95	25g	¥7,000	2.5kg	¥54,000
SND3164	DI-n-BUTYLDIACRYLATETIN, tech-95	50g	¥37,500		
SND3175	DI-n-BUTYLDIBROMOTIN	10g	¥13,500		
SND3180	DI-n-BUTYLDI-n-BUTOXYTIN, 95%	25g	¥10,500	100g	¥24,000
SND3250	DI-n-BUTYLDICHLOROTIN	100g	¥9,300	1kg	¥28,500
SND3253	DI-t-BUTYLDICHLOROTIN	5g	¥25,500		
SND3255	DI-n-BUTYLDIFLUOROTIN	25g	¥34,000		
SND3257	DI-n-BUTYLDIISOTHIOCYANATOTIN	1.0g	¥15,800		
SND3260	DI-n-BUTYLDILAURYLTIN, tech-95	100g	¥7,500	2.5kg	¥36,500
SND3258	DI-n-BUTYLDIMETHACRYLATETIN, 95%	10g	¥13,500	50g	¥40,500
SND3280	DI-n-BUTYLDIMETHOXYTIN	5g	¥10,300	25g	¥27,500
SND3285	DI-n-BUTYLDINEODECANOATETIN, tech-95	50g	¥7,500	250g	¥16,500
SND3320	DI-n-BUTYL(MALEATE)TIN	100g	¥10,500	500g	¥28,500
SND3340	DI-n-BUTYL-S,S'-BIS(2-ETHYLHEXYLMERCAPTOACETATE)TIN, tech-95	50g	¥8,500	250g	¥20,500
SND3350	DI-n-BUTYLTIN OXIDE	100g	¥8,300	500g	¥19,500
SND3351	DI-t-BUTYLTIN OXIDE	2.5g	¥19,500		
SND3355	DI-n-BUTYLTIN SULFIDE, tech-95	25g	¥11,000	100g	¥25,500
SND3383	DICYCLOHEXYLDICHLOROTIN	5g	¥23,000		
SND3384	DICYCLOHEXYLDIMETHYLTIN	5g	¥27,500		
SND3403	DIETHYLDICHLOROTIN	1.0g	¥25,500		
SND3375	DIETHYLTIN OXIDE	5g	¥26,500		
SND3515	4,5-DIHYDRO-2-FURYLTRI-n-BUTYLTIN	2.5g	¥34,500		
SND3534	(N,N-DIISOPROPYLCARBAMOYL)TRIBUTYLTIN	5g	¥34,500		
SND3550	DIMETHYLAMINOTRI-n-BUTYLTIN	10g	¥14,300	50g	¥43,500
SND3610	DIMETHYLAMINOTRIMETHYLTIN, tech-95	5g	¥25,500		
SND4055	DIMETHYLBIS(DODECYLTHIO)TIN, tech-95	25g	¥14,300	100g	¥36,300
SND4060	DIMETHYL-S,S'-BIS(2-ETHYLHEXYLMERCAPTOACETATE)TIN, tech-80	25g	¥10,500	100g	¥24,000
SND4062	DIMETHYLBIS(2,4-PENTANEDIONATE)TIN	25g	¥20,500		
SND4063	DIMETHYLBIS(8-QUINOLATO)TIN	10g	¥26,000		
SND4115	DIMETHYLDIBROMOTIN, 95%	5g	¥28,500		
SND4200	DIMETHYLDICHLOROTIN	10g	¥16,500	50g	¥53,500
SND4201	DIMETHYLDICHLOROTIN, 50% in water	25g	¥9,300	2kg	¥70,500
SND4203	DIMETHYLDIFLUOROTIN	1.0g	¥22,500		
SND4205	DIMETHYLDIIODOTIN	5g	¥28,500		
SND4220	DIMETHYLDINEODECANOATETIN, tech-95	50g	¥7,500	250g	¥15,500
SND4240	DIMETHYLHYDROXY(OLEATE)TIN, tech-85	25g	¥7,500	100g	¥14,500
SND4242	DIMETHYLTIN OXIDE	5g	¥9,500	25g	¥24,500
SND4320	DINEOPHYLDICHLOROTIN	5g	¥32,000		
SND4410	DIOCTYLDICHLOROTIN, tech-95	25g	¥12,000	100g	¥29,000
SND4430	DIOCTYLDILAURYLTIN, tech-95	25g	¥7,000	100g	¥16,000
SND4435	DIOCTYLDINEODECANOATETIN, tech-95	25g	¥10,500	100g	¥24,000
SND4450	DIOCTYL(MALEATE)TIN, tech-95	50g	¥12,500		
SND4460	DIOCTYLTIN OXIDE	50g	¥10,000	250g	¥26,500
SND4480	DI-n-PENTYLDICHLOROTIN, tech-95	1.0g	¥57,000		
SND4505	DIPHENYLDI-n-BUTYLTIN	25g	¥14,500	100g	¥37,000
SND4520	DIPHENYLDICHLOROTIN, tech-95	25g	¥12,500	100g	¥30,500
SND4589	DIPHENYLTIN OXIDE	5g	¥12,500	25g	¥36,500
SND4592	DI-n-PROPYLDICHLOROTIN	1.0g	¥21,500		
SND4600	DIVINYLDI-n-BUTYLTIN	5g	¥15,000		
SND4617	DIVINYLDICHLOROTIN	10g	¥27,000		
SNE4620	1-ETHOXYVINYLTRI-n-BUTYLTIN	5g	¥22,500	25g	¥76,500
SNE4621	2-ETHOXYVINYLTRI-n-BUTYLTIN	5g	¥34,500		
