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Hydrophobicity, Hydrophilicity

and Silane Surface Modification

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- Mineral Surface Treatments
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- Architectural Coatings
- Crosslinkers for Silicones
- Nanoparticle Synthesis

Gelest, Inc.

Telephone:	General 215-547-1015 Order Entry 888-734-8344
FAX:	215-547-2484
Internet:	www.gelest.com
Correspondence:	11 East Steel Rd. Morrisville, PA 19067

For further information consult our web site at: www.gelest.com

In Europe:

For commercial quantities contact:

Gelest Ltd
46 Pickering Street
Maidstone
Kent ME15 9RR
United Kingdom
Tel: +44(0) 1622 741115
Fax: +44(0) 1622 741114
e-mail: europe@gelest.com

For research quantities contact:

ABCR GmbH & Co. KG
Im Schlehert
D-76187 Karlsruhe
Germany
Tel: +49 - 721 - 950610
Fax: +49 - 721 - 9506180
e-mail: info@abcr.de
on-line catalog: www.abcr.de

In Japan:

For commercial and research quantities contact:

AZmax Co. Ltd. Tokyo Office
Matsuda Yaesudori Bld F8
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Tokyo 104-0032
Tel: 81-3-5543-1630
Fax: 81-3-5543-0312
e-mail: sales@azmax.co.jp
on-line catalog: www.azmax.co.jp

In South-East Asia:

For commercial and research quantities contact:

Altus Technologies Pte Ltd
196 Pandan Loop #06-09
Pantech Industrial Complex
Singapore 128384
Tel: (65) 6779 7666
Fax: (65) 6779-7555
www.altus.com.sg

Front Cover Photos: Water rolls off a duck's back. Lotus leaves exhibit superhydrophobicity. Biological systems are dependent on water, but at the same time must control the interaction. In a sense, all living organisms exhibit behaviors that can be described as both hydrophobic and hydrophilic.

Hydrophobicity, Hydrophilicity
and Silane Surface Modification

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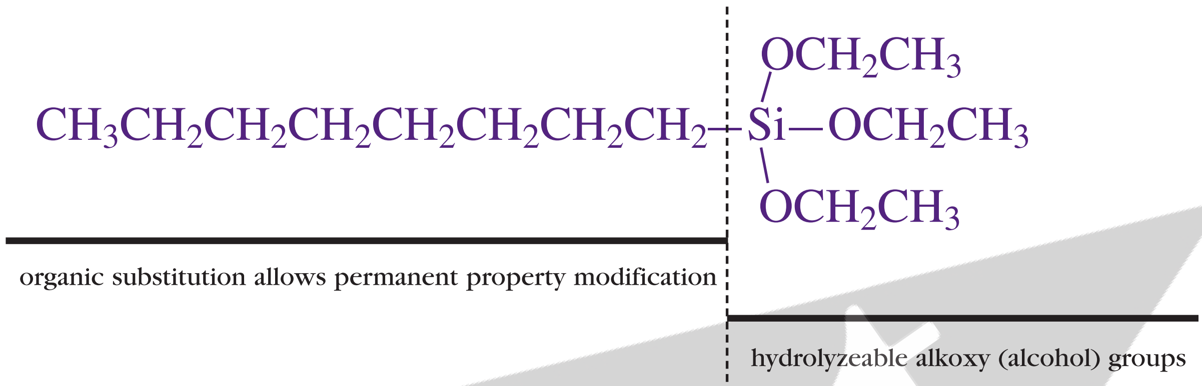
Hydrophobicity, Hydrophilicity and Silane Surface Modification
by Barry Arkles

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

Water, Hydrophobicity and Hydrophilicity

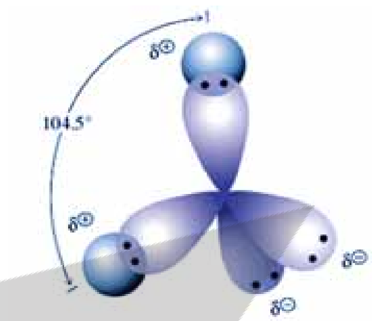
Hydrophobic and **Hydrophilic** are frequently used descriptors of surfaces. A surface is hydrophobic if it tends *not to* adsorb water or be wetted by water. A surface is hydrophilic if it tends *to* adsorb water or be wetted by water. More particularly, the terms describe the interaction of the boundary layer of a solid phase with liquid or vapor water. Silanes can be used to modify the interaction of boundary layers of solids with water with a high degree of control, effecting variable degrees of hydrophobicity or hydrophilicity.

Since the interaction of water with surfaces is frequently used to define surface properties, a brief review of its structure and properties can be helpful. Although the structure of water is a subject of early discussion in the study of physical sciences, it is interesting to note that the structure of liquid water is still not solved and, even so, most technologists lose appreciation of what is known about its structure and properties.

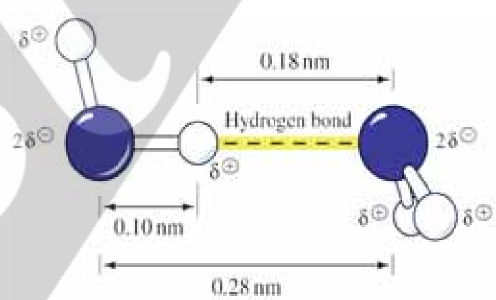
The quantum calculation of the structure of an isolated H_2O molecule has evolved to the currently accepted model which demonstrates a strong dipole, but no lone electron pairs associated with sp^3 hybridized orbitals of oxygen. This model of isolated H_2O conforms most closely to the vapor state and extrapolation often leads to the conclusion that water is a collection of individual molecules which associate with each other primarily through dipole interactions. The polar nature of water, with its partial positive and partial negative dipole, explains why bulk water readily dissolves many ionic species and interacts with ionic surfaces. The difference between isolated vapor phase water and bulk liquid water is much more extreme than can be accounted for by a model relying only on dipole interaction. The properties of bulk liquid water are strongly influenced by hydrogen bond interactions. In the liquid state, in spite of 80% of the electrons being concerned with bonding, the three atoms of a water molecule do not stay together as discrete molecules. The hydrogen atoms are constantly exchanging between water molecules in a protonation-deprotonation process. Both acids and bases catalyze hydrogen exchange and, even when at its slowest rate of exchange (at pH 7), the average residence time of a hydrogen atom is only about a millisecond. In the liquid state, water molecules are bound to each other by an average of three hydrogen bonds. Hydrogen bonds arise when a hydrogen that is covalently bound to an oxygen in one molecule of water nears another oxygen from another water molecule. The electrophilic oxygen atom "pulls" the hydrogen closer to itself. The end result is that the hydrogen is now shared (unequally) between the oxygen to which it is covalently bound and the electrophilic oxygen to which it is attracted (O-H···O). Each hydrogen bond has an average energy of 20 kJ/mol. This is much less than an O-H covalent bond, which is 460 kJ/mol. Even though an individual hydrogen bond is relatively weak, the large number of hydrogen bonds that exist in water which pull the molecules together have a significant role in giving water its special bulk properties. In ice, water molecules are highly organized with four hydrogen bonds. Liquid water is thought to be a combination of domains of molecules with 3-4 hydrogen bonds separated by domains with 2-3 hydrogen bonds, subject to constant turnover - the *flickering cluster model*.

This brief description of water is provided in order to give the insight that whenever a solid surface interacts with bulk water it is interacting with a soft matter structure, not simply a collection of individual molecules. Surface interactions with water must compete with a variety of internal interactions of liquid phase water: van der Waals forces, dipole interactions, hydrogen bonding and proton exchange.

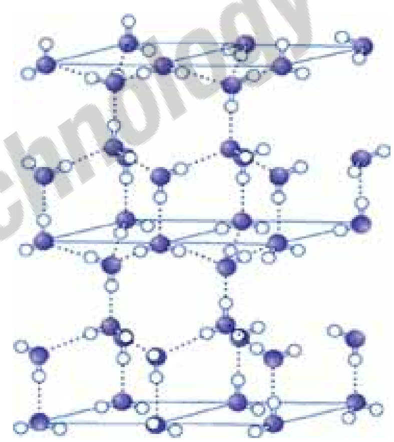
water



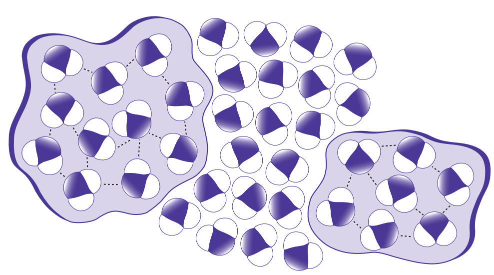
molecule of water showing dipole



2 molecules showing hydrogen bond



ice - molecules of water with 4 hydrogen bonds



liquid water - flickering cluster model
regions of molecules with 3-4 hydrogen bonds
separated by regions with 2-3 hydrogen bonds
(not shown: out of plane hydrogen bonds)

Wettability and Contact Angle

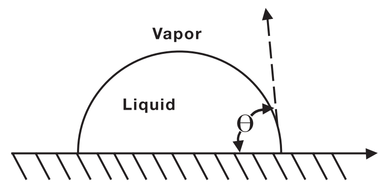
A surface is said to be wetted if a liquid spreads over the surface evenly without the formation of droplets. When the liquid is water and it spreads over the surface without the formation of droplets, the surface is said to be hydrophilic. In terms of energetics, this implies that the forces associated 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 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".

Ordinary Surface-
"typical wetting"

Hydrophobic-
"poor wetting"

Hydrophilic-
"good wetting"

Contact Angle Defines Wettability



Contact angle

Contact Angle of Water on Smooth Surfaces

	θ
heptadecafluorodecyltrimethoxysilane*	115°
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°
intestinal mucosa	50-60°
glycidoxypropyltrimethoxysilane*	49°
kaolin	42-46°
platinum	40°
silicon nitride	28-30°
silver iodide	17°
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. 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 (γ_c) 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. The contact angle is given by Young's equation:

$$\gamma_{sv} - \gamma_{sl} = \gamma_{lv} \cdot \cos\theta_e$$

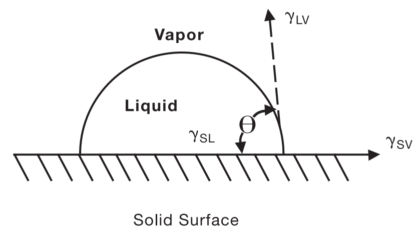
where γ_{sl} = interfacial surface tension, γ_{lv} = surface tension of liquid.

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 associated with the adsorption.

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.

Silane treatment has allowed control of thixotropic activity of silica and clays in paint and coating applications. 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. Immobilization of cellular organelles, including mitochondria, chloroplasts, and microsomes, has been effected by treating silica with alkylsilanes of C_8 or greater substitution.

Contact Angle Defines Wettability



Contact angle

Critical surface tensions

	γ_c dynes/cm
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
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.

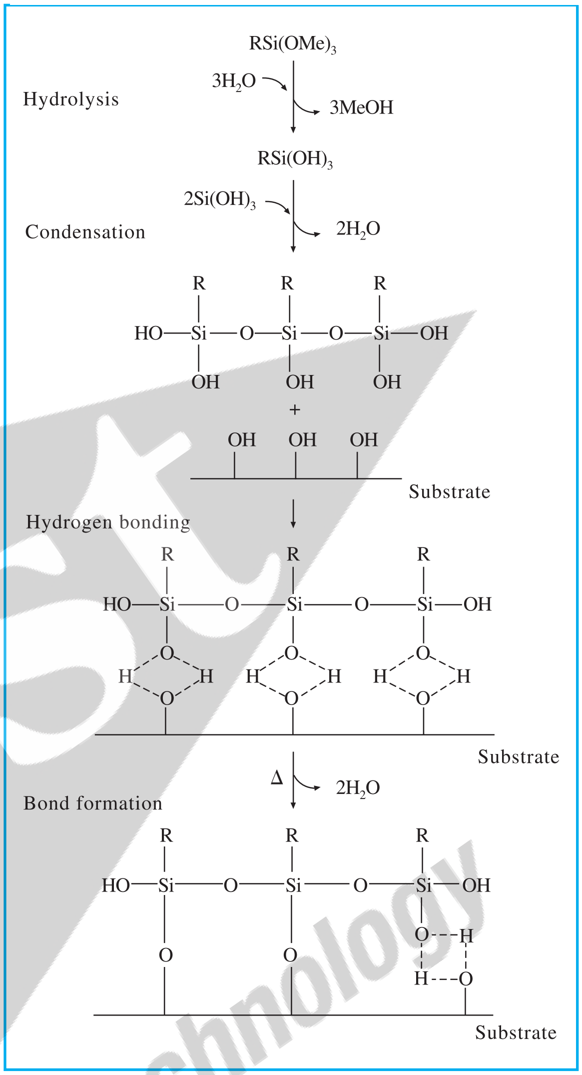
Hydrolysis Considerations

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 interconnected 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.

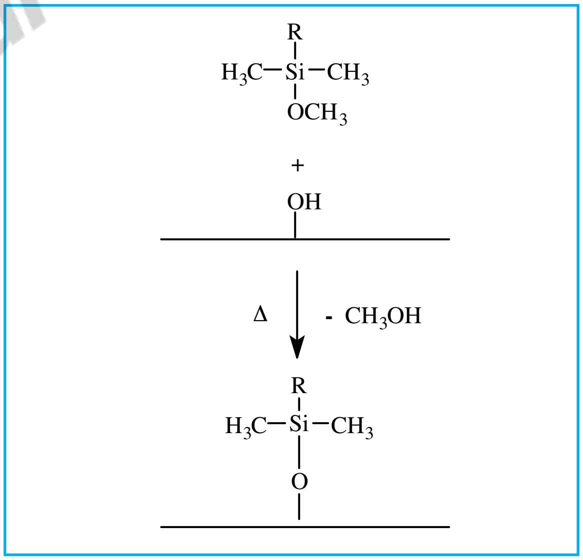
The formation of covalent bonds to the surface proceeds with a certain amount of reversibility. As water is removed, generally by heating to 120°C for 30 to 90 minutes or evacuation for 2 to 6 hours, bonds may form, break, and reform to relieve internal stress.

Hydrolytic Deposition of Silanes

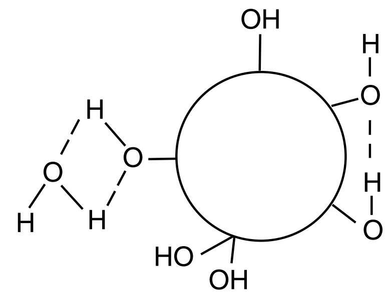


B. Arkles, CHEMTECH, 7, 766, 1977

Anhydrous Deposition of Silanes



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

Effectiveness	SUBSTRATES
EXCELLENT	Silica
	Quartz
	Glass
	Aluminum (AlO(OH))
	Alumino-silicates (e.g. clays)
	Silicon
	Copper
GOOD	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 ($BaSO_4$)
	Graphite
POOR	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

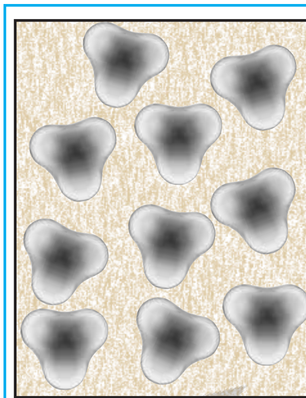
Hydrophobic Silane Surface Treatments

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.

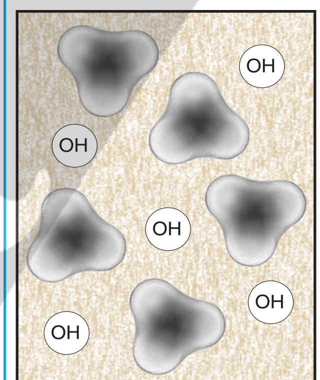
Aliphatic hydrocarbon substituents or fluorinated hydrocarbon substituents are the hydrophobic entities which enable silanes to induce surface hydrophobicity. Beyond the simple attribute that in order to generate a hydrophobic surface the organic substitution of the silane must be non-polar, more subtle 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.

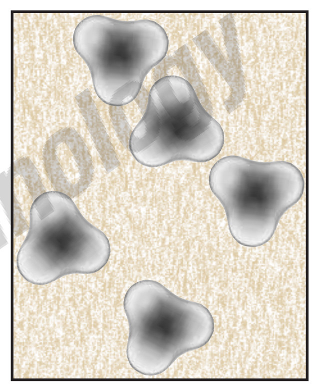
Strategies for silane surface treatment depend on the population of hydroxyl groups and their accessibility for bonding. A simple conceptual case is the reaction of organosilanes to form a monolayer. If all hydroxyl groups are capped by the silanes and the surface is effectively shielded, a hydrophobic 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.



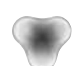
complete coverage



incomplete hydroxyl reaction



few bonding opportunities

 = $(CH_3)_3Si$ = trimethylsilyl

Hypothetical Trimethylsilylated Surfaces

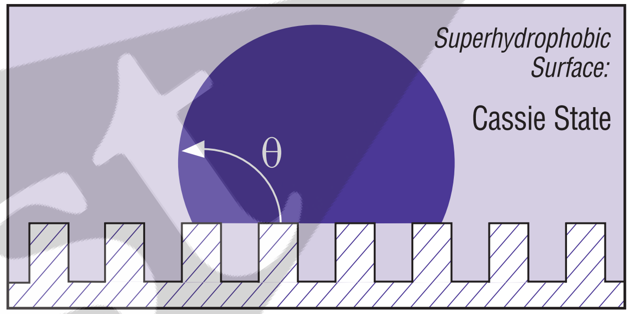
Pyrogenic silica has 4.4-4.6 OH/nm^2. Typically less than 50% are reacted. Other substrates have fewer opportunities for reaction.

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, 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 super-hydrophobicity 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 the *Cassie state*. Perfectly hydrophobic surfaces (contact angles of 180°) have been prepared by hydrolytic deposition of methylchlorosilanes as microfibrillar structures.

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.



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.*

Hydrophilic Silane Surface Treatments

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.

The vast majority of surfaces are hydrophilic and 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 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.

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.

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.

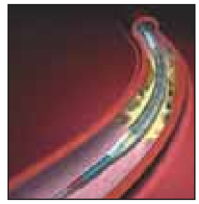
Much of the discussion of hydrophobicity centers around high contact angles and their measurement. As a corollary, low or 0° contact angles of water are associated with hydrophilicity, but practically the collection of consistent data is more difficult. Discriminating between surfaces with a 0° contact angle is impossible. The use of heat of immersion is a method that generates more consistent data for solid surfaces, provided they do not react with, dissolve or absorb the tested liquid. Another important consideraton is whether 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.