SNE4900.3	ETHYL-3-(TRI-n-BUTYLTIN)PROPENOATE	1.0g	¥27,500		
SNE4901.7	ETHYLTRIMETHYLTIN	10g	¥26,500		
SNE4900	ETHYNYLTRI-n-BUTYLTIN, 95%	2.5g	¥18,800	10g	¥51,000
SNF4915	p-FLUOROPHENYLTRI-n-BUTYLTIN, 95%	5g	¥49,500		
SNH5900	HEXA-n-BUTYLDITIN	10g	¥14,000	50g	¥42,500
SNH5918	HEXA(CYCLOHEXYL)DITIN	5g	¥49,500		
SNH6120	HEXAMETHYLDITIN	5g	¥26,500		
SNH6126	HEXANEOPHYLDITIN	1.0g	¥57,000		

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
SNH6159	HEXAPHENYLDITIN	10g	¥32,000		
DINSN20	INDIUM TIN	25g	¥22,000	100g	¥61,500
W-ITO-75-1.1	INDIUM TIN OXIDE COATED GLASS SLIDES	5 slides	¥25,700		
SNM6488	METHACRYLOXYTRI-n-BUTYLTIN	50g	inquire		
SNM6512.8	(2-METHYLPROPENYL)TRI-n-BUTYLTIN	5g	¥49,500		
SNM6521	METHYLTRICHLOROTIN, 95%	1.0g	¥9,800	5g	¥25,500
SNO6714	OCTYLTRICHLOROTIN, tech-95	5g	¥9,300	25g	¥23,500
SNP6734	PHENYLETHYNYLTRI-n-BUTYLTIN, 95%	10g	¥11,500		
SNP6765	PHENYLTHIOTRI-n-BUTYLTIN, 95%	10g	¥32,000		
SNP6740	PHENYLTRI-n-BUTYLTIN	10g	¥19,000	50g	¥62,500
SNP6820	PHENYLTRICHLOROTIN, tech-95	5g	¥9,800	25g	¥25,500
SNP6828.2	PHTHALOCYANATODICHLOROTIN(IV)	5g	¥46,500		
SNP6828.4	PHTHALOCYANATOTIN(II)	5g	¥46,500		
SNP6900	POTASSIUM STANNATE, trihydrate	100g	¥7,500	500g	¥15,500
SNP6925	PROPYNYLTRI-n-BUTYLTIN, 95%	5g	¥41,000		
SNP6929	(2-PYRAZINYL)TRI-n-BUTYLTIN	1.0g	¥32,000		
SNP6935	2-PYRIDYLTRI-n-BUTYLTIN, 95%	5g	¥22,500		
SNP6936	3-PYRIDYLTRI-n-BUTYLTIN, 95%	2.5g	¥35,500		
SNS6950	SODIUM STANNATE, trihydrate	100g	¥8,500	500g	¥20,500
SNS6960	SODIUM TIN ETHOXIDE, 95%	10g	¥16,800		
SNT6990	TETRAACETOXYTIN, 95%	5g	¥18,000	25g	¥58,500
SNT7040	TETRAALLYLTIN	5g	¥22,500	25g	¥76,500
SNT7064	TETRA-t-BUTOXYTIN	5g	¥20,000	25g	¥66,500
SNT7072	TETRABUTYLAMMONIUM TRIPHENYLDIFLUOROTIN	5g	¥44,500		
SNT7075	TETRABUTYLDILAURYLDISTANNOXANE, tech-95	25g	¥14,300		
SNT7260	TETRA-n-BUTYLTIN, tech-95	100g	¥7,300	2kg	¥46,500
SNT7261	TETRA-n-BUTYLTIN, 99%	25g	¥9,500	100g	¥24,500
SNT7262	TETRACYCLOHEXYLTIN	5g	¥34,500		
SNT7270	TETRAETHYLTIN	1.0g	¥10,500	5g	¥28,500
SNT7278	TETRAISOPROPOXYTIN-ISOPROPANOL ADDUCT	5g	¥16,000	25g	¥50,500
SNT7280	TETRAISOPROPYLTIN	5g	¥26,000	25g	¥90,500
SNT7294	TETRAKIS(DIETHYLAMINO)TIN, 95%	5g	¥34,500		
SNT7350	TETRAKIS(DIMETHYLAMINO)TIN	5g	¥24,000		
SNT7560	TETRAMETHYLTIN	25g	inquire	100g	inquire
SNT7560.1	TETRAMETHYLTIN, 99%	10g	inquire		
SNT7730	TETRA-n-OCTYLTIN, 95%	25g	¥11,500	100g	¥27,300
SNT7660	TETRA-n-PENTYLTIN	5g	¥22,500		
SNT7760	TETRAPHENYLTIN	100g	¥14,300	500g	¥43,500
SNT7885	TETRA-n-PROPYLTIN	10g	¥49,500		
SNT7894	TETRA-p-TOLYLTIN	10g	¥16,500	50g	¥52,500
SNT7906	TETRAVINYLTIN	5g	¥18,500	25g	¥60,500
SNT7909	2-THIENYLTRI-n-BUTYLTIN, 95%	10g	¥12,500		
SNT7910	TIN, powder	100g	¥9,000	500g	¥22,500
SNT7914	TIN(II) BROMIDE	50g	¥25,000		
SNT7915	TIN(IV) BROMIDE	50g	¥15,000	250g	¥46,500
SNT7920	TIN(II) CHLORIDE, anhydrous	250g	¥11,000		
SNT7921	TIN(II) CHLORIDE, dihydrate	500g	¥16,500		
SNT7930	TIN(IV) CHLORIDE, anhydrous	25g	¥8,500	500g	¥19,500
SNT7935	TIN(II) ETHOXIDE	2.5g	¥13,500	10g	¥33,800
SNT7940	TIN(II) FLUORIDE	100g	¥11,800	500g	¥33,500
SNT7942	TIN(II) FLUOROBORATE, 47% in water	250g	¥10,000		
SNT7943	TIN(II) HEXAFLUORO-2,4-PENTANEDIONATE	5g	¥23,000		
SNT7945	TIN(II) IODIDE	25g	¥24,000		
SNT7946	TIN(IV) IODIDE, 95%	10g	¥14,000		
SNT7947	TIN(II) METHANESULFONATE, 50% in water	1.5kg	¥26,000		
SNT7950	TIN(II) METHOXIDE	10g	¥34,500		
SNT7955	TIN(II) OLEATE, tech-90	100g	¥16,500		
SNT7960	TIN(II) OXALATE	100g	¥9,000	500g	¥22,500
SNT7968	TIN(II) OXIDE	100g	¥10,500	500g	¥28,500
SNT7970	TIN(IV) OXIDE	100g	¥10,500	500g	¥28,500
SNT7971.2	TIN(IV) OXIDE, amorphous gel, 50% in methanol	100g	¥16,500		
SNT7976	TIN(II) 2,4-PENTANEDIONATE	2.5g	¥13,500	10g	¥34,000
SNT7980	TIN(II) PYROPHOSPHATE, hydrate	25g	¥10,500		
SNT7990	TIN(II) SULFATE	100g	¥10,500	500g	¥28,500
SNT7993	TIN(II) TRIFLUOROMETHANESULFONATE	5g	¥21,000	25g	¥70,500
SNT8049	TRIBENZYLCHLOROTIN	5g	¥27,000		
SNT8060	TRI-n-BUTYLACETOXYTIN	50g	inquire	250g	inquire
SNT8065	TRI-n-BUTYLAZIDOTIN, 95%	5g	¥20,500		
SNT8070	TRI-n-BUTYLBENZOYLOXYTIN	25g	¥26,000		
SNT8076	TRI-n-BUTYLBROMOTIN, 95%	5g	¥14,500	25g	¥44,500
SNT8085	TRI-n-BUTYLCHLOROTIN	100g	inquire	1kg	inquire
SNT8087	TRI-n-BUTYLCYANOTIN	5g	¥13,000	25g	¥37,500
SNT8090	TRI-n-BUTYLETHOXYTIN	25g	¥12,500	100g	¥30,500
SNT8095	TRI-n-BUTYLFLUOROTIN	25g	inquire	100g	inquire
SNT8105	TRI-n-BUTYLIODOTIN, tech-95	10g	¥12,000	50g	¥34,500
SNT8108	TRI-n-BUTYLISOCYANATOTIN	10g	¥43,000		

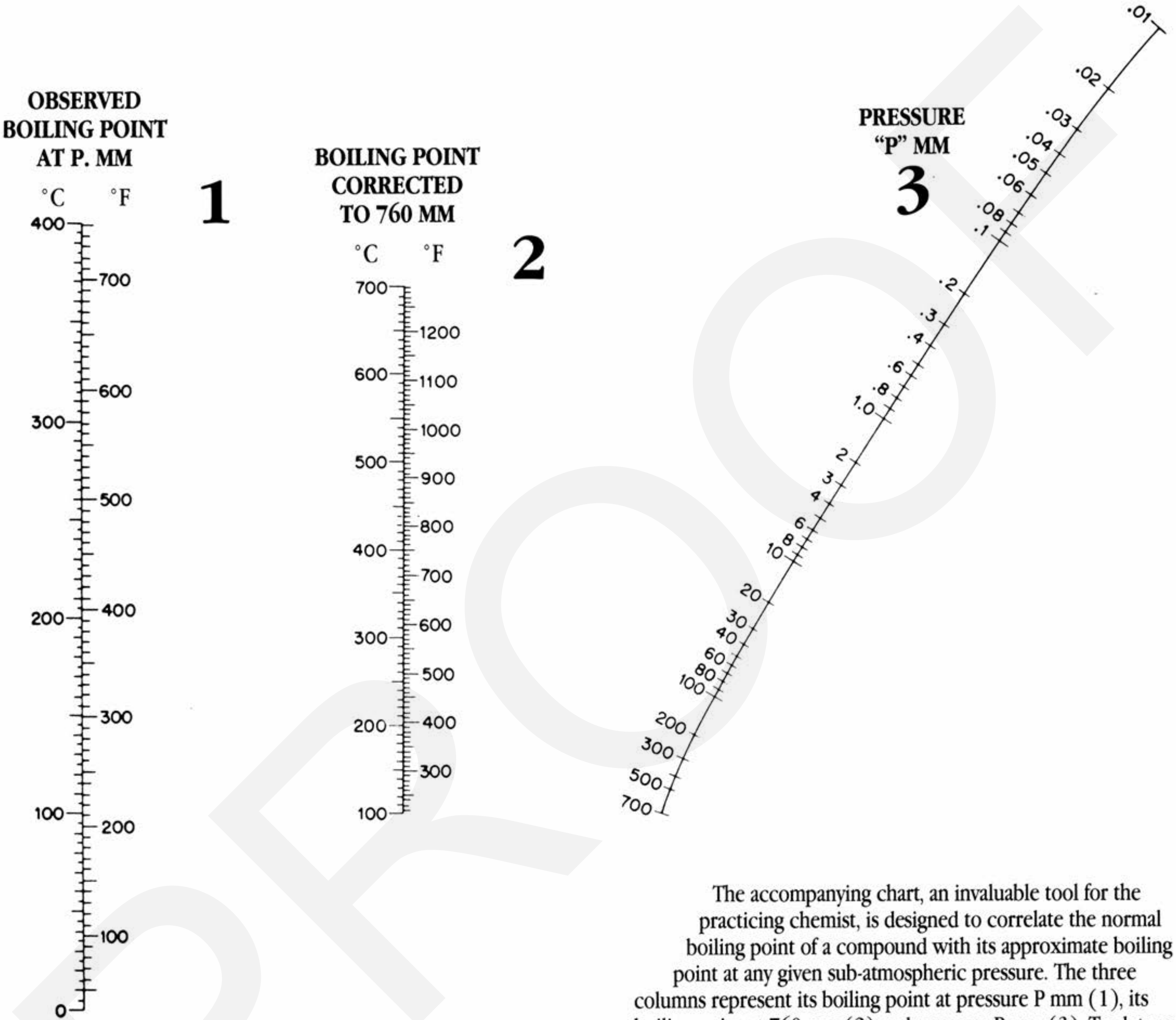
CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
SNT8110	TRI-n-BUTYLMETHOXYTIN	25g	¥11,500	100g	¥27,300
SNT8120	TRI-n-BUTYLMETHYLTIN	10g	¥12,500	50g	¥36,500
SNT8133	2-TRI-n-BUTYLSTANNYLBENZOTHIOPHENE	1.0g	¥32,000		
SNT8122	2-(TRI-n-BUTYLSTANNYL)DITHIANE	5g	¥74,500		
SNT8125	2-TRIBUTYLSTANNYLFURAN	10g	¥16,500		
SNT8585	TRI-n-BUTYLSTANNYLTRIMETHYLSILANE	2.5g	¥13,500	10g	¥33,800
SNT8130	TRI-n-BUTYLTIN HYDRIDE	10g	¥9,300	50g	¥23,500
SNT8140	TRI-n-BUTYL(TRIFLUOROMETHANESULFONATE)TIN, 95%	10g	¥16,800	50g	¥53,500
SNT8159	TRICYCLOHEXYLCHLOROTIN, 95%	5g	¥16,500	25g	¥52,500
SNT8161	TRICYCLOHEXYLHYDROXYTIN, 95%	10g	¥26,500		
SNT8163	TRICYCLOHEXYLTIN HYDRIDE	5g	¥59,500		
SNT8210	TRIETHYLBROMOTIN, 95%	1.0g	¥10,500	5g	¥28,500
SNT8380	(TRIISOPROPOXYTITANOXY)TRI-n-BUTYLTIN, tech-95	10g	¥12,000	50g	¥34,500
SNT8445	TRIMETHYLBROMOTIN	1.0g	¥14,300		
SNT8520	TRIMETHYLCHLOROTIN	10g	¥15,800	50g	¥49,500
SNT8520.2	TRIMETHYLCHLOROTIN, 1M in THF	100g	¥24,000		
SNT8530	TRIMETHYLFLUOROTIN	5g	¥56,000		
SNT8565	TRIMETHYLIODOTIN	1.0g	¥25,500		
SIT8588.8	TRIMETHYLSILYLETHYNYLTRI-n-BUTYLTIN	10g	¥29,400		
SIT8594.5	(TRIMETHYLSILYLMETHYL)TRI-n-BUTYLTIN	10g	¥27,100		
SNT8623.5	TRINEOPHYLTIN HYDRIDE	10g	¥22,500		
SNT8624	TRI-n-OCTYLCHLOROTIN, tech-95	5g	¥34,500		
SNT8583	TRI-n-PENTYLCHLOROTIN, tech-95	1.0g	¥24,500		
SNT8595	TRIPHENYLACETOXYTIN	25g	inquire	100g	inquire