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 oleophobic lipophobic	 fluorocarbon	contact angle
	oleophilic lipophilic hydrophobic	 hydrocarbon	water-sliding angle critical surface tension
moderate	polar hydrophilic	polymer oxide surface	heat of immersion
	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 organofunctional silanes decreases in the order: $Si\text{-}NR_2$ > Si-Cl > Si-NH-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

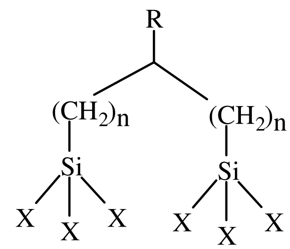
Type	Advantage	Disadvantage
dimethylamine	reactive, volatile byproduct	toxic
hydrogen chloride	reactive, volatile byproduct	corrosive
silazane (NH_3)	volatile	limited availability
methoxy	moderate reactivity, neutral byproduct	moderate toxicity
ethoxy	low toxicity	lower reactivity

Special Topics

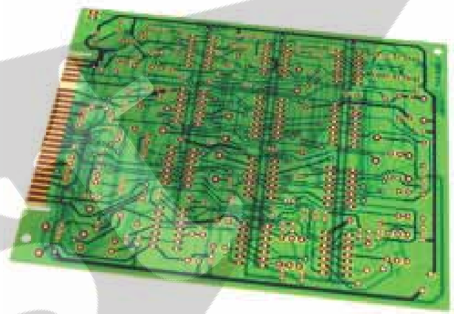
Dipodal Silanes

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.



Multilayer printed circuit boards *use dipodal silanes to maintain the integrity of the bond between metal and resins by reducing interfacial water adsorption.*



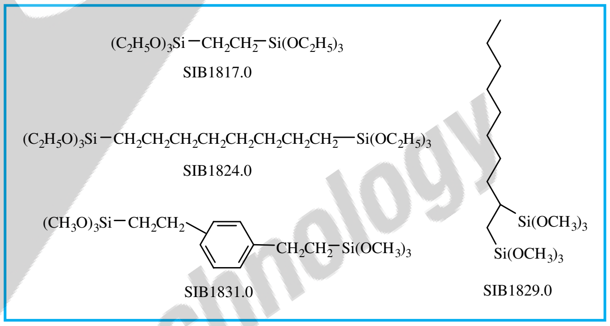
Effect of dipodal -SiCH2CH2Si- on the bond strength of a crosslinkable ethylene-vinyl acetate primer formulation

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)

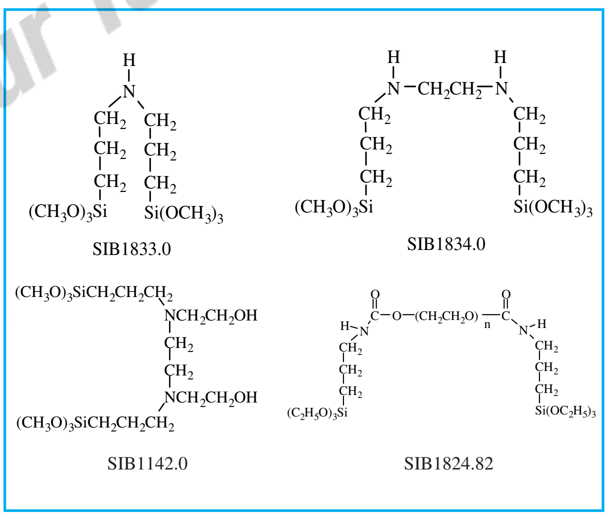
90º peel strength after 2 h in 80ºC water.

P. Pape et al, in Silanes and Other Coupling Agents, ed. K. Mittal, 1992, VSP, p105

Hydrophobic Dipodal Silanes



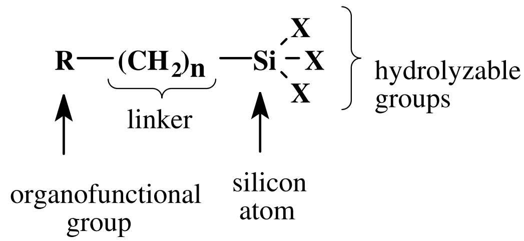
Hydrophilic Dipodal Silanes



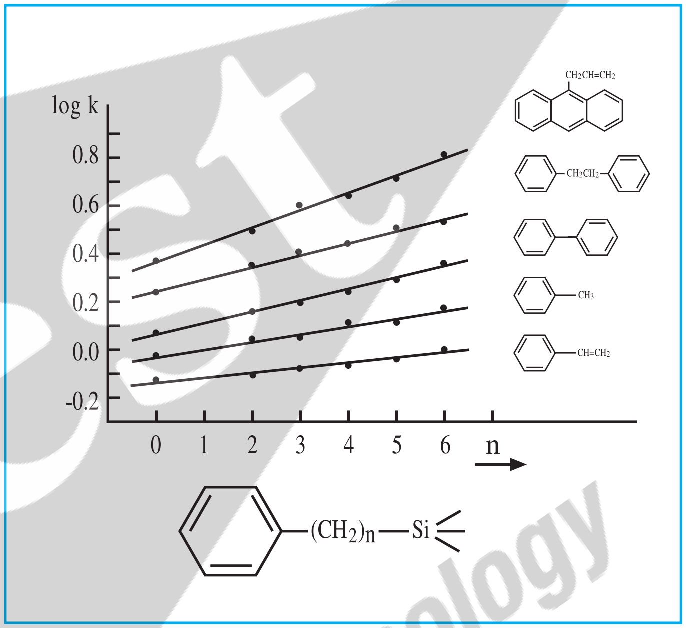
Hydrophobic coatings applied to antennas inhibit the formation of adsorbed water layers which become dielectric layers that absorb signals and cause high losses. If the water is in beads, the energy will be slightly diffracted because the water droplets have dimensions much less than a wavelength at these frequencies.

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.

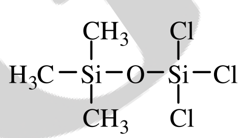


Effect of linker length on the separation of aromatic hydrocarbons



T. Den et al, in "Silanes, Surfaces, Interfaces" D. Leyden ed., 1986 p403.

Silanes with short linker length



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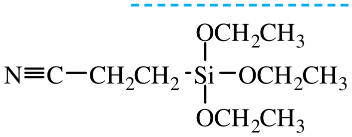

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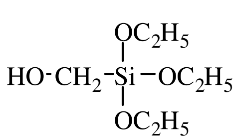

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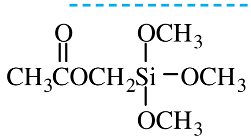
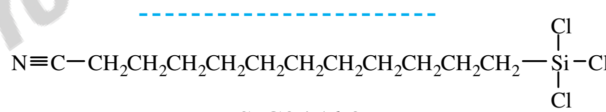


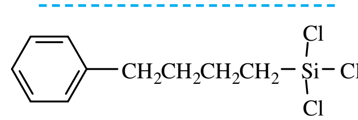
SIA0055.0

Silanes with extended linker length

SIH5925.0



SIC2456.3



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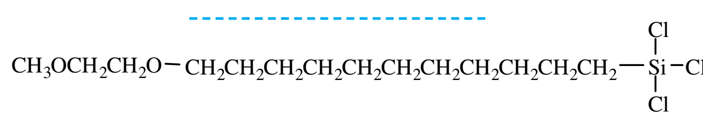


SIM6491.5

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 methylaminopropyltrimethoxysilane (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.

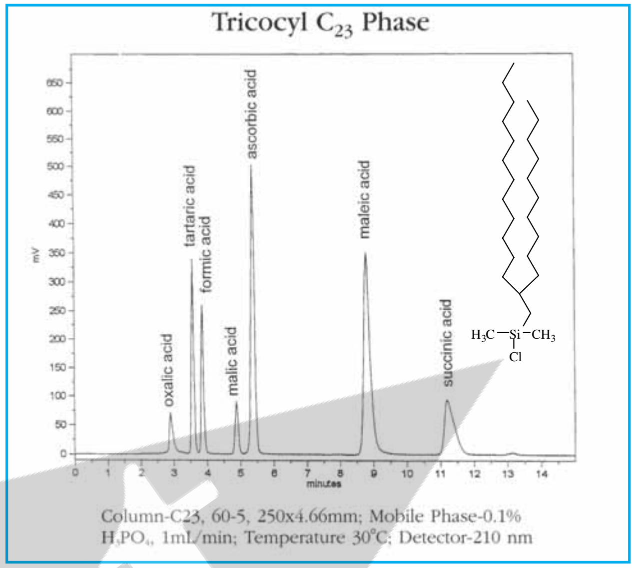
Self-Assembled Monolayers (SAMs)

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.

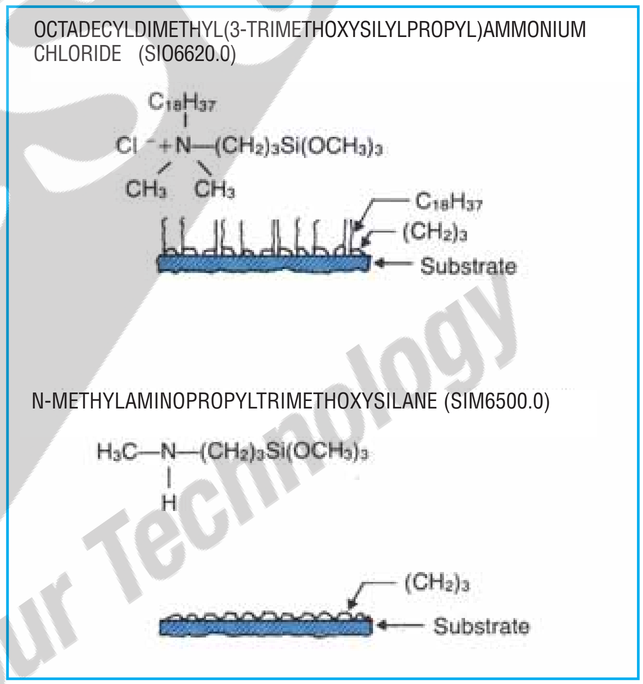
Common long chain alkyl silanes used in the formation of SAMs are simple hydrocarbon, fluoroalkyl and end-group substituted silanes. Silanes with one hydrolyzeable group maintain interphase structure after deposition by forming a single oxane bond with the substrate. Silanes with three hydrolyzeable 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

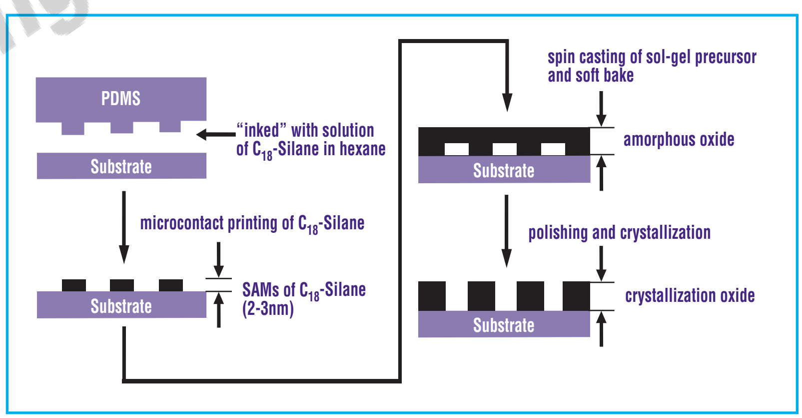


Orientation effects of silanes for passive LCDs



F. Kahn., Appl. Phys. Lett. *22*, 386, 1973

Micro-Contact Printing Using SAMs



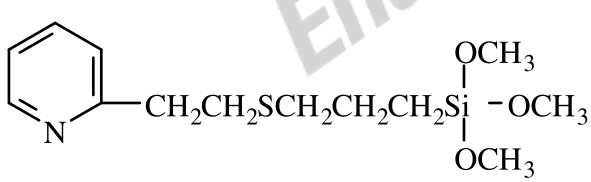
Modification of Metal Substrates

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.



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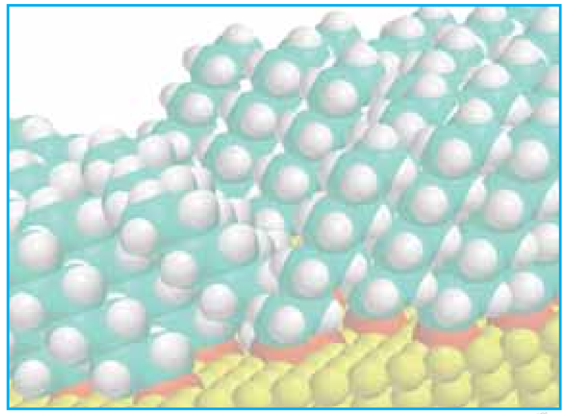


Octysilane adsorbed on titanium — figure courtesy of M. Banaszak-Holl

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. 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. (see p72.)

$$H_2C{=}CH(CH_2)_8CH_2SiH_3$$

SIU9048.0

Coupling Agents for Metals*

Metal	Class	Screening Candidates	
Copper	Amine	SSP-060	SIT8398.0
Gold	Sulfur	SIT7908.0	SIP6926.2
	Phosphorus	SID4558.0	SIB1091.0
Iron	Amine	SIB1834.0	WSA-7011
	Sulfur	SIB1824.6	SIM6476.0
Tin	Amine	SIB1835.5	
Titanium	Epoxy	SIG5840.0	SIE6668.0
	Hydride	SIU9048.0	
Zinc	Amine	SSP-060	SIT8398.0
	Carboxylate	SIT8402.0	SIT8192.6

*These coupling agents are almost always used in conjunction with a second silane with organic reactivity or a dipodal silane.

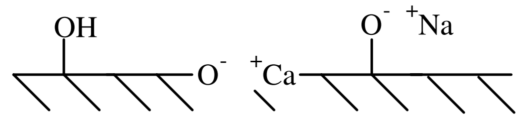
Difficult Substrates

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

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).

Fig. 1 Reactor for slurry treatment of powders. Separate filtration and drying steps are required.

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 pre-blend. 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.

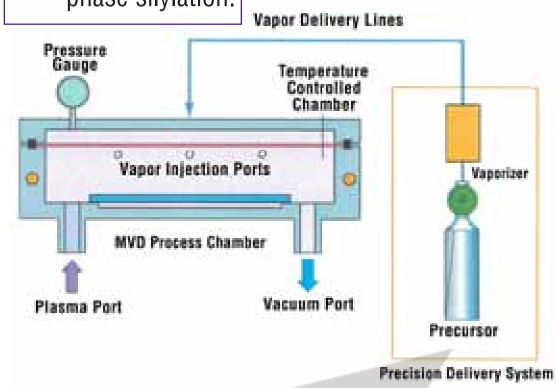
Anhydrous liquid phase deposition of chlorosilanes, methoxysilanes, aminosilanes and cyclic azasilanes is preferred for small particles and nano-featured substrates. Toluene, tetrahydrofuran or hydrocarbon solutions are prepared containing 5% silane. The mixture is refluxed for 12-24 hours with the substrate 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.

Fig. 3 Twin-cone blenders with intensive mixing bars are used for bulk deposition of silanes onto powders.

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

Figure 4. Apparatus for vapor phase silylation.



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 5. Spin-coater for deposition on wafers.

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 6. Spray application of silanes on large structures.

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.

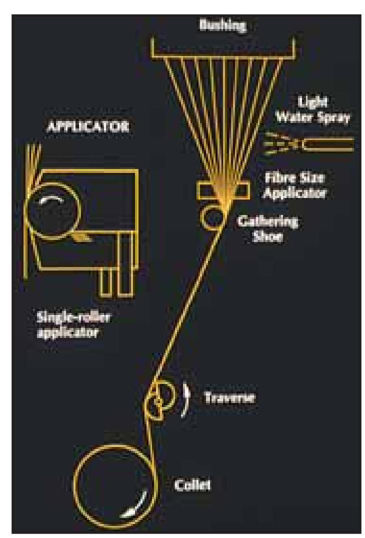


Figure 7. Spray & contact roller application of silanes on fiberglass.

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 Hydrolyzeable Groups

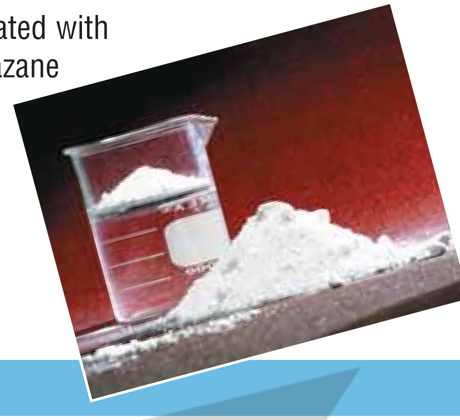
Hydrolyzeable Groups	Product Code	Product Name
chloro	SIM6520.0	methyltrichlorosilane
methoxy	SIM6560.0	methyltrimethoxysilane
ethoxy	SIM6555.0	methyltriethoxysilane
propoxy	SIM6579.0	methyltri-n-propoxysilane
methoxyalkoxy	SIM6585.0	methyltris(methoxyethoxy)silane
acetoxy	SIM6519.0	methyltriacetoxysilane
dimethylamine	SIT8712.0	tris(dimethylamino)methylsilane
other amine	SIT8710.0	tris(cyclohexylamino)methylsilane
silazane (NH)		
oxime	SIM6590.0	methyltris(methylethylketoximino)silane

Methyl-SiloxanylSilanes

3 Hydrolyzeable Groups

Hydrolyzeable Groups	Product Code	Product Name
2 silicon atom compounds		
chloro	SIT8572.6	trimethylsiloxytrichlorosilane
ethoxy		
acetoxy		
3 silicon atom compounds		
chloro		
methoxy		
ethoxy		
chloro		
oligomeric polysiloxanes		
chloro		
methoxy		
ethoxy		
amine/silazane		
silanol		
selected specialties		
	SID4236.0	dimethyltetramethoxydisiloxane

Fumed silica treated with hexamethyldisilazane floats on water.



2 Hydrolyzeable 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 Hydrolyzeable 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

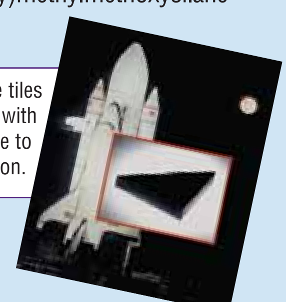
2 Hydrolyzeable Groups

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 Hydrolyzeable Group

Product Code	Product Name
SIP6717.0	pentamethylacetoxydisiloxane
SIB1843.0	bis(trimethylsiloxy)methylmethoxysilane
SID4125.0	dimethylethoxysilane
SIT8719.5	[tris(trimethylsiloxy)silylethyl]dimethylchlorosilane

Space Shuttle tiles are treated with dimethylethoxysilane to reduce water absorption.