SNT8650	TRIPHENYLCHLOROTIN, tech-95	100g	inquire	500g	inquire
SNT8670	TRIPHENYLFLUOROTIN, 95%	5g	inquire	25g	inquire
SNT8680	TRIPHENYLHYDROXYTIN, tech-90	100g	inquire	500g	inquire
SNT8683	TRIPHENYLIODOTIN, 95%	5g	¥16,500		
SNT8700	TRIPHENYLTIN HYDRIDE, 95%	5g	¥25,500		
SNT8708	TRI-n-PROPYLCHLOROTIN	5g	¥25,500		
SNT8715.7	TRIS(2-PERFLUOROHEXYLETHYL)TIN HYDRIDE	5g	¥74,500		
SNT8727	TRI-p-TOLYLCHLOROTIN, 95%	10g	¥18,500	50g	¥60,500
SNT8728	TRI-p-TOLYLHYDROXYTIN, tech-90	10g	¥30,500		
SNV9100	VINYLTRI-n-BUTYLTIN	5g	¥18,500	25g	¥60,500
SNZ9760	ZINC STANNATE	25g	¥10,300	100g	¥23,000
TITANIUM					
AKT841	O-ALLYLOXY(POLYETHYLENEOXY)TRIISOPROPOXYTITANATE, 95%	25g	¥8,500	100g	¥16,800
DALTI50	ALUMINUM TITANIUM DOUBLE METAL ALKOXIDE, (0.85 M)	100g	¥10,800	500g	¥28,500
INTI004	AMMONIUM HEXAFLUOROTITANATE	25g	¥16,800		
DBATI50	BARIUM TITANIUM DOUBLE METAL ALKOXIDE (0.5 M)	25g	¥9,500	100g	¥22,500
OMTI008	BIS(t-BUTYLCYCLOPENTADIENYL)TITANIUM DICHLORIDE	2.5g	¥38,500	10g	¥115,000
OMTI010	BIS(CYCLOPENTADIENYL)TITANIUM(III) CHLORIDE	5g	¥61,000		
OMTI012	BIS(CYCLOPENTADIENYL)TITANIUM DIFLUORIDE	2.5g	¥39,500		
OMTI014	BIS(2,6-DIFLUORO-3-(1-HYDROPYRROL-1-YL)PHENYL)TITANOCENE	10g	¥32,000		
OMTI016	BIS(PENTAMETHYLCYCLOPENTADIENYL)TITANIUM DICHLORIDE	5g	¥64,500		
OMTI018	CYCLOPENTADIENYLTITANIUM TRICHLORIDE	5g	¥24,500	25g	¥84,500
OMTI020	DICYCLOPENTADIENYLDICARBONYL TITANIUM(II)	5g	¥84,500		
PSITI-019	DIETHOXYSILOXANE - ETHYLTITANATE COPOLYMER	25g	¥14,100	100g	¥37,900
INTI021	HEXAFLUOROTITANIC ACID, 60% in water	1.5kg	¥16,000		
PBL6465	LEAD TITANATE	100g	¥10,800		
PBL6459	LEAD TITANIUM OXOACETOXYETHOXIDE	50g	¥30,500		
DMGTI50	MAGNESIUM TITANIUM DOUBLE METAL ALKOXIDE (1.0M)	25g	¥9,800	100g	¥21,500
OMTI046	METHYLTITANIUM TRIISOPROPOXIDE, 1M in tetrahydrofuran	25g	¥49,500		
OMTI050	PENTAMETHYLCYCLOPENTADIENYLTITANIUM TRICHLORIDE	5g	¥53,500		
OMTI052	PENTAMETHYLCYCLOPENTADIENYLTITANIUM TRIMETHOXIDE	5g	¥67,500		
OMTI054	PHENYLTITANIUM TRIISOPROPOXIDE, 1M in tetrahydrofuran	25g	¥47,000		
OMTI057	PHTHALOCYANINE TITANIUM OXIDE	1.0g	¥25,500	5g	¥88,500
PTI-023	POLY(DIBUTYLTITANATE)	100g	inquire	500g	inquire
PTI-008	POLY(OCTYLENEGLYCOLTITANATE)	25g	inquire	100g	inquire
SIT7305.0	TETRAKIS(TRIMETHYLSILOXY)TITANIUM	25g	¥14,600	100g	¥39,500
AKT843	TITANIUM ALLYLACETOACETATETRAIISOPROPOXIDE	25g	¥9,800	100g	¥20,500
AKT844	TITANIUM BIS(2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE)DICHLORIDE	5g	¥24,500		
AKT845	TITANIUM BIS(TRIETHANOLAMINE)DIISOPROPOXIDE, 80% in isopropanol	25g	¥10,500	100g	¥24,000
INTI027	TITANIUM BORIDE, powder	50g	¥13,300		
AKT850	TITANIUM n-BUTOXIDE	100g	¥7,000	2kg	¥25,500
AKT850.1	TITANIUM s-BUTOXIDE	100g	¥18,000		
AKT850.2	TITANIUM t-BUTOXIDE	25g	¥37,500		
INTI079	TITANIUM(III) CHLORIDE, tetrahydrofuran complex	25g	¥69,500		
AKT850.5	TITANIUM CHLORIDE TRI-n-BUTOXIDE	25g	¥12,500		