Hydrophobic Silane Selection Guide

Linear Alkyl-Silanes

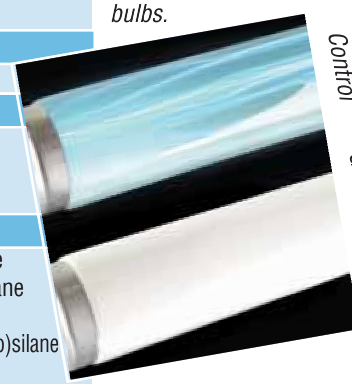
3 Hydrolyzeable Groups

	Hydrolyzeable 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
	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
	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
	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		
	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
C_{26}-C_{34}	forms hydrophobic and oleophilic coatings, solid at room temperature		
	chloro	SIT8048.0	triacontyltrichlorosilane blend

2 Hydrolyzeable Groups		*1 Hydrolyzeable 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
		SIB1934.0	n-butyldimethylchlorosilane
		SIB1937.0	n-butyldimethyl(dimethylamino)silane
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 Hydrolyzeable Groups

		Hydrolyzeable 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
		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
		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

2 Hydrolyzeable Groups		1 Hydrolyzeable 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

Isobutyltriethoxysilane solutions in ethanol are applied by spray to protect architecture.

Hydrophobic Silane Selection Guide

Phenyl- and Phenylalkyl-Silanes

3 Hydrolyzeable Groups

	Hydrolyzeable Groups	Product Code	Product Name
spacer atoms = 0			
	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			
	chloro	SIP6722.0	phenethyltrichlorosilane
	methoxy	SIP6722.6	phenethyltrimethoxysilane
	amine/silazane		
spacer atoms = 3			
	chloro		
spacer atoms = 4			
	chloro	SIP6724.9	4-phenylbutyltrichlorosilane
	chloro	SIP6723.3	phenoxypropyltrichlorosilane
spacer atoms > 4			
	chloro	SIP6736.4	phenoxyundecyltrichlorosilane
	chloro	SIP6723.4	phenylhexyltrichlorosilane

Substituted Phenyl- and Phenylalkyl-Silanes

	Hydrolyzeable Groups	Product Code	Product Name
spacer atoms = 0			
	chloro	SIT8040.0	p-tolyltrichlorosilane
	methoxy	SIT8042.0	p-tolyltrimethoxysilane
spacer atoms = 2			
	methyl/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

	Hydrolyzeable Groups	Product Code	Product Name
	methoxy	SIN6597.0	1-napthyltrimethoxysilane
	chloro	SIN6596.0	(1-napthylmethyl)trichlorosilane

Specialty Aromatic- Silanes

	Hydrolyzeable Groups	Product Code	Product Name
spacer atoms = 0			
	chloro		
spacer atoms = 4			
	chloro		

2 Hydrolyzeable Groups		*1 Hydrolyzeable 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		
		SIB0962.0	benzyldimethylchlorosilane
SIP6738.5	1-phenyl-1-methyldichlorosilylbutane		
SIP6721.5	phenethylmethyldichlorosilane	SP6721.0	phenethyldimethylchlorosilane
		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
SIT8035.0	p-tolylmethydichlorosilane	SIT8030.0	p-tolyldimethylchlorosilane
SIM6511.0	(p-methylphenethyl)methyldichlorosilane		
		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

3 Hydrolyzeable Groups

	Hydrolyzeable Groups	Product Code	Product Name
C_3			
	chloro methoxy amine/silazane	SIT8371.0 SIT8372.0	(3,3,3-trifluoropropyl)trichlorosilane (3,3,3-trifluoropropyl)trimethoxysilane
C_6			
	chloro methoxy ethoxy amino	SIN6597.6 SIN6597.7 SIN6597.65 SIN6597.4	nonafluorohexyltrichlorosilane nonafluorohexyltrimethoxysilane nonafluorohexyltriethoxysilane nonafluorohexyltris(dimethylamino)silane
C_8			
	chloro methoxy ethoxy	SIT8174.0 SIT8176.0 SIT8175.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)trichlorosilane (tridecafluoro-1,1,2,2-tetrahydrooctyl)trimethoxysilane (tridecafluoro-1,1,2,2-tetrahydrooctyl)triethoxysilane
C_{10}			
	chloro methoxy ethoxy	SIH5841.0 SIH5841.5 SIH5841.2	(heptadecafluoro-1,1,2,2-tetrahydrodecyl)trichlorosilane (heptadecafluoro-1,1,2,2-tetrahydrodecyl)trimethoxysilane (heptadecafluoro-1,1,2,2-tetrahydrodecyl)triethoxysilane

DiAlkyl Silanes

2 Hydrolyzeable Groups

Highest Carbon #	Next Carbon #	Hydrolyzeable Groups	Product Code	Product Name
C_2	C_2			
		chloro ethoxy	SID3402.0 SID3404.0	diethyldichlorosilane diethyldiethoxysilane
C_3	C_3			
		chloro methoxy	SID3537.0 SID3538.0	diisopropyldichlorosilane diisopropyldimethoxysilane
C_4	C_4			
		chloro methoxy methoxy ethoxy	SID3203.0 SID3214.0 SID3530.0 SID3528.0	di-n-butyldichlorosilane di-n-butyldimethoxysilane diisobutyldimethoxysilane diisobutyldiethoxysilane
C_4	C_3			
		methoxy	SII6452.6	isobutylisopropyldimethoxysilane
C_5	C_5			
		chloro methoxy	SID3390.0 SID3391.0	dicyclopentyldichlorosilane dicyclopentyldimethoxysilane
C_6	C_6			
		chloro chloro	SID3510.0 SID3382.0	di-n-hexyldichlorosilane dicyclohexyldichlorosilane
C_8	C_8			
		chloro	SID4400.0	di-n-octyldichlorosilane

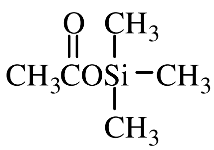
2 Hydrolyzeable Groups Product Code	Product Name	*1 Hydrolyzeable Group* Product Code	Product Name
SIT8369.0	(3,3,3-trifluoropropyl)methyldichlorosilane	SIT8364.0	(3,3,3-trifluoropropyl)dimethylchlorosilane
SIT8370.0	(3,3,3-trifluoropropyl)methyldimethoxysilane	SIB1828.4	bis(trifluoropropyl)tetramethyldisilazane
SIN6597.5	nonafluorohexylmethyldichlorosilane	SIN6597.3	nonafluorohexyldimethylchlorosilane
SIT8172.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)methyldichlorosilane	SIT8170.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)dimethylchlorosilane
SIH5840.6	(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.*

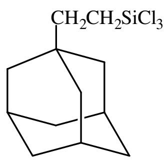
Hydrophobic Silane Properties

Conventional Surface Bonding

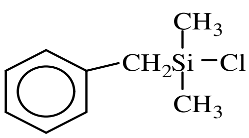
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



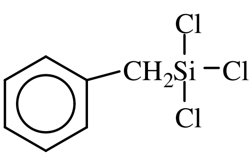
SIA0110.0
ACETOXYTRIMETHYLSILANE — MW 132.23 — bp 103-4° (-32°)mp — D_4^{20} 0.891 — n_D^{20} 1.3890
O-TRIMETHYLSILYLACETATE
$C_5H_{12}O_2Si$ — flashpoint: 4°C (39°F)
vapor pressure, 30°: 35mm
HYDROLYTIC SENSITIVITY: 4 no reaction under neutral conditions
[2754-27-0] TSCA HMIS: 3-4-1-X — 25g/$11.00 — 100g/$34.00



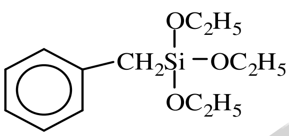
SIA0325.0
ADAMANTYLETHYLTRICHLOROSILANE — MW 297.73 — bp 135°/3 (36-7°)mp — D_4^{20} 1.2204 — n_D^{20} 1.5135
$C_{12}H_{19}Cl_3Si$ contains up to 5% α -isomer — flashpoint: 155°C (310°F)
forms silica bonded phases for reverse phase chromatography[1].
1. Yang et al, Anal. Chem., *59*, 2750, 1988
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[37843-11-1] TSCA HMIS: 3-1-1-X — 5.0g/$73.00 — 25g/$292.00



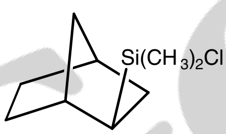
SIB0962.0
BENZYLDIMETHYLCHLOROSILANE — MW 184.74 — bp 75-6°/15 — D_4^{20} 0.949 — n_D^{20} 1.5040
$C_9H_{13}ClSi$ — flashpoint: 73°C (163°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[1833-31-4] TSCA HMIS: 3-2-1-X — 10g/$43.00 — 50g/$172.00



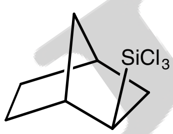
SIB0970.0
BENZYLTRICHLOROSILANE — MW 225.58 — bp 140-2°/10 — D_4^{20} 1.288 — n_D^{20} 1.527
$C_7H_7Cl_3Si$ — TOXICITY- oral rat, LD50: 2830mg/kg
dipole moment: 1.78 — flashpoint: 87°C (189°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[770-10-5] TSCA HMIS: 3-2-1-X — 25g/$47.00 — 100g/$152.00



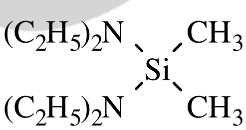
SIB0971.0
BENZYLTRIETHOXYSILANE — MW 254.40 — bp 148°/26 — D_4^{20} 0.986 — n_D^{20} 1.4628[25]
$C_{13}H_{22}O_3Si$ — flashpoint: 127°C (260°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[2549-99-7] TSCA HMIS: 2-1-0-X — 10g/$39.00 — 50g/$156.00



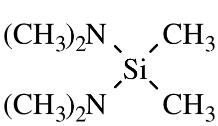
SIB0994.0
2-(BICYCLOHEPTYL)DIMETHYLCHLOROSILANE — MW 188.77 — bp 52-5°/1 — D_4^{20} 0.99
$C_9H_{17}ClSi$ — flashpoint: 87° (189°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[117046-42-1 HMIS: 3-2-1-X — 25g/$68.00 — 100g/$220.00



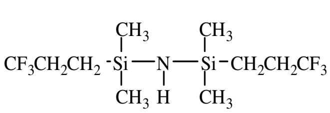
SIB0997.0
2-(BICYCLOHEPTYL)TRICHLOROSILANE — MW 229.61 — bp 63-4°/4.5 — D_4^{20} 1.2678 — n_D^{20} 1.4919
$C_7H_{11}Cl_3Si$ — flashpoint: 83°C (181°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18245-29-9] TSCA HMIS: 3-2-1-X — 10g/$31.00 — 50g/$124.00



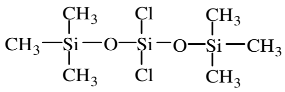
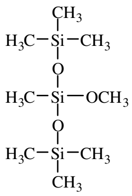
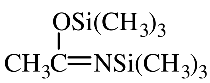
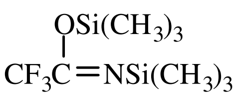
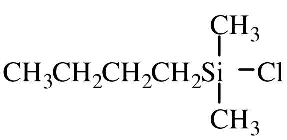
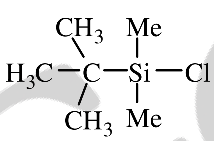
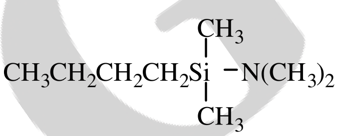
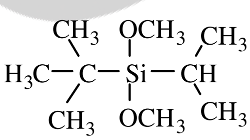
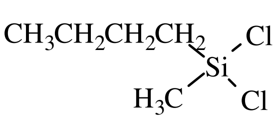
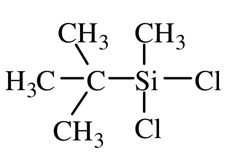
SIB1068.0
BIS(DIETHYLAMINO)DIMETHYLSILANE — MW 202.42 — bp 192-5° — D_4^{20} 0.826 — n_D^{20} 1.435
$C_{10}H_{26}N_2Si$ — flashpoint: 35°C (95°F)
silylates diamines to cyclic diaminosilanes[1].
1. E. Schwartz et al, J. Org. Chem., *50*, 5469, 1985.
HYDROLYTIC SENSITIVITY: 8 Si-NR reacts rapidly with moisture, water, protic solvents
[4669-59-4] TSCA HMIS: 3-3-1-X — 50g/$127.00



SIB1072.0
BIS(DIMETHYLAMINO)DIMETHYLSILANE — MW 146.31 — bp 128-9° (-98°)mp — D_4^{20} 0.810 — n_D^{20} 1.4169[22]
$C_6H_{18}N_2Si$ — flashpoint: -3°C (27°F)
couples silanol-terminated siloxanes
HYDROLYTIC SENSITIVITY: 8 Si-NR reacts rapidly with moisture, water, protic solvents
[3768-58-9] TSCA HMIS: 3-4-1-X — 25g/$23.00 — 100g/$75.00



SIB1828.4
BIS(TRIFLUOROPROPYL)TETRAMETHYL-DISILAZANE, 95% — MW 325.45 — bp 76-8°/10 — D_4^{20} 1.110 — n_D^{20} 1.3860
$C_{10}H_{21}F_6NSi_2$ — flashpoint: 78°C (173°F)
fluorinated blocking agent
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[39482-87-6] TSCA HMIS: 2-2-1-X — 50g/$148.00

structure	name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
	SIB1837.0 BIS(TRIMETHYLSILOXY)DICHLOROSILANE *3,3-DICHLOROHEXAMETHYLTRISILOXANE* $C_6H_{18}Cl_2O_2Si_3$ [2750-44-9] HMIS: 3-2-1-X	277.37	173° (-53°)mp vapor pressure, 57°: 12mm 25g/$96.00	1.0017	1.3983
	SIB1843.0 BIS(TRIMETHYLSILOXY)METHYMETHOXY SILANE *METHOXYHEPTAMETHYLTRISILOXANE* $C_8H_{24}O_3Si_3$ [7671-19-4] HMIS: 3-2-1-X	252.53	82°/47 25g/$68.00	0.862	1.38832^{25}
	SIB1846.0 N,O-BIS(TRIMETHYLSILYL)ACETAMIDE $C_8H_{21}NOSi_2$ *BSA* versatile blocking agent. HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture [10416-59-8] TSCA HMIS: 3-3-1-X	203.43	71-3°/35 (-24°)mp flashpoint: 42°C (108°F) TOXICITY - oral rat, LD50: 1580mg/kg 25g/$16.00 100g/$52.00 2kg/$560.00	0.832	1.418
	SIB1876.0 BIS(TRIMETHYLSILYL)TRIFLUOROACETAMIDE *BSTFA* $C_8H_{18}F_3NOSi_2$ silylation reagent for preparing derivatives of amino acids[1]. 1. D. Stalling et al, Biochem. Biophys., Res. Comm., *31*, 616, 1968. HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [25561-30-2] TSCA HMIS: 3-3-1-X	257.40	45-50°/15 (-10°)mp flashpoint: 24°C (75°F) 25g/$49.00 100g/$152.00 2kg/$1360.00	0.969	1.3840
	SIB1934.0 n-BUTYLDIMETHYLCHLOROSILANE $C_6H_{15}ClSi$ forms bonded phases for HPLC HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [1000-50-6] TSCA HMIS: 3 -3-1-X	150.72	138° flashpoint: 39°C (103°F) 25g/$43.00 100g/$140.00	0.8751	1.4205
	SIB1935.0 t-BUTYLDIMETHYLCHLOROSILANE $C_6H_{15}ClSi$ vapor pressure, 100°: 476mm silylation reagent - derivatives resistant to Grignards, alkyl lithium compounds etc. blocking agent widely used in prostaglandin synthesis HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [18162-48-6] TSCA HMIS: 3-4-1-X	150.72	124-6° (87-90°)mp flashpoint: 22°C (73°F) 25g/$36.00 100g/$117.00 2kg/$720.00	0.83	
	SIB1937.0 n-BUTYLDIMETHYL(DIMETHYLAMINO)SILANE $C_8H_{21}NSi$ highly reactive reagent for bonded phases without acidic byproduct HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture [181231-67-4] TSCA-L HMIS: 3-3-1-X	159.35	47-9°/12 flashpoint: 26°C (79°F) 10g/$38.00 50g/$152.00	0.772	1.4220
	SIB1971.0 t-BUTYLISOPROPYLDIMETHOXYSILANE $C_9H_{22}O_2Si$ HMIS: 3-2-1-X	190.36	75°/20 1.0g/$126.00	0.871	1.4189
	SIB1972.0 n-BUTYLMETHYLDICHLOROSILANE $C_5H_{12}Cl_2Si$ HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents [18147-23-4] TSCA HMIS: 3-3-1-X	171.14	148° flashpoint: 30°C (86°F) 10g/$35.00	1.0424	1.4312
	SIB1972.2 t-BUTYLMETHYLDICHLOROSILANE $C_5H_{12}Cl_2Si$ HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents [18147-18-7] HMIS: 3-3-1-X	171.14	130-2° (88-90°)mp flashpoint: 26°C (79°F) 5.0g/$89.00		

HYDROPHOBIC

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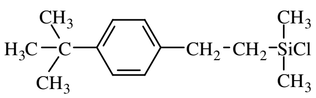
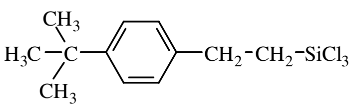
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



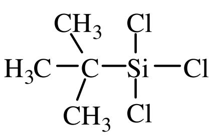
SIB1972.5
p-(t-BUTYL)PHENETHYLDIMETHYLCHLOROSILANE contains ~5% meta isomer — 254.87 — 122-3°/2 — 0.95
$C_{14}H_{23}ClSi$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[93502-75-1] HMIS: 3-2-1-X — 25g/$78.00



SIB1973.0
p-(t-BUTYL)PHENETHYLTRICHLOROSILANE — 295.71 — 124-9°/2.5 — 1.16
$C_{12}H_{17}Cl_3Si$ mixed isomers — flashpoint: 108°C (226°F)
for HPLC bonded phase
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
HMIS: 3-2-1-X — 25g/$78.00

$CH_3CH_2CH_2CH_2SiCl_3$

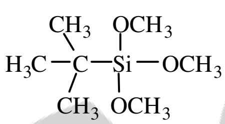
SIB1982.0
n-BUTYLTRICHLOROSILANE — 191.56 — 142-3° — 1.1608 — 1.4364
$C_4H_9Cl_3Si$ — flashpoint: 45°C (114°F)
vapor pressure, 31°: 10mm
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[7521-80-4] TSCA HMIS: 3-3-1-X — 25g/$37.00 — 100g/$121.00



SIB1985.0
t-BUTYLTRICHLOROSILANE — 191.56 — 142-3° (97-100°)mp — 1.1608 — 1.436
$C_4H_9Cl_3Si$
forms silanetriol — flashpoint: 40°C (105°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[18171-74-9] TSCA HMIS: 3-3-1-X — 10g/$41.00 — 50g/$164.00

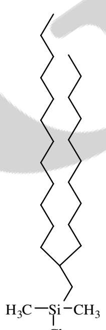
$CH_3CH_2CH_2CH_2Si(OCH_3)_3$

SIB1988.0
n-BUTYLTRIMETHOXYSILANE — 178.30 — 164-5° — 0.9312 — 1.3979
$C_7H_{18}O_3Si$ — flashpoint: 49°C (120°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[1067-57-8] TSCA HMIS: 3-2-1-X — 25g/$42.00 — 100g/$136.00

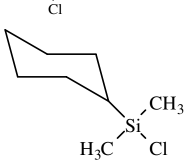


SIB1989.0
t-BUTYLTRIMETHOXYSILANE — 178.30 — 140-1° — 0.903 — 1.3941
$C_7H_{18}O_3Si$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[18395-29-4] HMIS: 3-2-1-X — 10g/$143.00

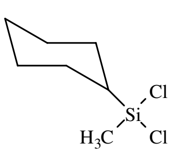
SIC2266.0
13-(CHLORODIMETHYLSILYLMETHYL)-HEPTACOSANE, 95% — 487.37 — 200-210°/0.01 — 0.848^{25} — 1.4542^{30}
$C_{30}H_{63}ClSi$
forms hydrophobic bonded phases
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[194243-00-0] TSCA-L HMIS: 3-1-1-X — 10g/$117.00



SIC2266.5
11-(CHLORODIMETHYLSILYLMETHYL)-TRICOSANE — 431.27 — 170°/0.075 — 1.4575^{22}
$C_{26}H_{55}ClSi$
forms self-assembled oleophilic monolayers
employed as bonded phase in HPLC
HMIS: 3-1-1-X — 10g/$101.00



SIC2465.0
CYCLOHEXYLDIMETHYLCHLOROSILANE — 176.76 — 52-3°/2 — 0.956 — 1.4626
$C_8H_{17}ClSi$ — flashpoint: 63°C (145°F)
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/$36.00 — 100g/$117.00



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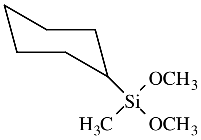
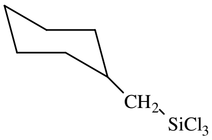
SIC2468.0
CYCLOHEXYLMETHYLDICHLOROSILANE — 197.18 — 83°/15 — 1.095 — 1.4724
$C_7H_{14}Cl_2Si$ — flashpoint: 66°C (151°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[5578-42-7] TSCA HMIS: 3-2-1-X — 25g/$25.00 — 2 kg/$402.00

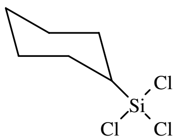
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



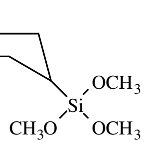
SIC2469.0
CYCLOHEXYLMETHYLDIMETHOXYSILANE — 188.34 — 196° — 0.9472 — 1.4354
$C_9H_{20}O_2Si$ — TOXICITY- oral rat, LD50: 3000mg/kg
vapor pressure, 20°: 12mm — flashpoint: 66°C (151°F)
donor for polyolefin polymerization
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[17865-32-6] TSCA HMIS: 2-3-1-X — 25g/$11.00 — 100g/$37.00 — 2kg/$496.00



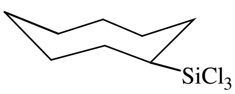
SIC2470.0
(CYCLOHEXYLMETHYL)TRICHLOROSILANE — 231.62 — 94-8°/11
$C_7H_{13}Cl_3Si$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18388-16-4] TSCA HMIS: 3-2-1-X — 10g/$93.00



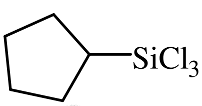
SIC2480.0
CYCLOHEXYLTRICHLOROSILANE — 217.60 — 90-1°/10 — 1.222 — 1.4774
$C_6H_{11}Cl_3Si$ — flashpoint: 91°C (195°F)
intermediate for melt-processable silsesquioxane-siloxanes[1].
employed in solid-phase extraction columns[2].
1. J. Lichtenhan et al, Macromolecules, *26*, 2141, 1993.
2. B. Tippins, Nature, *334*, 273, 1988.
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[98-12-4] TSCA HMIS: 3-2-1-X — 25g/$34.00 — 100g/$110.00



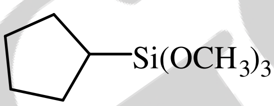
SIC2482.0
CYCLOHEXYLTRIMETHOXYSILANE — 204.34 — 207-9°
$C_9H_{20}O_3Si$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[17865-54-2] HMIS: 2-3-1-X — 10g/$31.00 — 50g/$124.00



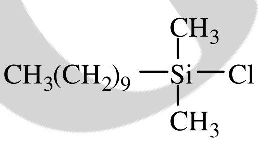
SIC2490.0
CYCLOOCTYLTRICHLOROSILANE, 95% — 245.65 — 85-9°/1.25 — 1.19
$C_8H_{15}Cl_3Si$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X — 10g/$37.00 — 50g/$148.00



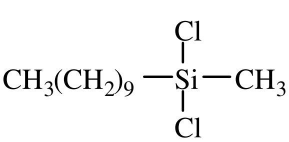
SIC2555.0
CYCLOPENTYLTRICHLOROSILANE — 203.57 — 178-9° — 1.2255 — 1.4713
$C_5H_9Cl_3Si$ — flashpoint: 77°C (171°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[14579-03-4] HMIS: 3-2-1-X — 25g/$45.00 — 100g/$146.00



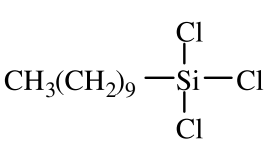
SIC2557.0
CYCLOPENTYLTRIMETHOXYSILANE — 190.31 — 75°/10 — 0.990^{25} — 1.4240^{25}
$C_8H_{18}O_3Si$ — flashpoint: 54°C (130°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[143487-47-2] HMIS: 3-3-1-X — 10g/$34.00 — 50g/$136.00



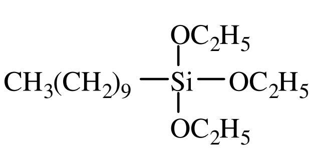
SID2660.0
n-DECYLDIMETHYLCHLOROSILANE — 234.88 — 98°/2 — 0.866 — 1.441
$C_{12}H_{27}ClSi$ — flashpoint: 137°C (279°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[38051-57-9] TSCA HMIS: 3-1-1-X — 25g/$36.00 — 100g/$117.00



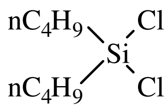
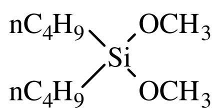
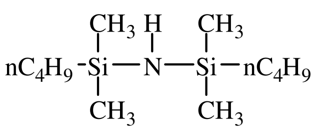
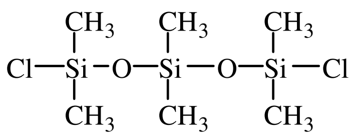
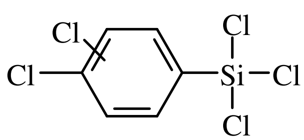
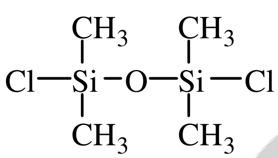
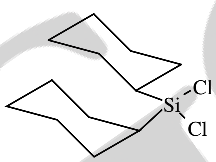
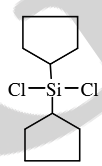
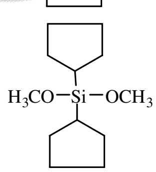
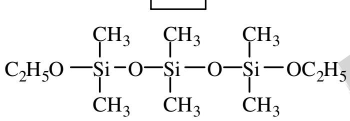
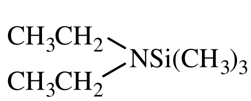
SID2662.0
n-DECYLMETHYLDICHLOROSILANE — 255.31 — 111-4°/3 — 0.960 — 1.4490
$C_{11}H_{24}Cl_2Si$ — flashpoint: 120°C (248°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18051-88-2] TSCA HMIS: 3-1-1-X — 25g/$30.00



SID2663.0
n-DECYLTRICHLOROSILANE — 275.72 — 133-7°/5 — 1.0540 — 1.4528
$C_{10}H_{21}Cl_3Si$ — flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[13829-21-5] TSCA HMIS: 3-1-1-X — 25g/$20.00 — 100g/$65.00

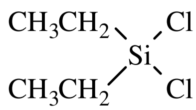


SID2665.0
n-DECYLTRIETHOXYSILANE — 304.54 — 150°/8 — 0.8790 — 1.4220
$C_{16}H_{36}O_3Si$
see also SIB1829.0 for dipodal version
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[2943-73-9] HMIS: 2-1-0-X — 25g/$54.00 — 100g/$175.00

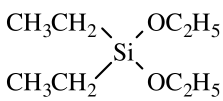
	name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
	SID3203.0 DI-n-BUTYLDICHLOROSILANE, 95% $C_8H_{18}Cl_2Si$ HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [3449-28-3] TSCA HMIS: 3-2-1-X	213.22 flashpoint: 64°C (147°F) 10g/$52.00	212°	0.991 50g/$208.00	1.4448
	SID3214.0 DI-n-BUTYLDIMETHOXYSILANE $C_{10}H_{24}O_2Si$ HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture [18132-63-3] TSCA-L HMIS: 3-2-1-X	204.39 flashpoint: 103°C (217°F)	125°/50 25g/$64.00	0.861	
	SID3349.0 DI-n-BUTYLTETRAMETHYLDISILAZANE $C_{12}H_{31}NSi_2$ HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture [82356-80-7] HMIS: 2-1-1-X	245.55 flashpoint: 86°C (187°F) 25g/$74.00	81°/2	0.80 100g/$240.00	1.4353
	SID3360.0 1,5-DICHLOROHEXAMETHYLTRISILOXANE, 95% $C_6H_{18}Cl_2O_2Si_3$ ΔHvap: 11.4 kcal/mole HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [3582-71-6] TSCA HMIS: 3-2-1-X	277.37 flashpoint: 76°C (169°F) vapor pressure:, 50°: 1mm 25g/$37.00	184° (-53°)mp	1.018 100g/$120.00	1.4071
	SID3367.6 DICHLOROPHENYLTRICHLOROSILANE, 95% $C_6H_3Cl_5Si$-isomeric mixture vapor pressure, 102°: 7mm HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [27137-85-5] TSCA HMIS: 3-1-1-X	280.44 flashpoint: 150°C (302°F) 25g/$45.00	260-1°	1.553 100g/$146.00	1.564
	SID3372.0 1,3-DICHLOROTETRAMETHYLDISILOXANE $C_4H_{12}Cl_2OSi_2$ vapor pressure, 25°: 8mm blocking agent HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [2401-73-2] TSCA HMIS: 3-4-1-X	203.22 flashpoint: 15°C (59°F) 25g/$36.00	138° (-37°)mp	1.039 100g/$117.00	1.4054
	SID3382.0 DICYCLOHEXYLDICHLOROSILANE $C_{12}H_{22}Cl_2Si$ HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [18035-74-0] HMIS: 3-1-1-X	265.30 flashpoint: 149°C (300°F)	123°/0.4 25g/$60.00	1.103	
	SID3390.0 DICYCLOPENTYLDICHLOROSILANE $C_{10}H_{18}Cl_2Si$ HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [139147-73-2] HMIS: 3-2-1-X	237.24 flashpoint: 84°C (183°F) 10g/$29.00	105-7°/10	1.110 50g/$116.00	
	SID3391.0 DICYCLOPENTYLDIMETHOXYSILANE $C_{12}H_{24}O_2Si$ HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture [126990-35-0] TSCA HMIS: 3-1-1-X	228.40 flashpoint: 102°C (216°F) 10g/$24.00	120°/6	1.00 50g/$96.00	1.4663
	SID3394.0 1,5-DIETHOXYHEXAMETHYLTRISILOXANE $C_{10}H_{28}O_4Si_3$ [17928-13-1] HMIS: 2-2-1-X	296.59	51-2°/0.8 25g/$118.00	0.912	1.3889
	SID3398.0 (DIETHYLAMINO)TRIMETHYLSILANE *TMSDEA* $C_7H_{19}NSi$ ΔHform: -87.7kcal/mole silylation reagent: F&F: *3*, 317; *4*, 544; *6*, 634; *18*, 382 HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture [996-50-9] TSCA HMIS: 3-4-1-X	145.32 flashpoint: 10°C (50°F) 25g/$28.00	126-7° (-10°)mp	0.7627 100g/$90.00	1.4109

HYDROPHOBIC

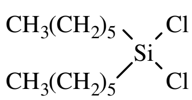
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



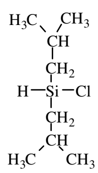
SID3402.0
DIETHYLDICHLOROSILANE | 157.11 | 130° (-96.5)mp | 1.0504 | 1.4309
$C_4H_{10}Cl_2Si$
ΔHvap: 10.0 kcal/mole
dipole moment: 2.4
surface tension: 30.3 dynes/cm
vapor pressure, 21°: 10mm
TOXICITY- oral rat, LD20: 1000mg/kg
flashpoint: 27°C (81°F)
thermal conductivity: 0.134 W/m°C
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[1719-53-5] TSCA HMIS: 3-3-1-X 25g/$23.00 100g/$75.00



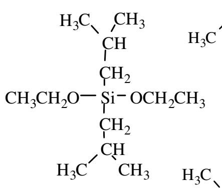
SID3404.0
DIETHYLDIETHOXYSILANE | 176.33 | 157° | 0.8622 | 1.4022
$C_8H_{20}O_2Si$
flashpoint: 43°C (109°F)
vapor pressure, 73°: 38mm
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[5021-93-2] TSCA HMIS: 2-3-1-X 10g/$36.00 50g/$144.00



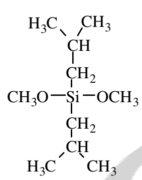
SID3510.0
DI-n-HEXYLDICHLOROSILANE | 269.33 | 111-3°/6 | 0.962 | 1.4518
$C_{12}H_{26}Cl_2Si$
flashpoint: 88°C (190°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18204-93-8] TSCA HMIS: 3-2-1-X 10g/$41.00 50g/$166.00



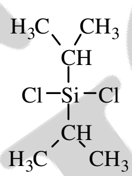
SID3526.0
DIISOBUTYLCHLOROSILANE | 178.78 | 166-7° | 0.995 | 1.4340
$C_8H_{19}ClSi$
flashpoint: 42°C (108°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18279-73-7] HMIS: 3-3-1-X 25g/$127.00



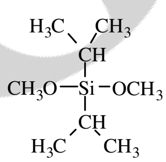
SID3528.0
DIISOBUTYLDIETHOXYSILANE | 232.44 | 221° | 0.8450 | 1.4179
$C_{12}H_{28}O_2Si$
[18297-14-8] HMIS: 2-2-1-X 10g/$86.00



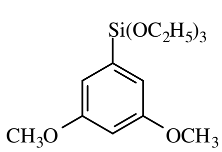
SID3530.0
DIISOBUTYLDIMETHOXYSILANE | 204.39 | 120°/6 | 0.87 | 1.4167
$C_{10}H_{24}O_2Si$
flashpoint: 102°C (216°F)
intermediate for diisobutylsilanediol, a liquid crystal.
employed in polyolefin polymerization
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[17980-32-4] TSCA HMIS: 2-1-1-X 10g/$20.00 50g/$80.00



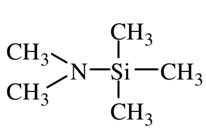
SID3537.0
DIISOPROPYLDICHLOROSILANE | 185.17 | 64-5°/25 | 1.026 | 1.4450
$C_6H_{14}Cl_2Si$
flashpoint: 43°C (109°F)
forms bis(blocked) or tethered alcohols[1,2].
1. J. Hutchinson et al, Tet. Lett., *32*, 573, 1991.
2. C. Bradford et al, Tet. Lett., 36, 4189, 1995.
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[7751-38-4] HMIS: 3-3-1-X 10g/$21.00 50g/$84.00



SID3538.0
DIISOPROPYLDIMETHOXYSILANE | 176.33 | 85-7°/50 | 0.875 | 1.4140
$C_8H_{20}O_2Si$
flashpoint: 43°C (109°F)
cocatalyst for α-olefin polymerization[1].
1. S. Lee et al, US Pat. 5,223,466, 1993
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[18230-61-0] TSCA HMIS: 3-3-1-X 10g/$39.00 50g/$156.00



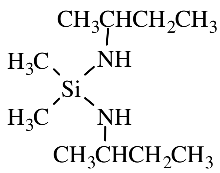
SID3544.0
3,5-DIMETHOXYPHENYLTRIETHOXYSILANE | 300.43 | 136-8°/0.6 | 1.050
$C_{14}H_{24}O_5Si$
HMIS: 2-1-1-X 5.0g/$175.00



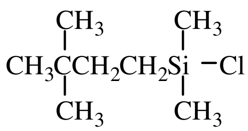
SID3605.0
(N,N-DIMETHYLAMINO)TRIMETHYLSILANE | 117.27 | 85-6° | 0.741 | 1.3970
TMSDMA PENTAMETHYLSILANAMINE
$C_5H_{15}NSi$
flashpoint: -19°C (-3°F)
ΔHvap: 7.6 kcal/mole
stronger silylation reagent than HMDS; silylates amino acids[1].
selectively silylates equatorial hydroxyl groups in prostaglandin synthesis[2].
1. K. Rühlman, Chem. Ber., *94*, 1876, 1961.
2. E. Yankee et al, J. Am. Chem. Soc., *94*, 3651, 1972.
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[2083-91-2] TSCA HMIS: 3-4-1-X 25g/$38.00 100g/$123.00 2kg/$920.00

COMMERCIAL

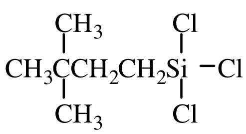
	name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



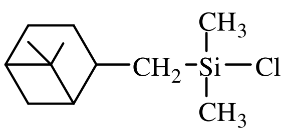
SID4040.0
DIMETHYLBIS(s-BUTYLAMINO)SILANE 95% — 202.42 — 82°/15 (<-50°)mp — 0.810 — 1.4271
$C_{10}H_{26}N_2Si$
TOXICITY- oral rat, LD50: 907mg/kg
flashpoint: 40°C (104°F)
chain-extender for silicones
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[93777-98-1] TSCA HMIS: 3-3-1-X — 25g/$41.00 — 100g/$133.00



SID4065.0
(3,3-DIMETHYLBUTYL)DIMETHYLCHLORO-SILANE *NEOHEXYLDIMETHYLCHLOROSILANE* — 178.78 — 167° — 0.849 — 1.4240
$C_8H_{19}ClSi$
flashpoint: 38°C (100°F)
blocking agent
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[96220-76-7] HMIS: 3-3-1-X — 25g/$34.00 — 100g/$110.00