AKT851	TITANIUM CHLORIDE TRIISOPROPOXIDE, 95%	100g	¥10,000	500g	¥26,500
AKT851.1	TITANIUM CHLORIDE TRIISOPROPOXIDE, 2M in hexane	25g	¥8,500	750g	¥21,500
AKT851.2	TITANIUM CHLORIDE TRIISOPROPOXIDE, 1.25M in tetrahydrofuran	25g	¥9,300	750g	¥25,500
AKT851.3	TITANIUM CHLORIDE TRIISOPROPOXIDE, 2M in heptane	25g	¥9,300	750g	¥25,500
AKT852	TITANIUM DI-n-BUTOXIDE BIS(2-ETHYLHEXANOATE)	25g	¥13,500		
AKT852.5	TITANIUM DI-s-BUTOXIDE BIS(3,5-HEPTANEDIONATE)	10g	¥35,500		
AKT853	TITANIUM DI-n-BUTOXIDE BIS(2,4-PENTANEDIONATE)	100g	¥12,000	500g	¥34,500

METAL ORGANICS

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
AKT854	TITANIUM DICHLORIDE DIETHOXIDE, 95%	25g	¥13,000	100g	¥32,000
AKT854.5	TITANIUM DIETHYLDITHIOCARBAMATE	10g	¥22,500		
AKT865	TITANIUM DIISOPROPOXIDE BIS(ETHYLACETOACETATE), 95%	100g	¥8,500	500g	¥20,500
AKT855	TITANIUM DIISOPROPOXIDE BIS(2,4-PENTANEDIONATE), 75% in isopropanol	100g	¥7,500	2kg	¥25,500
AKT857	TITANIUM DIISOPROPOXIDE BIS(2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE)	5g	¥25,000		
CXTI038	TITANIUM 3,6-DIOXAHEPTANOATE	25g	¥25,500		
AKT860	TITANIUM ETHOXIDE, tech-95	100g	¥9,300	500g	¥23,500
AKT861	TITANIUM ETHOXIDE, 99%	25g	¥23,500		
AKT867	TITANIUM 2-ETHYLHEXOXIDE	100g	¥7,500	2kg	¥25,500
AKT868.2	TITANIUM IODIDE TRIISOPROPOXIDE, 1.25M in tetrahydrofuran	25g	¥15,000		
AKT870	TITANIUM ISOBUTOXIDE	100g	¥9,500	500g	¥24,500
AKT872	TITANIUM ISOPROPOXIDE	100g	¥7,000	2kg	¥19,500
AKT875	TITANIUM LACTATE, AMMONIUM SALT, 50% in water	25g	¥9,300	100g	¥20,000
AKT877	TITANIUM METHACRYLATE TRIISOPROPOXIDE	25g	¥9,800	100g	¥20,500
AKT878	TITANIUM METHACRYLOXYETHYLACETOACETATE TRIISOPROPOXIDE, 88% in isopropanol	25g	¥11,500	100g	¥27,300
AKT880	TITANIUM METHOXIDE, 95%	25g	¥9,000	100g	¥19,300
AKT880.5	TITANIUM METHOXYPROPOXIDE	25g	¥16,500	100g	¥41,500
AKT881	TITANIUM METHYLPHENOXIDE, tech-90	25g	¥10,000	250g	¥43,000
AKT882	TITANIUM n-NONYLOXIDE, 95%	25g	¥16,500		
AKT883	TITANIUM OXIDE BIS(2,4-PENTANEDIONATE)	25g	¥19,500	100g	¥53,300
AKT884	TITANIUM OXIDE BIS(2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE)	2.5g	¥21,500		
AKT885	TITANIUM n-PROPOXIDE	25g	¥8,500	100g	¥17,500
SIT8005.0	TITANIUM SILICIDE, 95%, powder	25g	¥8,500	100g	¥19,900
INTI060	TITANIUM TETRABROMIDE (99.9% on metals basis)	25g	¥16,500		
INTI065	TITANIUM TETRACHLORIDE, 99%	25g	inquire	2.5kg	inquire
INTI065.5	TITANIUM TETRACHLORIDE, 1M in toluene (19.7 wgt%)	400g	¥20,000	2kg	¥47,000
INTI068	TITANIUM TETRACHLORIDE - BIS(TETRAHYDROFURAN) COMPLEX	25g	¥25,500		
AKT886	TITANIUM TETRAHYDROFURFURYLOXIDE, 50% in isopropanol, tetrahydrofuran	25g	¥18,000		
INTI070	TITANIUM TETRAIODIDE (99.9% on metals basis)	100g	¥26,000	1kg	¥165,000
INTI071	TITANIUM TETRAIODIDE (99+%)	50g	¥32,500		
AKT887	TITANIUM TETRAKIS(BIS 2,2-(ALLYLOXYMETHYL)BUTOXIDE)	25g	¥11,800	100g	¥28,000
OMTI075	TITANIUM TETRAKIS(DIETHYLAMIDE), 99+%	5g	¥19,500	25g	¥64,500
OMTI080	TITANIUM TETRAKIS(DIMETHYLAMIDE), 99+%	5g	¥19,500	25g	¥64,500
OMTI083	TITANIUM TETRAKIS(ETHYLMETHYLAMIDE), 99+%	5g	¥24,500	25g	¥84,500
AKT887.2	TITANIUM TRIACRYLATE METHOXYETHOXYETHOXIDE, 90% in methoxydiethyleneglycol	100g	¥11,500		
AKT887.5	TITANIUM TRIISOSTEAROYLISOPROPOXIDE, tech-90	100g	¥9,300	500g	¥23,500
AKT888	TITANIUM TRIMETHACRYLATE METHOXYETHOXYETHOXIDE, 70% in methoxydiethyleneglycol/isopropanol	100g	¥9,800	500g	¥24,000
AKT889.1	TITANIUM TRIS(DIOCTYLPYROPHOSPHATO)ISOPROPOXIDE, tech-90	25g	¥11,500	100g	¥27,300
AKT889.3	TITANIUM TRIS(DODECYLBENZENESULFONATE)ISOPROPOXIDE, tech-90	25g	¥8,000	100g	¥16,000
AKT889.4	TITANIUM(III) TRIS(2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE)	1.0g	¥22,500		
OMTI085	TITANOCENE DICHLORIDE	100g	¥28,000	500g	¥98,500
SNT8380	(TRIISOPROPOXYTITANOXY)TRI-n-BUTYLTIN, tech-95	10g	¥12,000	50g	¥34,500
TUNGSTEN					
INTU022	[1,2-BIS(DIPHENYLPHOSPHINO)ETHANE]TUNGSTEN TETRACARBONYL	5g	¥35,500		
AKT890	TUNGSTEN(V) ETHOXIDE, 95%	5g	¥16,500	25g	¥52,500
INTU030	TUNGSTEN HEXACARBONYL	50g	¥53,300		
AKT893	TUNGSTEN(VI) PHENOXIDE	5g	¥16,000	25g	¥50,500
SIT8787.0	TUNGSTEN SILICIDE	25g	¥24,100		
SIT8780.0	TUNGSTOSILICIC ACID hydrate	50g	¥32,600		
VANDIUM					
AKV897	VANADIUM(IV) OXIDE BIS(BENZOYLACETONATE)	5g	¥32,500		
AKV898	VANADIUM(IV) OXIDE BIS(HEXAFLUORO-2,4-PENTANEDIONATE), monohydrate	10g	¥41,000		
AKV900	VANADIUM(IV) OXIDE BIS(2,4-PENTANEDIONATE)	50g	¥13,500	250g	¥40,500
AKV920	VANADIUM OXIDE TRIS(METHOXYETHOXIDE)	25g	¥32,500		
AKV905	VANADIUM(III) 2,4-PENTANEDIONATE	50g	¥16,500	250g	¥52,500
AKV908	VANADIUM TRIISOBUTOXIDE OXIDE, 95%	25g	¥19,500	100g	¥53,300
AKV910	VANADIUM TRIISOPROPOXIDE OXIDE	25g	¥24,500	100g	¥69,500
AKV915	VANADIUM TRI-n-PROPOXIDE OXIDE	10g	¥12,500	50g	¥36,500
YTTERBIUM					
CXYB010	YTTERBIUM ACETATE, tetrahydrate	25g	¥18,300		
AKY921	YTTERBIUM 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	1.0g	¥16,500		
AKY921.2	YTTERBIUM 3,5-HEPTANEDIONATE	5g	¥27,000		
AKY921.5	YTTERBIUM HEXAFLUORO-2,4-PENTANEDIONATE	1.0g	¥19,500	5g	¥64,500
AKY920	YTTERBIUM 2,4-PENTANEDIONATE	1.0g	¥11,800	5g	¥33,500
AKY922	YTTERBIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥12,800	5g	¥37,500
CXYB083	YTTERBIUM TRIFLUOROMETHANESULFONATE, hydrate	25g	¥28,500		
YTTRIUM					
DALY080	ALUMINUM YTTRIUM DOUBLE METAL ALKOXIDE	25g	¥13,000	100g	¥32,000
DBAY060	BARIUM YTTRIUM DOUBLE METAL ALKOXIDE (0.3 M)	25g	¥15,500	100g	¥40,300
CXYO010	YTTRIUM ACETATE, tetrahydrate	25g	¥9,500		
AKY922.5	YTTRIUM 6,6,7,7,8,8,8-HEPTAFLUORO-2,2-DIMETHYL-3,5-OCTANEDIONATE	1.0g	¥22,500		
AKY923.1	YTTRIUM HEXAFLUOROISOPROPOXIDE DIAMMONIA complex, 10% in diethylether	10g	¥41,500		
AKY924	YTTRIUM HEXAFLUORO-2,4-PENTANEDIONATE	5g	¥21,500	25g	¥72,500
AKY925	YTTRIUM ISOPROPOXIDE, 95%	2.5g	¥15,000	10g	¥38,500
CXYO050	YTTRIUM METHACRYLATE	10g	¥28,500		

CODE	PRODUCT	SIZE 1	PRICE 1	SIZE 2	PRICE 2