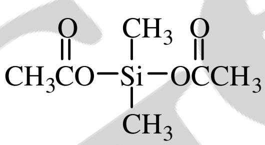
SID4069.0
(3,3-DIMETHYLBUTYL)TRICHLOROSILANE — 219.61 — 183-4° — 1.1355 — 1.4479
NEOHEXYLTRICHLOROSILANE
$C_6H_{13}Cl_3Si$
[105732-02-3] HMIS: 3-2-1-X — 25g/$48.00



SID4074.0
(DIMETHYLCHLOROSILYL)METHYLPINANE — 230.85 — 93-4°/2 — 0.957 — 1.4780
$C_{12}H_{23}ClSi$
flashpoint: 92°C (198°F)
1*S,2*S,5*S $[\alpha]_D$: -5.15; >95% optical purity
acetylenic derivative forms chiral polymer membrane that resolves amino acids[1].
1. T. Aoki et al, Makromol. Chem. Rapid Commun, *13*, 565, 1992
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[2182-66-3] TSCA HMIS: 3-2-1-X — 10g/$37.00

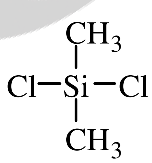
COMMERCIAL

SID4074.4
1,1-DIMETHYLCYCLOSILAZANES, 22-25% — 0.69
in hexane primarily trimer and tetramer
flashpoint: 20°C (-25°F)
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
TSCA HMIS: 2-4-1-X — 100g/$20.00 — 2kg/$190.00

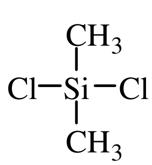


SID4076.0
DIMETHYLDIACETOXYSILANE — 176.24 — 164-6° — 1.054 — 1.4030
$C_6H_{12}O_4Si$
flashpoint: 37°C (98°F)
reagent for the preparation of cis-diols and corticosteroids[1].
1. R. Kelley, J. Chromatog., *43*, 229, 1969; F&F *3*, 113
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[2182-66-3] TSCA HMIS: 2-3-1-X — 100g/$30.00 — 500g/$120.00

COMMERCIAL



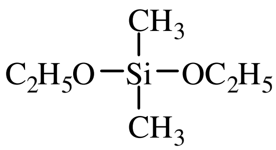
SID4120.0
DIMETHYLDICHLOROSILANE — 129.06 — 70-1° (-76°)mp — 1.0637 — 1.4055
$C_2H_6Cl_2Si$
TOXICITY- ihl rat: LC50: 930ppm/4H
viscosity: 0.47 cSt — flashpoint: -10°C (14°F)
ΔHvap: 8.0 kcal/mole — ΔHcomb: -491 kcal/mole
vapor pressure, 17°: 100mm — specific heat: 0.22 cal/g/°
coefficient of thermal expansion: 1.3×10^{-3} — surface tension: 20.1 dynes/cm
critical temperature: 247.2° — critical pressure: 34.4 atm
autoignition temperature: 410° — flammability limits: 3.4-10.4%
fundamental monomer for silicones; hydrophobic surface treatment
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[75-78-5] TSCA HMIS: 3-4-2-X — 500g/$25.00 — 2kg/$58.00 — 18kg/$477.00*+container
*zDR-S-019 or zCYL-S-019 required



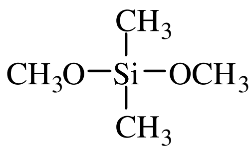
SID4120.1
DIMETHYLDICHLOROSILANE, 99+% — 129.06 — 70-1° (-76°)mp — 1.0637 — 1.4055
$C_2H_6Cl_2Si$
redistilled
flashpoint: -10°C (14°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[75-78-5] TSCA HMIS: 3-4-2-X — 25g/$11.00 — 500g/$68.00 — 18kg/$1224.00*+container
*zDR-S-019 or zCYL-S-019 required

PLEASE INQUIRE ABOUT BULK QUANTITIES

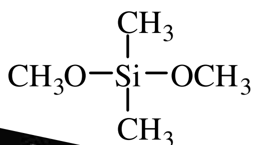
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SID4121.0 DIMETHYLDIETHOXYSILANE	148.28	114-5° (-97°)mp	0.8395	1.3805
SID4123.0 DIMETHYLDIMETHOXYSILANE	120.22	82° (-80°)mp	0.8646	1.3708
SID4123.1 DIMETHYLDIMETHOXYSILANE, 99+%	120.22	82° (-80°)mp	0.8646	1.3708
SID4125.0 DIMETHYLETHOXYSILANE	104.22	54-5°	0.757	1.3683
SID4210.0 DIMETHYLMETHOXYCHLOROSILANE, 90%	124.64	77°	0.953[25]	1.3865
SID4236.0 1,3-DIMETHYLTETRAMETHOXY-DISILOXANE, 95%	226.38	165°	1.010	1.3834
SID4400.0 DI-n-OCTYLDICHLOROSILANE	325.44	145°/0.2	0.940	
SID4401.0 (DI-n-OCTYLMETHYLSILYL)ETHYLDIMETHYL-CHLOROSILANE	391.23	165-6°/0.1	0.859	



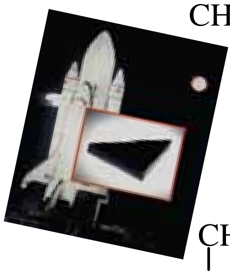
SID4121.0
DIMETHYLDIETHOXYSILANE — 148.28 — 114-5° (-97°)mp — 0.8395 — 1.3805
$C_6H_{16}O_2Si$
viscosity; 0.53cSt — TOXICITY- oral rat, LDLo: 1000mg/kg
vapor pressure, 25°: 15mm — flashpoint: 11°C (51°F)
ΔHvap: 9.8 kcal/mole — ΔHcomb: -1119 kcal/mole
ΔHform: 200 kcal/mole — dipole moment: 1.39
coefficient of thermal expansion: 1.3×10^{-3}
hydrophobic surface treatment and release agent
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[78-62-6] TSCA HMIS: 2-4-1-X — 100g/$12.00 — 2kg/$144.00 — 15kg/$930.00

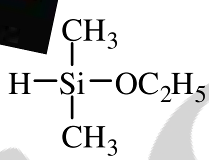


SID4123.0
DIMETHYLDIMETHOXYSILANE — 120.22 — 82° (-80°)mp — 0.8646 — 1.3708
$C_4H_{12}O_2Si$
ΔHcomb: 832 kcal/mole — flashpoint: -8°C (18°F)
ΔHform: 171 kcal/mole — dipole moment 1.33
vapor pressure, 36°: 100mm — viscosity, 20°C: 0.44cSt
coefficient of thermal expansion: 1.3×10^{-3}
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[1112-39-6] TSCA HMIS: 3-4-1-X — 25g/$10.00 — 2kg/$110.00 — 15kg/$600.00

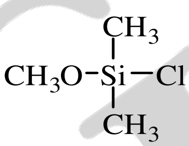


SID4123.1
DIMETHYLDIMETHOXYSILANE, 99+% — 120.22 — 82° (-80°)mp — 0.8646 — 1.3708
DMDMOS
$C_4H_{12}O_2Si$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[1112-39-6] TSCA HMIS: 3-4-1-X — 500g/$89.00

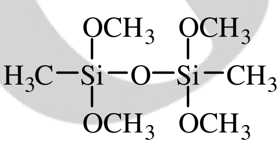




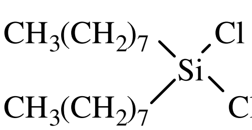
SID4125.0
DIMETHYLETHOXYSILANE — 104.22 — 54-5° — 0.757 — 1.3683
$C_4H_{12}OSi$ — TOXICITY- oral rat, LD50: 5000mg/kg
vapor pressure, 25°: 281mm — flashpoint: 15°C (59°F)
undergoes hydrosilylation reactions
waterproofing agent for space shuttle thermal tiles[1].
1. W. Hill et al, Poly. Mat. Sci. Eng., *62*, 668, 1990
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[14857-34-2] TSCA HMIS: 2-4-1-X — 25g/$30.00 — 100g/$98.00



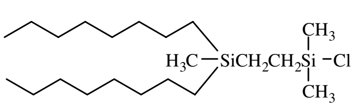
SID4210.0
DIMETHYLMETHOXYCHLOROSILANE, 90% — 124.64 — 77° — 0.953[25] — 1.3865
C_3H_9ClOSi — flashpoint: -9°C (16°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[1825-68-9] TSCA HMIS: 3-4-1-X — 25g/$48.00 — 100g/$150.00



SID4236.0
1,3-DIMETHYLTETRAMETHOXY-DISILOXANE, 95% — 226.38 — 165° — 1.010 — 1.3834
flashpoint: 30°C (86°F)
$C_6H_{18}O_5Si_2$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[18186-97-5] HMIS: 3-3-1-X — 10g/$30.00 — 50g/$120.00



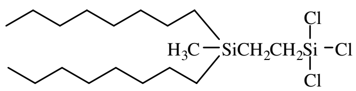
SID4400.0
DI-n-OCTYLDICHLOROSILANE — 325.44 — 145°/0.2 — 0.940
$C_{16}H_{34}Cl_2Si$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18416-07-4] HMIS: 3-2-1-X — 25g/$38.00 — 100g/$124.00



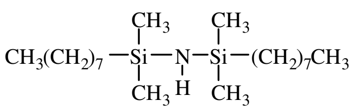
SID4401.0
(DI-n-OCTYLMETHYLSILYL)ETHYLDIMETHYL-CHLOROSILANE — 391.23 — 165-6°/0.1 — 0.859
$C_{21}H_{47}ClSi_2$
forms bonded phases for reverse phase chromatography
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[472513-03-7] HMIS: 3-2-1-X — 25g/$117.00

HYDROPHOBIC
COMMERCIAL

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}

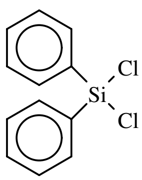


SID4401.5
(DI-n-OCTYLMETHYLSILYL)ETHYLTRI-CHLOROSILANE — 432.06 — 166-8°/0.1 — 0.966
$C_{19}H_{41}Cl_3Si_2$
forms bonded phases for reverse phase HPLC
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X — 25g/$117.00

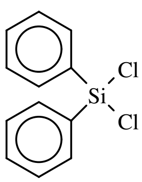


SID4404.0
1, 3-DI-n-OCTYLTETRAMETHYLDISILAZANE — 357.77 — 160-5°/1 — 0.826 — 1.4500
$C_{20}H_{47}NSi_2$ — flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[69519-51-3] HMIS: 2-1-0-X — 10g/$49.00

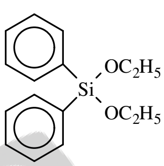
COMMERCIAL



SID4510.0
DIPHENYLDICHLOROSILANE, 95% — 253.20 — 304-5° (-22°)mp — 1.2216 — 1.5819
$C_{12}H_{10}Cl_2Si$
vapor pressure, 125°: 2mm — TOXICITY- ipr mus, LD50: 383mg/kg
ΔHvap: 15.0 kcal/mole — flashpoint: 157°C (314°F)
coefficient of thermal expansion: 0.7 x 10^{-3} — dipole moment: 2.6 debye
specific heat: 0.30 — viscosity, 25°: 4.1 cSt
silicone monomer; forms diol on contact with water
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[80-10-4] TSCA HMIS: 3-1-1-X — 100g/$19.00 — 2kg/$90.00 — 20kg/$720.00

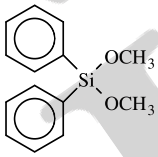


SID4510.1
DIPHENYLDICHLOROSILANE, 99% — 253.20 — 304-5° (-22°)mp — 1.2216 — 1.5819
$C_{12}H_{10}Cl_2Si$
TOXICITY- ipr mus, LD50: 383mg/kg
flashpoint: 157°C (314°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[80-10-4] TSCA HMIS: 3-1-1-X — 25g/$11.00 — 100g/$36.00 — 2kg/$390.00

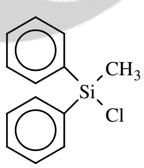


SID4525.0
DIPHENYLDIETHOXYSILANE — 272.42 — 167°/15 — 1.0329 — 1.5269
$C_{16}H_{20}O_2Si$ — flashpoint: 175°C (347°F)
vapor pressure, 125°: 2mm
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[2553-19-7] TSCA HMIS: 2-1-0-X — 25g/$19.00 — 100g/$58.00 — 2kg/$265.00

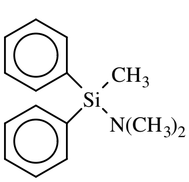
COMMERCIAL



SID4535.0
DIPHENYLDIMETHOXYSILANE — 244.36 — 161°/15 — 1.0771 — 1.5447
$C_{14}H_{16}O_2Si$ — flashpoint: 121°C (250°F)
viscosity, 25°: 8.4 cSt
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[6843-66-9] TSCA HMIS: 3-1-1-X — 100g/$16.00 — 2kg/$190.00



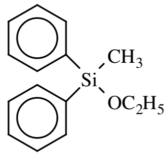
SID4552.0
DIPHENYLMETHYLCHLOROSILANE — 232.78 — 295° (-22°C)mp — 1.128 — 1.5742
$C_{13}H_{13}ClSi$
vapor pressure, 125°: 3mm — flashpoint: 141°C (286°F)
ΔHvap: 149 kcal/mole — viscosity, 25°: 5.3 cSt
surface tension: 40.0 dynes/cm — thermal conductivity: 0.112 W/m°C
α silylates esters, lactones; precursors to α silyl enolates[1].
1. G. Larson et al, J. Am. Chem. Soc., *103*, 2418, 1981.
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[144-79-6] TSCA HMIS 3-1-1-X — 25g/$19.00 — 100g/$62.00 — 2.5kg/$530.00



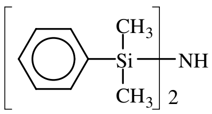
SID4552.5
DIPHENYLMETHYL(DIMETHYLAMINO)SILANE — 241.41 — 98-9°/0.25 — 1.011
$C_{15}H_{19}NSi$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[68733-63-1] TSCA-L HMIS: 3-3-1-X — 25g/$34.00 — 100g/$110.00

PLEASE INQUIRE ABOUT BULK QUANTITIES

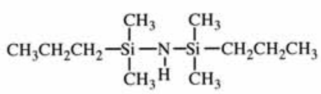
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



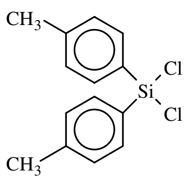
SID4553.0
DIPHENYLMETHYLETHOXYSILANE — 242.39 — 100-2°/0.3 (-27°)mp — 1.018 — 1.5440^{25}
$C_{15}H_{18}OSi$
ΔHvap: 14.8 kcal/mole — flashpoint: 165°C (329°F)
vapor pressure: 125°: 3mm — viscosity, 25°: 6.5 cSt
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[1825-59-8] TSCA HMIS: 2-0-0-X — 10g/$23.00 — 50g/$92.00



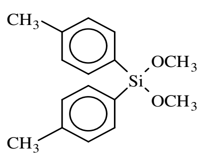
SID4586.0
1,3-DIPHENYL-1,1,3,3,-TETRAMETHYL-DISILAZANE — 285.54 — 96-9°/0.1 — 0.985 — 1.5384
flashpoint: 162°C (324°F)
$C_{16}H_{23}NSi_2$
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[3449-26-1] TSCA-L HMIS: 3-1-1-X — 5.0g/$30.00 — 25g/$120.00



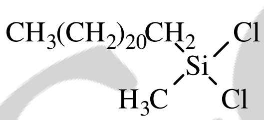
SID4591.0
1,3-DI-n-PROPYLTETRAMETHYLDISILAZANE — 217.51 — 84°/9 — 0.800 — 1.4290
$C_{10}H_{27}NSi_2$ — flashpoint: 65°C (150°F)
[14579-90-9] HMIS: 3-2-1-X — 25g/$140.00



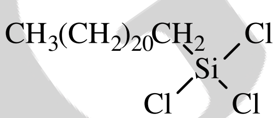
SID4598.0
DI(p-TOLYL)DICHLOROSILANE, 95% — 281.26 — 225-6°/50 — 1.10 — 1.568
$C_{14}H_{14}Cl_2Si$ — contains 4-4'dimethylbiphenyl
forms polymers w/ liquid crystal behavior[1].
1. M. Lee et al, Polymer, *34*, 4882, 1993.
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18414-38-5] HMIS: 3-2-1-X — 10g/$37.00 — 50g/$148.00



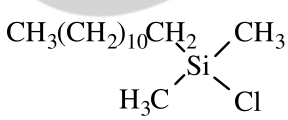
SID4599.0
DI(p-TOLYL)DIMETHOXYSILANE — 272.42 — 140°/0.5 — 1.023 — 1.5355^{25}
$C_{16}H_{20}O_2Si$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[92779-72-1] HMIS: 3-2-1-X — 25g/$155.00



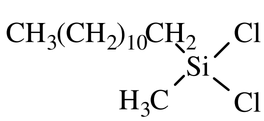
SID4620.0
DOCOSYLMETHYLDICHLOROSILANE, blend — 423.62 — 218-20°/0.5 (21-9°)mp — 0.93
$C_{23}H_{48}Cl_2Si$ contains C_{20} to C_{24} homologs
flashpoint: 172°C (342°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[67892-56-2] TSCA HMIS: 3-1-1-X — 50g/$130.00



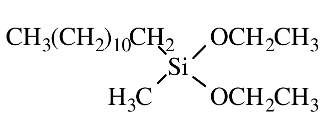
SID4621.0
DOCOSYLTRICHLOROSILANE, blend — 444.04 — 210°/0.2 (20-8°)mp — 0.94
$C_{22}H_{45}Cl_3Si$
contains C_{20} to C_{24} homologs — flashpoint: 200°C (392°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[7325-84-0] TSCA HMIS: 3-1-1-X — 25g/$85.00



SID4627.0
DODECYLDIMETHYLCHLOROSILANE — 262.94 — 291-3° — 0.865 — 1.445
$C_{14}H_{31}ClSi$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[66604-31-7] HMIS: 3-2-1-X — 25g/$58.00



SID4628.0
DODECYLMETHYLDICHLOROSILANE — 283.36 — 124-7°/3 — 0.955 — 1.4581
$C_{13}H_{28}Cl_2Si$ — flashpoint: 143°C (289°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18407-07-3] TSCA HMIS:3-1-1-X — 25g/$48.00



SID4629.0
DODECYLMETHYLDIETHOXYSILANE — 302.57 — 140°/0.5 — 0.845^{25}
$C_{17}H_{38}O_2Si$ — flashpoint: 152°C (305°F)
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[60317-40-0] TSCA HMIS: 2-1-0-X — 25g/$55.00

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}

$CH_3(CH_2)_{10}CH_2SiCl_3$

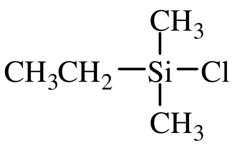
SID4630.0
DODECYLTRICHLOROSILANE — 303.77 — 120°/3 (-30°)mp — 1.0242 — 1.4581
$C_{12}H_{25}Cl_3Si$
flashpoint: 165°C (329°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[4484-72-4] TSCA HMIS: 3-1-1-X — 25g/$16.00 — 250g/$112.00