AKY927	YTTRIUM METHOXYETHOXIDE, 15-18% in methoxyethanol	25g	¥8,500	100g	¥17,500
AKY930	YTTRIUM 2,4-PENTANEDIONATE, hydrate	10g	¥13,500	50g	¥40,500
AKY932	YTTRIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥13,300	5g	¥39,500
CXYO080	YTTRIUM TRIFLUOROACETATE, hydrate	10g	¥17,600		
CXYO083	YTTRIUM TRIFLUOROMETHANESULFONATE, hydrate	5g	¥12,500		
SIY9680.0	YTTRIUM(III) TRIS[BIS(TRIMETHYLSILYLAMIDE)]	5g	¥67,100		
ZINC					
OMZN017	DIETHYLZINC, 95%	500g	inquire		
OMZN019	DIETHYLZINC BIS(METHOXYETHYL) ETHER COMPLEX, 50% in diglyme	500g	inquire		
OMZN018	DIETHYLZINC, 1M in heptane	500g	inquire		
OMZN040	DIPHENYLZINC, 95%	5g	¥77,000		
CXZN010	ZINC ACETATE, dihydrate	100g	¥7,000	2kg	¥129,000
CXZN015	ZINC ACRYLATE	100g	¥9,300	500g	¥23,500
SIZ9700.0	ZINC BIS(HEXAMETHYLDISILAZIDE)	1.0g	¥38,500		
AKZ932.5	ZINC DI-n-BUTYLDITHIOCARBAMATE	25g	¥9,500	100g	¥20,800
AKZ932.7	ZINC O,O-DI-n-BUTYLPHOSPHORODITHIOATE	25g	¥14,300		
AKZ932.8	ZINC DIETHYLDITHIOCARBAMATE	25g	¥7,000	100g	¥12,500
AKZ933	ZINC N,N-DIMETHYLAMINOETHOXIDE	2.5g	¥20,500	10g	¥52,500
AKZ933.5	ZINC DIMETHYLDITHIOCARBAMATE	25g	¥7,000	100g	¥12,500
CXZN040	ZINC 2-ETHYLHEXANOATE	100g	¥9,300	500g	¥24,000
CXZN045	ZINC FORMATE, dihydrate	25g	¥14,500		
AKZ933.7	ZINC HEXAFLUORO-2,4-PENTANEDIONATE, hydrate	1.0g	¥15,800		
AKZ933.8	ZINC 8-HYDROXYQUINOLINATE	5g	¥14,500	25g	¥44,500
CXZN050	ZINC METHACRYLATE	100g	¥14,300		
AKZ934	ZINC METHOXYETHOXIDE, 95%	2.5g	¥16,800	10g	¥44,500
CXZN062	ZINC NEODECANOATE, tech-95	100g	¥9,300		
AKZ935	ZINC 2,4-PENTANEDIONATE, hydrate	100g	¥12,000	500g	¥34,500
SNZ9760	ZINC STANNATE	25g	¥10,300	100g	¥23,000
AKZ938	ZINC 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	1.0g	¥11,800	5g	¥33,500
CXZN085	ZINC UNDECYLENATE	100g	¥9,000		
ZIRCONIUM					
DALZR50	ALUMINUM ZIRCONIUM DOUBLE METAL ALKOXIDE (0.67 M)	100g	¥11,800	500g	¥33,500
DBAZR50	BARIUM ZIRCONIUM DOUBLE METAL ALKOXIDE (0.33 M)	25g	¥10,000	100g	¥22,500
OMZR007	BIS(n-BUTYLCYCLOPENTADIENYL)ZIRCONIUM DICHLORIDE	5g	¥57,000		
OMZR014	BIS(METHYLCYCLOPENTADIENYL)ZIRCONIUM DICHLORIDE	5g	¥74,500		
OMZR016	BIS(PENTAMETHYLCYCLOPENTADIENYL)ZIRCONIUM DICHLORIDE	2.5g	¥39,500		
SID4045.0	DIMETHYL[BIS(CYCLOPENTADIENYL)SILYL] ZIRCONIUM DICHLORIDE	1.0g	¥64,400		
W-PZT-25-02	LEAD ZIRCONATE TITANATE WAFER	Each	¥11,900		
DMGZR50	MAGNESIUM ZIRCONIUM DOUBLE METAL ALKOXIDE 1.0M)	25g	¥11,000	100g	¥25,500
SIP6902.2	PRASEODYMIUM ZIRCONIUM SILICATE	25g	¥14,600		
OMZR078	TETRABENZYLZIRCONIUM, 10-12% in toluene	25g	¥102,000		
SIT7306.0	TETRAKIS(TRIMETHYLSILOXY)ZIRCONIUM	10g	¥39,500		
AKZ941	ZIRCONIUM (BIS-2-2-(ALLYLOXYMETHYL)BUTOXIDE)TRIS(DIOCTYLPHOSPHATE), 95%	25g	¥10,500	100g	¥24,000
AKZ938.6	ZIRCONIUM BIS(DIETHYLCITRATO)DI-n-PROPOXIDE, 75% in n-propanol/ethanol	25g	¥8,000	100g	¥16,000
SIZ9810.0	ZIRCONIUM BIS(HEXAMETHYLDISILAZIDE)DICHLORIDE, tech-95	10g	¥31,600		
AKZ945	ZIRCONIUM n-BUTOXIDE, 80% in n-butanol	100g	¥8,000	2kg	¥41,500
AKZ946	ZIRCONIUM t-BUTOXIDE	5g	¥19,500	25g	¥64,500
AKZ947	ZIRCONIUM DI-n-BUTOXIDE BIS(2,4-PENTANEDIONATE), 25% in n-butanol/toluene	100g	¥13,500		
AKZ947.5	ZIRCONIUM DICHLORIDE BIS(2,4-PENTANEDIONATE)	5g	¥16,500	25g	¥52,500
AKZ948	ZIRCONIUM DIISOPROPOXIDE BIS(2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE), tech-90	5g	¥23,000		
AKZ949	ZIRCONIUM DIMETHACRYLATE DIBUTOXIDE, 25% in toluene/n-butanol	25g	¥13,500		
AKZ950	ZIRCONIUM ETHOXIDE	10g	¥10,500	50g	¥28,500
CXZR043	ZIRCONIUM 2-ETHYLHEXANOATE, 90%	100g	¥10,500		
AKZ951	ZIRCONIUM 2-ETHYLHEXOXIDE, 70% in 2-ethylhexanol	25g	¥12,000	100g	¥29,000
AKZ952	ZIRCONIUM 3,5-HEPTANEDIONATE	10g	¥15,800	50g	¥49,500
AKZ953	ZIRCONIUM HEXAFLUORO-2,4-PENTANEDIONATE	5g	¥19,500	25g	¥64,500
AKZ955	ZIRCONIUM ISOPROPOXIDE, 70-75% in heptane	5g	¥11,500	25g	¥32,500
CXZR050	ZIRCONIUM METHACRYLATE, 95%	25g	¥19,500		
AKZ968	ZIRCONIUM 2-METHOXYMETHYL-2-PROPOXIDE	5g	¥44,500		
AKZ965	ZIRCONIUM 2-METHYL-2-BUTOXIDE	10g	¥13,300	50g	¥39,500
AKZ970	ZIRCONIUM 2,4-PENTANEDIONATE	50g	¥9,000	500g	¥36,000
AKZ975	ZIRCONIUM n-PROPOXIDE, 70% in n-propanol	100g	¥7,000	2kg	¥32,000
SIZ9850.0	ZIRCONIUM SILICATE	500g	¥10,900	2.5kg	¥35,500
SIZ9860.0	ZIRCONIUM SILICIDE, powder, 99%	25g	¥13,000		
INZR065	ZIRCONIUM TETRACHLORIDE, 99+%	100g	¥12,000	500g	¥34,500
INZR070	ZIRCONIUM TETRAIODIDE	5g	¥32,000		
OMZR080	ZIRCONIUM TETRAKIS(DIMETHYLAMIDE)	5g	¥27,000	25g	¥94,500
OMZR083	ZIRCONIUM TETRAKIS(ETHYLMETHYLAMIDE)	5g	¥34,500	25g	¥125,000
AKZ980	ZIRCONIUM 2,2,6,6-TETRAMETHYL-3,5-HEPTANEDIONATE	5g	¥23,500		
AKZ985	ZIRCONIUM 1,1,1-TRIFLUORO-2,4-PENTANEDIONATE	2.5g	¥11,800	10g	¥20,500
AKZ990	ZIRCONIUM TRIMETHYLSILYLETHOXIDE	10g	¥59,500		
SIZ9920.0	ZIRCONIUM TRIS(2,2,5,5-TETRAMETHYL-2,5-DISILAPYRROLIDINE)CHLORIDE, tech-95	10g	¥77,700		
OMZR085	ZIRCONOCENE DICHLORIDE	25g	¥20,500		
CXZR051	ZIRCONYL DIMETHACRYLATE, hydrate	25g	¥13,000		
CXZR075	ZIRCONYL PROPIONATE, 75%	25g	¥11,800		

Boiling Point - Pressure Nomograph



The accompanying chart, an invaluable tool for the practicing chemist, is designed to correlate the normal boiling point of a compound with its approximate boiling point at any given sub-atmospheric pressure. The three columns represent its boiling point at pressure P mm (1), its boiling point at 760 mm (2) and pressure P mm (3). To determine any one of the three values, knowing the other two, connect the two known points with a straight edge and read the third value by extrapolation to the third column.

For example, if a compound has a reported boiling point of 100° at 1 mm and is to be redistilled at 18 mm, the boiling point at 18 mm can be determined using this chart. First connect 100°C (column 1) with 1 mm (column 3) and note where it intersects column 2 (280°). Next connect 280°C (column 2) with 18 mm (column 3) and read where it intersects column 1. Thus, 151° is the boiling point at 18 mm.