$CH_3(CH_2)_{10}CH_2Si(OC_2H_5)_3$

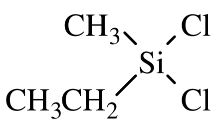
SID4632.0
DODECYLTRIETHOXYSILANE — 332.60 — 152-3°/3 — 0.8842^{25} — 1.4330^{25}
$C_{18}H_{40}O_3Si$
flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[18536-91-9] TSCA HMIS: 2-1-0-X — 25g/$27.00 — 100g/$88.00

$CH_3(CH_2)_{18}CH_2SiCl_3$

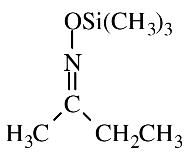
SIE4661.0
EICOSYLTRICHLOROSILANE, 95% — 415.9 — 200°/0.5
$C_{20}H_{41}Cl_3Si$
flashpoint: 230°C (446°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18733-57-8] TSCA HMIS: 3-0-1-X — 25g/$160.00



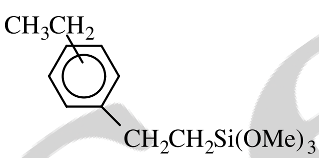
SIE4892.0
ETHYLDIMETHYLCHLOROSILANE — 122.67 — 91° — 0.8756 — 1.4050
$C_4H_{11}ClSi$
flashpoint: -4°C (24°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[6917-76-6] HMIS: 3-4-1-X — 10g/$24.00 — 50g/$96.00



SIE4896.0
ETHYLMETHYLDICHLOROSILANE — 143.09 — 100° — 1.0630 — 1.4197
$C_3H_8Cl_2Si$
flashpoint: 2°C (36°F)
dipole moment: 2.32 debye
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[4525-44-4] TSCA HMIS: 3-4-1-X — 25g/$31.00 — 100g/$100.00

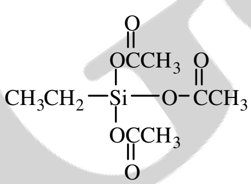


SIE4897.0
(ETHYLMETHYLKETOXIMINO)TRIMETHYLSILANE *O-(TRIMETHYLSILYL)OXIME-2-BUTANONE* — 159.30 — 65°/75 — 0.826^{25} — 1.4125^{25}
$C_7H_{17}NOSi$
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[37843-14-4] HMIS: 2-3-1-X — 10g/$41.00

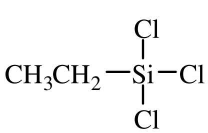


SIE4897.5
m,p-ETHYLPHENETHYLTRIMETHOXYSILANE, 95% — 254.40 — 93-6°/4 — 0.996 — 1.4776^{25}
$C_{13}H_{22}O_3Si$
component in optical hard coating resins
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[259818-29-6] HMIS: 3-2-1-X — 25g/$102.00

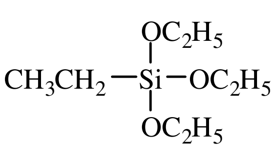
COMMERCIAL



SIE4899.0
ETHYLTRIACETOXYSILANE — 243.28 — 107-8°/8 (7-9°)mp — 1.143 — 1.4123
$C_8H_{14}O_6Si$
flashpoint: 106°C (223°F)
liquid cross-linker for silicone RTVs
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[17689-77-9] TSCA HMIS: 3-1-1-X — 25g/$10.00 — 2.0kg/$148.00



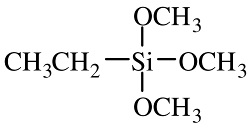
SIE4901.0
ETHYLTRICHLOROSILANE — 163.51 — 100-1° (-106°)mp — 1.237 — 1.426
$C_2H_5Cl_3Si$
vapor pressure, 20°: 26mm, 30.4°; 66mm
ΔHvap: 9.0 kcal/mole
coefficient of expansion: $1.5x10^{-3}$
viscosity: 0.48 cSt
TOXICITY- oral rat, LD50: 1330mg/kg
flashpoint: 27°C (80°F)
dipole moment: 2.1
critical temperature: 287°
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[115-21-9] TSCA HMIS: 3-3-1-X — 25g/$10.00 — 500g/$29.00 — 4kg/$176.00



SIE4901.2
ETHYLTRIETHOXYSILANE — 192.33 — 158-9° (-78°)mp — 0.8963 — 1.3955
$C_8H_{20}O_3Si$
viscosity: 0.70 cSt
vapor pressure, 50°: 10mm
coefficient of thermal expansion: 1.5×10^{-3}
ΔHvap: 7.8 kcal/mole
TOXICITY- oral rat, LD50: 13,720 mg/kg
flashpoint: 40°C (104°F)
autoignition temperature: 235°C (455°F)
specific heat: 0.43/g/°
γc of treated surface: 26.3 dynes/cm
critical temperature: 314°
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[78-07-9] TSCA HMIS: 3-2-1-X — 100g/$37.00 — 500g/$148.00

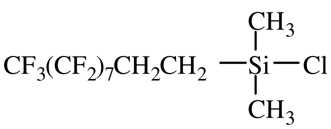
PLEASE INQUIRE ABOUT BULK QUANTITIES

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}

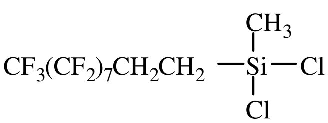


SIE4901.4				
ETHYLTRIMETHOXYSILANE	150.25	124-5°	0.9488	1.3838
$C_5H_{14}O_3Si$	flashpoint: 27°C (80°F)			
viscosity: 0.5 cSt	ΔHcomb: 3425 kcal/mole			
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture				
[5314-55-6] TSCA HMIS: 3-3-1-X	25g/$10.00	2kg/$120.00	17kg/$816.00	

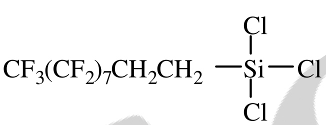
PP1-GC18				
GLASSCLAD® 18			0.88	
OCTADECYL FUNCTIONAL SILANE	flashpoint: 10°C(50°F)			
20% in t-BUTYL ALCOHOL and DIACETONE ALCOHOL	amber liquid			
γc of treated glass surface: 31 dynes/cm				
coefficient of friction of treated glass surface: 0.2-0.3				
surface resistivity of treated surface: 1.2 x 10^{13} ohms				
reduces blood protein adsorption[1].				
1. B. Arkles et al in "Silanes Surfaces & Interfaces" D. Leyden ed, Gordon & Breach, 1986, p91				
TSCA HMIS: 2-3-1-X	100g/$19.00	1.5kg/$148.00	15kg/$399.00	



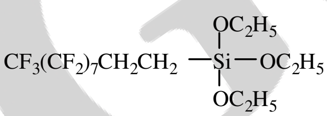
SIH5840.4				
(HEPTADECAFLUORO-1,1,2,2-TETRA-HYDRODECYL)DIMETHYLCHLOROSILANE	540.72	197-8°	1.51	1.3410
PERFLUORODECYL-1H,1H,2H,2H-DIMETHYLCHLOROSILANE				
$C_{12}H_{10}ClF_{17}Si$				
derivatizing agent for fluorous phase synthesis.				
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents				
[74612-30-9] HMIS: 3-2-1-X	5.0g/$41.00		25g/$164.00	



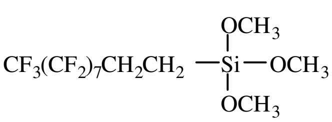
SIH5840.6				
(HEPTADECAFLUORO-1,1,2,2-TETRA-HYDRODECYL)METHYLDICHLOROSILANE	561.14	205-7° (26-7°)mp	1.63	
$C_{11}H_7Cl_2F_{17}Si$				
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents				
[3102-79-2] HMIS: 3-2-1-X	5.0g/$48.00		25g/$192.00	



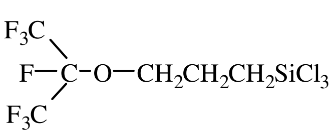
SIH5841.0				
(HEPTADECAFLUORO-1,1,2,2-TETRA-HYDRODECYL)TRICHLOROSILANE	581.56	216-8°	1.703	1.3490
	TOXICITY- oral rat, LD50: >5000 mg/kg			
PERFLUORODECYL-1H,1H,2H,2H-TRICHLOROSILANE				
$C_{10}H_4Cl_3F_{17}Si$				
γc of treated surfaces: 12 dynes/cm[1].				
1. J. Brzoska et al, Langmuir, *10*, 4367, 1994				
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents				
[78560-44-8] TSCA HMIS: 3-2-1-X	5.0g/$36.00		25g/$144.00	



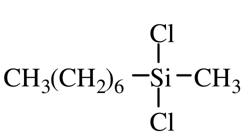
SIH5841.2				
(HEPTADECAFLUORO-1,1,2,2-TETRA-HYDRODECYL)TRIETHOXYSILANE	610.38	103-6°/3	1.407^{25}	1.3419
$C_{16}H_{19}F_{17}O_3Si$				
hydrolysis in combination with polydimethoxysiloxane gives hard hydrophobic coatings[1].				
1. T. Oota et al, Jpn. Kokai JP 06,293,782, 1993; CA 122: 136317d, 1995				
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture				
[101947-16-4] HMIS: 3-2-1-X	5g/$42.00		25g/$168.00	



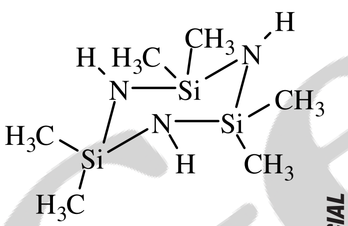
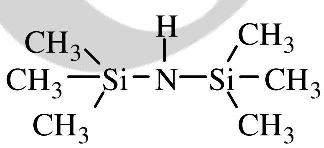
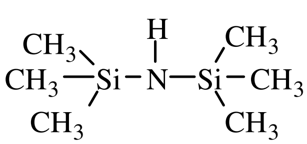
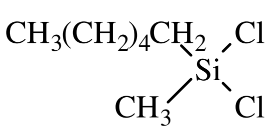
SIH5841.5				
(HEPTADECAFLUORO-1,1,2,2-TETRA-HYDRODECYL)TRIMETHOXYSILANE	568.30	247°	1.54	1.331^{25}
$C_{13}H_{13}F_{17}O_3Si$				
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture				
[83048-65-1] HMIS: 3-2-1-X	5g/$42.00		25g/$168.00	



SIH5842.0				
(3-HEPTAFLUOROISOPROPOXY)PROPYL-TRICHLOROSILANE	361.55	85-7°/35	1.497	1.3710
$C_6H_6Cl_3F_7OSi$				
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents				
[15538-93-9] HMIS: 3-3-1-X		5.0g/$64.00		



SIH5845.0				
n-HEPTYLMETHYLDICHLOROSILANE	213.22	207-8°	0.978	1.4396^{25}
$C_8H_{18}Cl_2Si$	flashpoint: 66°C (150°F)			
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents				
[18395-93-2] TSCA HMIS: 3-2-1-X		25g/$74.00		

structure	name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
$CH_3(CH_2)_6SiCl_3$	SIH5846.0 n-HEPTYLTRICHLOROSILANE $C_7H_{15}Cl_3Si$	233.64	211-2°	1.087	1.4439^{25}
$H_2C{=}CHCF_2(CF_2)_6CF_2CH_2CH_2SiCl_3$	SIH5918.0 HEXADECAFLUORODODEC-11-ENE-1-YL-TRICHLOROSILANE $C_{12}H_7Cl_3F_{16}Si$	589.61	94-6°/0.6	1.626	1.3713
$CH_3(CH_2)_{14}CH_2SiCl_3$	SIH5920.0 HEXADECYLTRICHLOROSILANE, 95% $C_{16}H_{33}Cl_3Si$	359.88	202°/10	0.98	1.4592
$CH_3(CH_2)_{14}CH_2Si(OC_2H_5)_3$	SIH5922.0 HEXADECYLTRIETHOXYSILANE, 95% $C_{22}H_{48}O_3Si$	388.71	160-1°/1 (-9°)mp	0.888	1.4370
$CH_3(CH_2)_{14}CH_2Si(OCH_3)_3$	SIH5925.0 HEXADECYLTRIMETHOXYSILANE, 95% $C_{19}H_{42}O_3Si$	346.63	155°/0.2 (-1°)mp	0.89	
	SIH6102.0 1,1,3,3,5,5-HEXAMETHYLCYCLOTRISILAZANE $C_6H_{21}N_3Si_3$	219.51	186-8° (-10°)mp	0.922	1.4448
	SIH6110.0 HEXAMETHYLDISILAZANE $C_6H_{19}NSi_2$ *HMDS, HMDZ*	161.39	126-7°	0.7742	1.4080
	SIH6110.1 HEXAMETHYLDISILAZANE, 99% $C_6H_{19}NSi_2$ *HMDS, HMDZ*	161.39	126-7°	0.7742	1.4080
	SIH6165.6 HEXYLMETHYLDICHLOROSILANE $C_7H_{16}Cl_2Si$	199.19	204-6°	0.993	1.4390

SIH5846.0 n-HEPTYLTRICHLOROSILANE
flashpoint: 64°C (146°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[871-41-0] HMIS: 3-2-1-X — 25g/$74.00

SIH5918.0 HEXADECAFLUORODODEC-11-ENE-1-YL-TRICHLOROSILANE
forms self-assembled monolayers/ reagent for immobilization of DNA
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
HMIS: 3-1-1-X — 5.0g/$190.00

SIH5920.0 HEXADECYLTRICHLOROSILANE, 95%
flashpoint: 154°C (309°F)
γc of treated surfaces: 21 dynes/cm
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[5894-60-0] TSCA HMIS: 3-1-1-X — 25g/$13.00 — 100g/$42.00

SIH5922.0 HEXADECYLTRIETHOXYSILANE, 95%
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[16415-13-7] HMIS: 2-1-1-X — 25g/$23.00 — 100g/$75.00

SIH5925.0 HEXADECYLTRIMETHOXYSILANE, 95%
viscosity: 7 cSt
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[16415-12-6] TSCA HMIS: 2-2-1-X — 25g/$18.00 — 2kg/$290.00 — 16kg/$1536.00

SIH6102.0 1,1,3,3,5,5-HEXAMETHYLCYCLOTRISILAZANE
flashpoint: 61°C (142°F)
ΔHform: 132 kcal/mole — dipole moment: 0.92
viscosity, 20°: 1.7 cSt — 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. E. Babich et al, Microelectron. Eng., *11*, 503, 1990.
2. Y. Blum et al, US Pat., 4,216,383, 1986; US Pat. 4,788,309, 1988.
3. L. Birkofer et al, J. Orgmet. Chem., *187*, 21, 1980.
see also SID4074.4
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[1009-93-4] TSCA HMIS: 2-2-1-X — 25g/$29.00 — 100g/$94.00 — 2kg/$636.00

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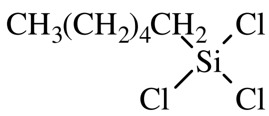
SIH6110.0 HEXAMETHYLDISILAZANE
viscosity: 0.90 cSt — TOXICITY- oral rat, LD50: 850mg/kg
vapor pressure, 50°: 50mm — TOXICITY- ipr mus, LDLo: 650mg/kg
pKa: 7.55 — flashpoint: 14°C (57°F)
surface tension: 18.2 dynes/cm — ΔHvap: 8.3 kcal mole
Ea, reaction w/SiO_2 surface: 17.6 kcal/mole — dielectric constant, 1000 Hz: 2.27
specific wetting surface: 485 m^2/g
versatile silylation reagent; creates hydrophobic surfaces
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[999-97-3] TSCA HMIS: 2-4-1-X — 25g/$10.00 — 1.5kg/$60.00 — 14kg/$305.00

SIH6110.1 HEXAMETHYLDISILAZANE, 99%
TOXICITY- ipr mus, LDLo: 650mg/kg
<5ppm chloride
photoresist adhesion promoter
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[999-97-3] TSCA HMIS: 2-4-1-X — 25g/$13.00 — 1.5kg/$85.00

SIH6165.6 HEXYLMETHYLDICHLOROSILANE
flashpoint: 85°C (185°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[14799-94-1] TSCA HMIS: 3-2-1-X — 25g/$31.00

	name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



SIH6167.0
HEXYLTRICHLOROSILANE — 219.61 — 191-2° — 1.107 — 1.3473
$C_6H_{13}Cl_3Si$ — flashpoint: 85°C (185°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[928-65-4] TSCA HMIS: 3-2-1-X — 25g/$15.00 — 100g/$49.00

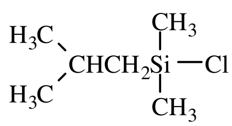
$CH_3(CH_2)_4CH_2Si(OC_2H_5)_3$

SIH6167.5
HEXYLTRIETHOXYSILANE — 248.44 — 115°/18 — 0.860 — 1.408^{25}
$C_{12}H_{28}O_3Si$ — flashpoint: 95°C (203°F)
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[18166-37-5] HMIS: 2-1-1-X — 25g/$31.00 — 100g/$100.00

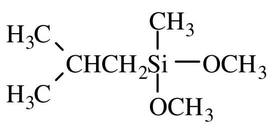
$CH_3(CH_2)_4CH_2Si(OCH_3)_3$

COMMERCIAL

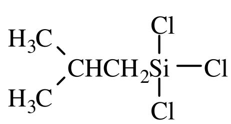
SIH6168.5
HEXYLTRIMETHOXYSILANE — 206.35 — 202-3° — 0.911^{25} — 1.4070
$C_9H_{22}O_3Si$ — flashpoint: 62°C (144°F)
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[3069-19-0] TSCA HMIS: 3-2-1-X — 50g/$31.00 — 2kg/$190.00



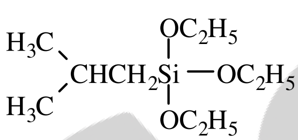
SII6452.5
ISOBUTYLDIMETHYLCHLOROSILANE — 150.72 — 131-3° — 1.4187^{25}
$C_6H_{15}ClSi$ — flashpoint: 18°C (64°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[60090-96-2] HMIS:3-4-1-X — 10g/$28.00



SII6452.8
ISOBUTYLMETHYLDIMETHOXYSILANE — 162.30 — 63°/40 — 0.851 — 1.3962
$C_7H_{18}O_2Si$ — flashpoint: 38°C (101°F)
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[18293-82-8] HMIS: 2-3-1-X — 25g/$57.00

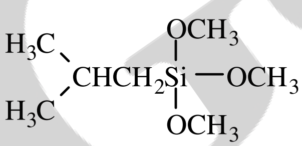


SII6453.0
ISOBUTYLTRICHLOROSILANE — 191.56 — 140° — 1.162 — 1.4335
$C_4H_9Cl_3Si$ — flashpoint: 37°C (100°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18169-57-8] TSCA HMIS: 3-3-1-X — 25g/$11.00 — 100g/$36.00

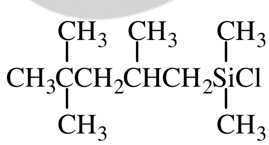


SII6453.5
ISOBUTYLTRIETHOXYSILANE — 220.38 — 190-1° — 0.9104 — 1.3908
$C_{10}H_{24}O_3Si$ — TOXICITY- oral rat, LD50: >5000mg/kg
flashpoint: 63°C (145°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[17980-47-1] TSCA HMIS: 2-2-1-X — 25g/$10.00 — 2kg/$92.00 — 16kg/$528.00

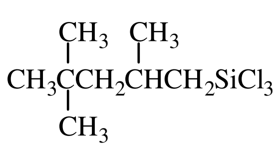
COMMERCIAL



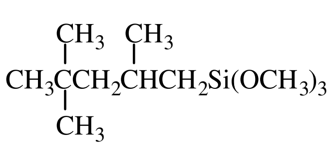
SII6453.7
ISOBUTYLTRIMETHOXYSILANE — 178.30 — 154° — 0.933 — 1.3960
TRIMETHOXYSILYL-2-METHYLPROPANE — flashpoint: 42°C (107°F)
$C_7H_{18}O_3Si$ — TOXICITY- oral rat,LD50: >2000mg/kg
viscosity: 0.8 cSt
branched structure provides hydrophobic surface treatments for architectural coatings
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[18395-30-7] TSCA HMIS: 3-2-1-X — 50g/$11.00 — 2kg/$110.00 — 17kg/$493.00



SII6456.6
ISOOCTYLDIMETHYLCHLOROSILANE — 206.83 — 83-5°/10 — 0.852
$C_{10}H_{23}ClSi$
[79957-95-2] HMIS: 3-3-1 — 25g/$72.00

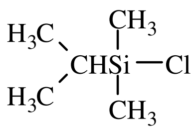


SII6457.0
ISOOCTYLTRICHLOROSILANE — 247.67 — 117°/50 — 1.0684 — 1.4510
1-TRICHLOROSILYL-2,4,4-TRIMETHYLPENTANE — flashpoint: 85°C (185°F)
$C_8H_{17}Cl_3Si$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18379-25-4] TSCA HMIS: 3-2-1-X — 25g/$22.00 — 100g/$72.00

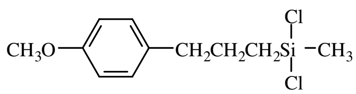


SII6458.0
ISOOCTYLTRIMETHOXYSILANE — 234.41 — 90°/10 — 0.887 — 1.4176
$C_{11}H_{26}O_3Si$ — flashpoint: 52°C (126°F)
viscosity: 2 cSt. — autoignition temp.: 310°
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[34396-03-7] TSCA HMIS: 3-2-1-X — 25g/$12.00 — 100g/$39.00 — 2kg/$190.00

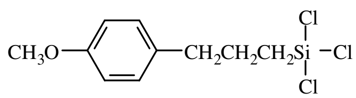
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



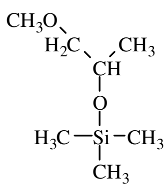
SII6462.0
ISOPROPYLDIMETHYLCHLOROSILANE — 136.69 — 114° — 0.873 — 1.4138
$C_5H_{13}ClSi$ — flashpoint: 15°C (59°F)
see also SID4065.0
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[3634-56-8] HMIS: 3-4-1-X — 25g/$48.00 — 100g/$156.00



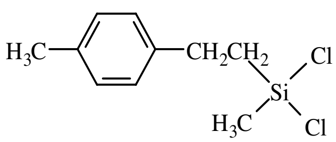
SIM6492.4
3-(p-METHOXYPHENYL)PROPYLMETHYLDICHLOROSILANE — 263.24 — 115-6°/0.3 — 1.13
$C_{11}H_{16}Cl_2OSi$ — flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
HMIS: 3-1-1-X store <5° — 25g/$68.00



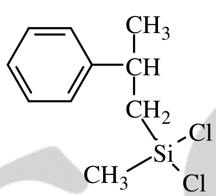
SIM6492.5
3-(p-METHOXYPHENYL)PROPYLTRICHLOROSILANE — 283.66 — 128-9°/1 — 1.226
$C_{10}H_{13}Cl_3OSi$ — flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[163155-57-5] HMIS: 3-1-1-X — 25g/$68.00



SIM6492.8
(1-METHOXY-2-PROPOXY)TRIMETHYLSILANE — 162.30 — 132° (-40°)mp — 0.83 — 1.3965
$C_7H_{18}O_2Si$
flashpoint: 20°C (68°F)
viscosity: 2 cSt
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[55816-62-1] HMIS: 3-2-1-X — 25g/$64.00

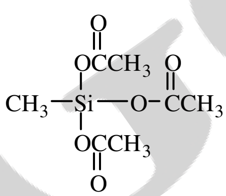


SIM6511.0
(p-METHYLPHENETHYL)METHYLDICHLOROSILANE, 95% — 233.21 — 103-5°/2 — 1.1 — 1.5100^{25}
flashpoint: 95°C (203°F)
(p-TOLYLETHYL)METHYLDICHLOROSILANE
$C_{10}H_{14}Cl_2Si$ $\alpha:\beta \sim 40:60$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture
[63126-87-4] TSCA-L HMIS: 3-1-1-X — 50g/$88.00

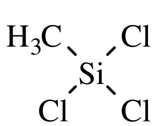


SIM6512.5
(2-METHYL-2-PHENYLETHYL)METHYLDICHLOROSILANE — 233.21 — 104-5°/9 — 1.1165 — 1.5152
METHYL(α-METHYLPHENETHYL)DICHLOROSILANE
$C_{10}H_{14}Cl_2Si$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture
[13617-28-2] TSCA HMIS: 3-1-1-X — 25g/$45.00 — 100g/$146.00

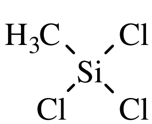
COMMERCIAL



SIM6519.0
METHYLTRIACETOXYSILANE, 95% — 220.25 — 87-8°/3 (40°)mp — 1.175 — 1.4083
$C_7H_{12}O_6Si$
vapor pressure, 94°: 9mm — flashpoint: 85°C (185°F)
most common crosslinker for condensation cure silicone RTV's
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[4253-34-3] TSCA HMIS: 3-2-1-X — 50g/$19.00 — 2kg/$280.00 — 18kg/$576.00



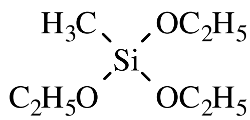
SIM6520.0
METHYLTRICHLOROSILANE — 149.48 — 66.4° (-78°)mp — 1.275 — 1.4110
CH_3Cl_3Si
vapor pressure, 13.5°: 100mm — TOXICITY- ihl rat,LDLo: 450ppm/4H
ΔHvap: 7.4 kcal/mole — flashpoint: -15°C (5°F)
viscosity: 0.46 cSt — autoignition temperature: 395°
critical pressure: 39 atm — critical temperature: 243°C
specific heat: 0.22 cal/g/° — ionization potential: 11.36 eV
coefficient of thermal expansion: 1.3×10^{-3} — surface tension: 20.3 dynes/cm
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture
[75-79-6] TSCA HMIS: 3-4-2-X — 25g/$11.00 — 500g/$26.00 — 20kg/$480.00*+container
*zDR-S-019 or zCYL-S-019 required



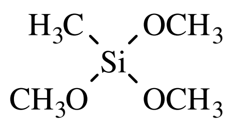
SIM6520.1
METHYLTRICHLOROSILANE, 99% — 149.48 — 66.4° (-78°)mp — 1.275 — 1.4110
CH_3Cl_3Si
in combination w/H_2 forms SiC by CVD[1].
1. A. Josiek et al, Chem. Vap. Dep., 2, 17, 1996
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture
[75-79-6] TSCA HMIS: 3-4-2-X — 25g/$36.00 — 500g/$252.00

PLEASE INQUIRE ABOUT BULK QUANTITIES

name | MW | bp/mm (mp) | D_4^{20} | n_D^{20}

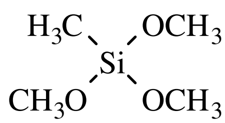


SIM6555.0
METHYLTRIETHOXYSILANE 178.30 142° 0.8948 1.3832
$C_7H_{18}O_3Si$ TOXICITY- oral rat, LD50: 12,500mg/kg
vapor pressure, 25°: 6mm flashpoint: 30°C (86°F)
dipole moment: 1.72 debye autoignition temperature: 225°C (437°F)
viscosity: 0.6 cSt ΔHcomb: 1831 kcal/mole
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[2031-67-6] TSCA HMIS: 1-3-1-X 25g/$11.00 2.0kg/$100.00 15kg/$360.00

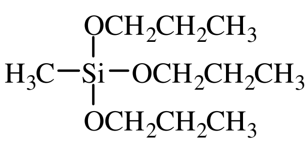


SIM6560.0
METHYLTRIMETHOXYSILANE 136.22 102-3° 0.955 1.3696
$C_4H_{12}O_3Si$ (-78°)mp
TOXICITY- oral rat, LD50: 12,500mg/kg
viscosity: 0.50 cSt flashpoint: 8°C (46°F)
dipole moment: 1.60 debye autoignition temperature: 255°
intermediate for coating resins ΔHcomb: 1142 kcal/mole
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[1185-55-3] TSCA HMIS: 3-4-1-X 25g/$11.00 2.0kg/$68.00 17kg/$323.00

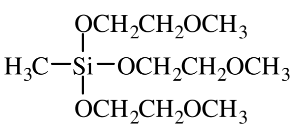
HYDROPHOBIC
COMMERCIAL



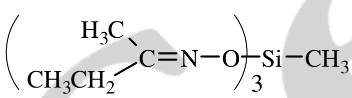
SIM6560.1
METHYLTRIMETHOXYSILANE, 99+% 136.22 102-3° 0.955 1.3696
$C_4H_{12}O_3Si$ (-78°)mp
TOXICITY- oral rat, LD50: 12,500mg/kg
viscosity: 0.50 cSt flashpoint: 8°C(46°F)
dipole moment: 1.60 debye autoignition temperature: 255°
intermediate for coating resins ΔHcomb: 1142 kcal/mole
[1185-55-3] TSCA HMIS: 3-4-1-X 100g/$91.00



SIM6579.0
METHYLTRI-n-PROPOXYSILANE 220.38 83-4°/13 0.878 1.4085
$C_{10}H_{24}O_3Si$ flashpoint: 60°C (130°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[5581-66-8] TSCA HMIS: 2-2-1-X 25g/$51.00

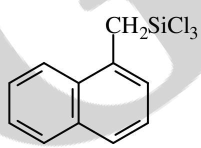


SIM6585.0
METHYLTRIS(METHOXYETHOXY)SILANE 268.38 145°/15 1.045 1.4178
$C_{10}H_{24}O_6Si$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[17980-64-2] TSCA HMIS: 3-1-0-X 25g/$34.00

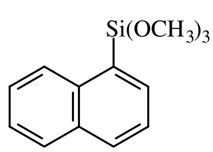


SIM6590.0
METHYLTRIS(METHYLETHYLKETOXIME)- 301.46 110-1°/2 0.982 1.4548[25]
SILANE, 95% *METHYLTRIS(2-BUTANONEOXIME)SILANE* (-22°)mp
$C_{13}H_{27}N_3O_3Si$ TOXICITY- oral rat, LD50: 2000-3000mg/kg
flashpoint: 90°C (194°F)
neutral crosslinker for condensation cure silicones
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[22984-54-9] TSCA HMIS: 2-2-1-X 100g/$16.00 2kg/$170.00

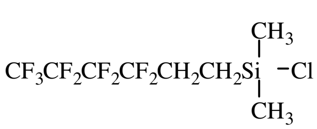
COMMERCIAL



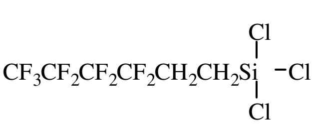
SIN6596.0
(1-NAPTHYLMETHYL)TRICHLOROSILANE 275.64 150-1°/7 1.3112 1.5974
$C_{11}H_9Cl_3Si$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[17998-59-3] HMIS: 3-2-1-X 10g/$123.00



SIN6597.0
1-NAPTHYLTRIMETHOXYSILANE 248.35 150°/2 1.5562
$C_{13}H_{16}O_3Si$ (33-5°)mp
employed in high refractive index surface modification
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[18052-76-1] HMIS: 3-2-1-X 5.0g/$180.00

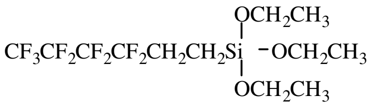


SIN6597.3
NONAFLUOROHEXYLDIMETHYLCHLORO- 340.69 162-4° 1.3422
SILANE
$C_8H_{10}ClF_9Si$
HMIS: 3-3-1-X 10g/$45.00

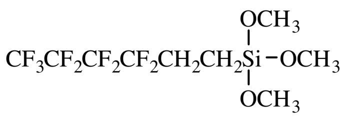


SIN6597.6
NONAFLUOROHEXYLTRICHLOROSILANE 381.53 70-2°/15 1.542
$C_6H_4Cl_3F_9Si$
[78560-47-1] TSCA HMIS: 3-2-1-X 10g/$27.00 50g/$108.00

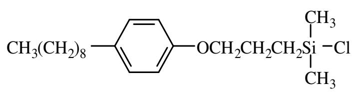
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



SIN6597.65
NONAFLUOROHEXYLTRIETHOXYSILANE — MW 410.35
$C_{12}H_{19}F_9O_3Si$
[102390-98-7] TSCA HMIS: 2-2-1-X — 25g/$74.00

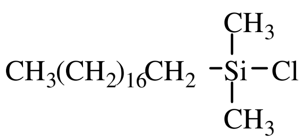


SIN6597.7
NONAFLUOROHEXYLTRIMETHOXYSILANE — MW 368.27 — bp 68-9°/15 — D_4^{20} 1.335 — n_D^{20} 1.3376
$C_9H_{13}F_9O_3Si$
γc of treated surface: 23 dynes/cm
[85877-79-8] TSCA HMIS: 3-2-1-X — 10g/$32.00 — 50g/$128.00

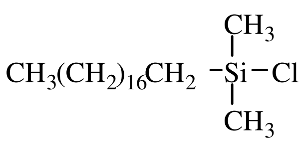


SIN6598.0
p-NONYLPHENOXYPROPYLDIMETHYL-CHLOROSILANE, 90% — MW 355.04 — bp 181°/0.75 — D_4^{20} 0.963 — n_D^{20} 1.4925
$C_{20}H_{35}ClOSi$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
HMIS: 3-1-1-X — 10g/$95.00

COMMERCIAL

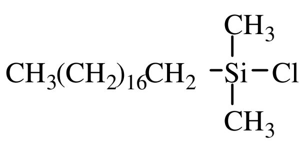


SIO6615.0
n-OCTADECYLDIMETHYLCHLOROSILANE — MW 347.10 — bp 159°/0.1 (28-30°)mp — D_4 0.856^{29} — n_D 1.4998^{29}
DIMETHYL-n-OCTADECYLCHLOROSILANE
$C_{20}H_{43}ClSi$ contains 5-10% C_{18} isomers — flashpoint: 201°C (394°F)
employed in bonded HPLC reverse phases[1].
1. S. Wise et al in "Silanes Surfaces & Interfaces" D. Leyden ed., Gordon & Breach, 1986, p349.
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18643-08-8] TSCA HMIS: 3-1-1-X — 25g/$25.00 — 2kg/$412.00

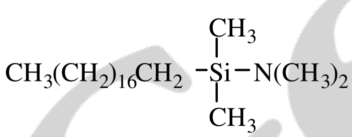


SIO6615.1
n-OCTADECYLDIMETHYLCHLOROSILANE, 97% — MW 347.10 — bp 159°/0.1 (28-30°)mp — D_4 0.956^{29} — n_D 1.4998^{29}
DIMETHYL-n-OCTADECYLCHLOROSILANE
$C_{20}H_{43}ClSi$ contains 3-6% C_{18} isomers — flashpoint: 201°C (394°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18643-08-8] TSCA HMIS: 3-1-1-X — 25g/$51.00 — 100g/$165.00

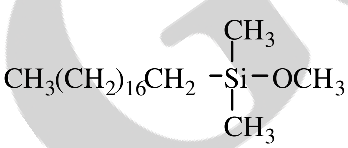
COMMERCIAL



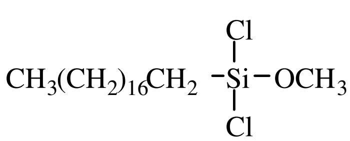
SIO6615.2
n-OCTADECYLDIMETHYLCHLOROSILANE, 70% in toluene — MW 347.10 — bp 159°/0.1 — D_4^{20} 0.854
flashpoint: 5°C (41°F)
$C_{20}H_{43}ClSi$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18643-08-8] TSCA HMIS: 3-3-1-X — 25g/$21.00 — 2kg/$350.00



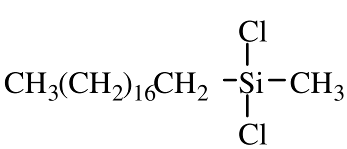
SIO6617.0
n-OCTADECYLDIMETHYL(DIMETHYLAMINO)-SILANE contains 5-10% C_{18} isomers — MW 355.72 — bp 160°/0.1
$C_{22}H_{49}NSi$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[76328-77-3] TSCA HMIS: 3-3-1-X — 10g/$42.00 — 50g/$168.00



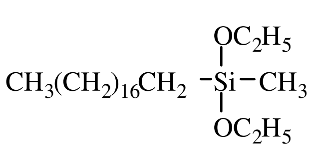
SIO6618.0
n-OCTADECYLDIMETHYLMETHOXYSILANE — MW 342.68 — bp 184-6°/0.2 — D_4 0.83^{25} — n_D^{20} 1.444
$C_{21}H_{46}OSi$ contains 5-10% C_{18} isomers
employed in SAM resist[1].
1. T. Oh et al, Mol. Cryst. Liq. Cryst. Sci. A, *337*, 7, 1999.
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[71808-65-6] TSCA HMIS: 2-1-0-X — 25g/$52.00 — 100g/$169.00



SIO6624.0
n-OCTADECYLMETHOXYDICHLORO-SILANE, 95% — MW 383.51 — bp 144-7°/1.5 — D_4 0.94^{25} — n_D^{20} 1.452
$C_{19}H_{40}Cl_2OSi$
maintains reactivity of octadecyltrichlorosilane, but with reduced HCl byproduct
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
HMIS: 3-1-1-X — 25g/$39.00 — 100g/$127.00



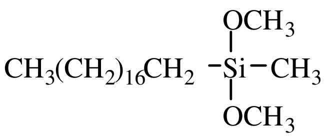
SIO6625.0
n-OCTADECYLMETHYLDICHLOROSILANE — MW 367.52 — bp 185°/2.5 (24-6°)mp — D_4^{20} 0.930
$C_{19}H_{40}Cl_2Si$ contains 5-10% C_{18} isomers
flashpoint: 185°C (365°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[5157-75-5] TSCA HMIS: 3-1-1-X — 25g/$20.00 — 500g/$262.00



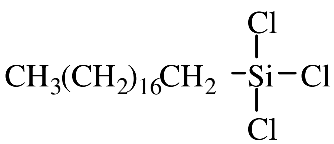
SIO6627.0
n-OCTADECYLMETHYLDIETHOXYSILANE — MW 386.73 — bp 197°/2 — D_4^{20} 0.852 — n_D^{20} 1.4407
$C_{23}H_{50}O_2Si$ contains 5-10% C_{18} isomers — flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[67859-75-0] TSCA HMIS: 2-1-0-X — 25g/$38.00

PLEASE INQUIRE ABOUT BULK QUANTITIES

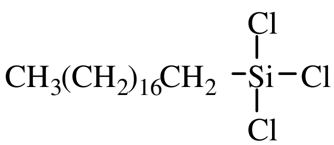
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



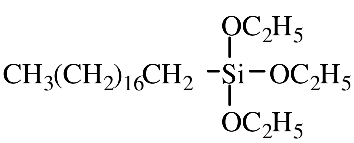
SIO6629.0
n-OCTADECYLMETHYLDIMETHOXYSILANE — 358.68 — 190°/3 (17-18°)mp — 0.85 — 1.4427
$C_{21}H_{46}O_2Si$ contains 5-10% C_{18} isomers
flashpoint: >110°C (>230°F)
autoignition temp: 225°
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[70851-50-2] TSCA HMIS: 3-1-0-X — 25g/$52.00 — 100g/$169.00



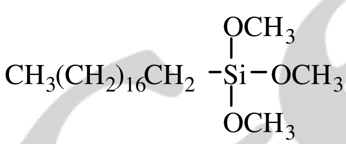
SIO6640.0 (COMMERCIAL)
n-OCTADECYLTRICHLOROSILANE, 95% — 387.93 — 160-2°/3 (22°)mp — 0.950[22] — 1.4602
$C_{18}H_{37}Cl_3Si$ contains 5-10% C_{18} isomers
flashpoint: 189°C (372°F)
provides lipidophilic surface coatings
employed in patterning and printing of electroactive molecular films[1,2].
see also SIO6624.0
1. Z. Huan et al, Synth. Met., *85*, 1375, 1997.
2. N. Jeon et al, Langmuir, *13*, 3382, 1997.
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[112-04-9] TSCA HMIS: 3-1-1-X — 25g/$11.00 — 1kg/$119.00 — 15kg/$962.00



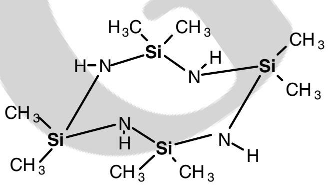
SIO6640.1
n-OCTADECYLTRICHLOROSILANE — 387.93 — 160-2°/3 (22°)mp — 0.950[22] — 1.4602
$C_{18}H_{37}Cl_3Si$ contains <3% C_{18} isomers
highest concentration of terminal silane substitution
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[112-04-9] TSCA HMIS: 3-1-1-X — 25g/$20.00 — 100g/$65.00



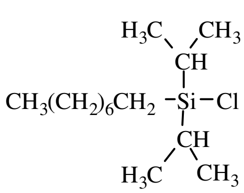
SIO6642.0
n-OCTADECYLTRIETHOXYSILANE, 95% — 416.76 — 165-9°/0.2 (10-12°)mp — 0.87 — 1.4386
$C_{24}H_{52}O_3Si$ contains 5-10% C_{18} isomers
forms hydrophobic, oleophilic coatings
flashpoint: >150°C (>302°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[7399-00-0] HMIS: 2-1-0-X — 25g/$30.00 — 100g/$96.00



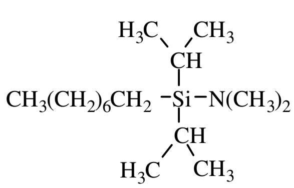
SIO6645.0 (COMMERCIAL)
n-OCTADECYLTRIMETHOXYSILANE, 95% — 374.68 — 170°/1 (13-17°)mp — 0.885 — 1.439
$C_{21}H_{46}O_3Si$ contains 5-10% C_{18} isomers
see also SIH5925.0
TOXICITY- oral rat, LD50: >5000mg/kg
forms clear, ordered, films w/ tetramethoxysilane[1].
flashpoint: 140°C (284°F)
1. A. Shimjima et al, J. Am. Chem. Soc., *120*, 4258, 1998.
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[3069-42-9] TSCA HMIS: 2-1-1-X — 25g/$15.00 — 2kg/$520.00



SIO6698.0
OCTAMETHYLCYCLOTETRASILAZANE — 292.68 — 225° (97°)mp — 0.950[22] — 1.458[25]
$C_8H_{28}N_4Si_4$
ΔHform: 188 kcal/mole
flashpoint: 66°C (150°F)
forms α-Si_3N_4 by ammonia thermal synthesis[1].
1. S. Schaible et al, Applied Organomet. Chem., *7*, 53, 1993
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[1020-84-4] TSCA HMIS: 2-2-1-X — 25g/$27.00 — 100g/$88.00

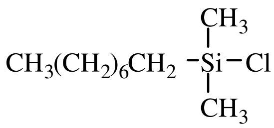


SIO6710.5
n-OCTYLDIISOPROPYLCHLOROSILANE — 262.94 — 95-9°/0.5 — 0.875 — 1.4550
$C_{14}H_{31}ClSi$
flashpoint: >110°C (>230°F)
reagent for preparation of HPLC stationary phases w/high stability and efficiency[1].
1. J. Kirkland et al, J. Chrom. Sci., *32*, 473, 1994.
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[117559-37-2] HMIS: 3-1-1-X — 10g/$58.00

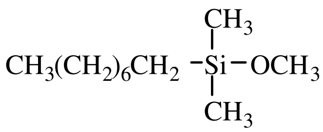


SIO6710.7
n-OCTYLDIISOPROPYL(DIMETHYLAMINO)-SILANE — 271.57 — 105°/0.7 — 0.833 — 1.4560
$C_{16}H_{37}NSi$
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[151613-25-1] TSCA HMIS: 3-2-1-X — 25g/$250.00

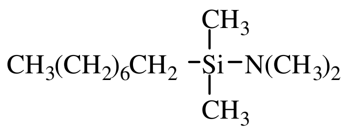
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



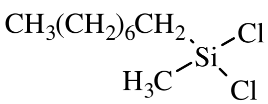
SIO6711.0
n-OCTYLDIMETHYLCHLOROSILANE | 206.83 | 222-5° | 0.794 | 14328^{25}
$C_{10}H_{23}ClSi$ | flashpoint: 97°C (207°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18162-84-0] TSCA HMIS: 3-1-1-X | 25g/$28.00 | 100g/$91.00



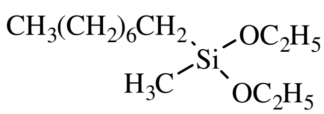
SIO6711.1
OCTYLDIMETHYLMETHOXYSILANE | 202.42 | 221-223° | 0.813 | 1.4230
$C_{11}H_{26}OSi$ | flashpoint: 82°C(181°F)
[93804-29-6] HMIS: 3-2-1-X | 25g/$84.00



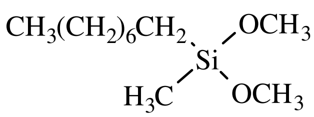
SIO6711.3
n-OCTYLDIMETHYL(DIMETHYLAMINO)SILANE | 215.45 | 94-6°/10 | 0.80^{25}
$C_{12}H_{29}NSi$ | flashpoint: 69°C (156°F)
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[2530-86-1] HMIS: 3-2-1-X | 25g/$52.00



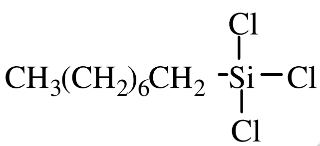
SIO6712.0
n-OCTYLMETHYLDICHLOROSILANE | 227.25 | 94°/6 | 0.9761 | 1.4440
$C_9H_{20}Cl_2Si$ | flashpoint: 98°C (209°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[14799-93-0] TSCA HMIS: 3-2-1-X | 25g/$20.00 | 500g/$174.00



SIO6712.2
n-OCTYLMETHYLDIETHOXYSILANE | 246.47 | 80-2°/2 | 0.8478 | 1.4190
$C_{13}H_{30}O_2Si$ | flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[2652-38-2] HMIS: 2-2-0-X | 25g/$21.00 | 100g/$68.00

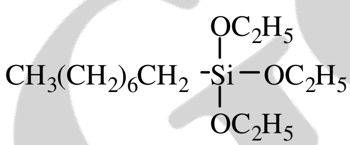


SIO6712.4
n-OCTYLMETHYLDIMETHOXYSILANE | 218.42 | 87-9°/5 | 0.858 | 1.4190
$C_{11}H_{26}O_2Si$ | flashpoint: 94°C(201°F)
[85712-15-8] HMIS: 3-2-1-X | 25g/$30.00 | 100g/$98.00

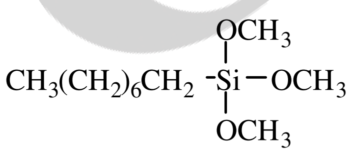


SIO6713.0
n-OCTYLTRICHLOROSILANE | 247.67 | 224-6° (<-50°)mp | 1.0744 | 1.4490
$C_8H_{17}Cl_3Si$
vapor pressure, 140°: 2mm | flashpoint: 96°C (204°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[5283-66-9] TSCA HMIS: 3-1-1-X | 25g/$11.00 | 2.0kg/$170.00

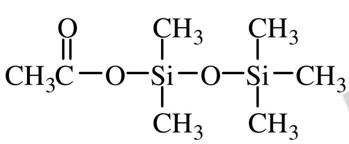
COMMERCIAL



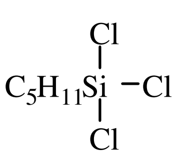
SIO6715.0
n-OCTYLTRIETHOXYSILANE | 276.48 | 98-9°/2 (<-40°)mp | 0.8750 | 1.4160
$C_{14}H_{32}O_3Si$
viscosity: 1.9 cSt | flashpoint: 100°C (212°F)
vapor pressure, 75°: 1mm
may be formulated to stable water emulsions[1].
1. R. Depasquale et al, US Pat. 4,648,904, 1987.
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[2943-75-1] TSCA HMIS: 2-1-0-X | 50g/$10.00 | 2.0kg/$140.00 | 15kg/$585.00



SIO6715.5
n-OCTYLTRIMETHOXYSILANE | 234.41 | 191-2° | 0.907 | 1.417
$C_{11}H_{26}O_3Si$ | flashpoint: 68°C (154°F)
vapor pressure, 75°: 0.1mm
see also- SII6458.0 ISOOCTYLTRIMETHOXYSILANE
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[3069-40-7] TSCA HMIS: 3-2-1-X | 25g/$10.00 | 2.0kg/$190.00

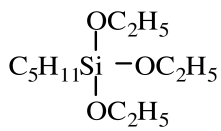


SIP6717.0
1,1,1,3,3-PENTAMETHYL-3-ACETOXY-DISILOXANE | 206.39 | 149-50° | 0.90 | 1.3887^{25}
$C_7H_{18}O_3Si_2$ | flashpoint: 40°C (104°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[70693-47-9] TSCA HMIS: 2-2-1-X | 10g/$36.00 | 50g/$144.00

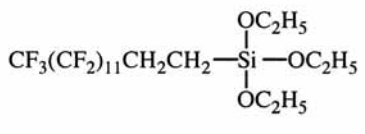


SIP6720.0
PENTYLTRICHLOROSILANE | 209.59 | 171-2° | 1.142 | 1.4456
AMYLTRICHLOROSILANE mixed isomers | flashpoint: 61°C (142°F)
$C_5H_{11}Cl_3Si$ | viscosity: 1.1 cSt.
specific heat: 0.35 cal/g/°
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[107-72-2] TSCA HMIS: 3-3-1-X | 25g/$45.00

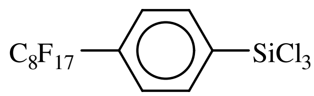
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



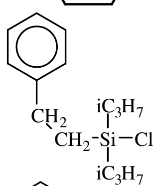
SIP6720.2
PENTYLTRIETHOXYSILANE — 234.41 — 95-6°/1.3 — 0.895 — 1.4059
AMYLTRIETHOXYSILANE mixed isomers — flashpoint: 68°C (154°F)
$C_{11}H_{26}O_3Si$ — viscosity: 2.1 cSt
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[2761-24-2] TSCA HMIS: 2-2-1-X — 25g/$55.00



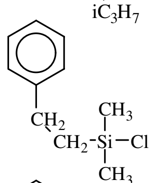
SIP6720.5
PERFLUORODODECYL-1H,1H,2H,2H-TRIETHOXY-SILANE -PERFLUOROTETRADECYL-1H,1H,2H,2H-TRIETHOXYSILANE MIXTURE, 80% — 710-810 — 157-198°/1.5 (70-85°)mp
(contains ~ 5% SIH5841.2, balance higher homologs)
for the preparation of low surface energy substrates
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
HMIS: 2-1-1-X — 5.0g/$127.00



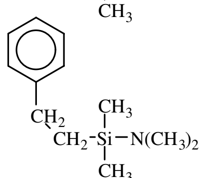
SIP6720.7
PERFLUOROOCTYLPHENYLTRICHLOROSILANE — 629.60 — 67-9°/3
$C_{14}H_4Cl_3F_{17}Si$ — thermally stable to >300°
contact angle treated glass surface, water: 115°.[1]
1. Y. Kondo, J. Oleoscience, *53*, 143, 2004
[753025-21-7] HMIS: 3-1-1-X — 1.0g/$232.00



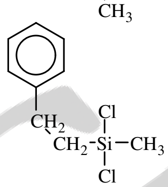
SIP6720.8
PHENETHYLDIISOPROPYLCHLOROSILANE, — 254.87 — 105-9°/0.3 — 0.97
$C_8H_{22}ClSi$ contains α,β-isomers
[151613-24-4] TSCA HMIS: 3-2-1-X — 5.0g/$120.00



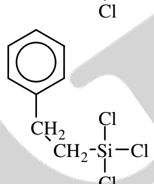
SIP6721.0
PHENETHYLDIMETHYLCHLOROSILANE — 198.77 — 56°/0.2 — 0.999 — 1.5185
$C_{10}H_{15}ClSi$ contains α,β-isomers — flashpoint: 70°C (158°F)
see also SIP6724.7
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[17146-08-6] TSCA HMIS: 3-2-1-X — 50g/$170.00



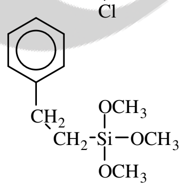
SIP6721.2
PHENETHYLDIMETHYL(DIMETHYLAMINO)-SILANE contains α,β-isomers — 207.39 — 109°/2 — 0.890
$C_{12}H_{21}NSi$
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[181231-68-5] TSCA-L HMIS: 3-2-1-X — 10g/$117.00



SIP6721.5
PHENETHYLMETHYLDICHLOROSILANE — 219.19 — 99°/6 — 1.127 — 1.5120
METHYL(PHENETHYL)DICHLOROSILANE — flashpoint: 80°C (176°F)
$C_9H_{12}Cl_2Si$ contains α,β-isomers
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[17146-08-6] TSCA HMIS: 3-2-1-X — 25g/$38.00 — 100g/$124.00

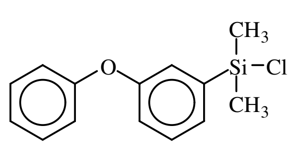


SIP6722.0
PHENETHYLTRICHLOROSILANE — 239.60 — 93-6°/3 — 1.240 — 1.5185
$C_8H_9Cl_3Si$ contains α,β-isomers — TOXICITY- oral rat, LD50: 2830mg/kg
flashpoint: 91°C (196°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[940-41-0] TSCA HMIS: 3-1-1-X — 25g/$25.00 — 100g/$82.00

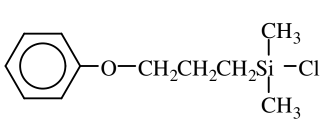


SIP6722.6
PHENETHYLTRIMETHOXYSILANE — 226.35 — 95-6°/2 — 1.037 — 1.4753
$C_{11}H_{18}O_3Si$ contains α,β-isomers — flashpoint: 109°C (228°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[49539-88-0] TSCA HMIS: 3-1-1-X — 25g/$28.00 — 100g/$91.00 — 2kg/$420.00

COMMERCIAL

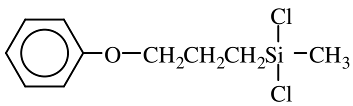
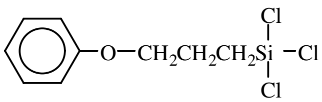
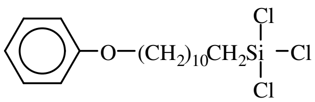
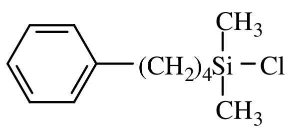
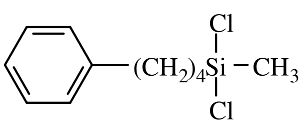
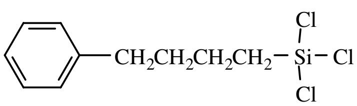
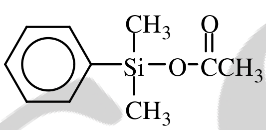
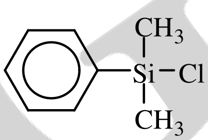
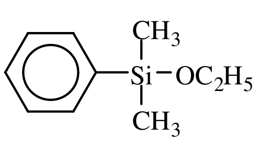
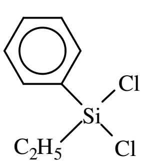
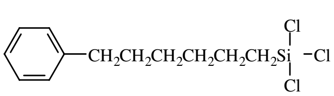


SIP6723.0
m-PHENOXYPHENYLDIMETHYLCHLORO-SILANE, 95% contains other isomers — 262.81 — 102-6°/1 — 1.11^{25} — 1.5603^{25}
$C_{14}H_{15}ClOSi$
end-capper for low-temperature lubricating fluids[1].
1. M. Gardos, ASLE Transactions, *18*, 31, 1972.
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X — 5.0g/$94.00

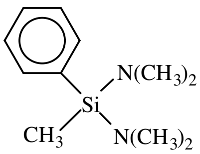


SIP6723.2
3-PHENOXYPROPYLDIMETHYLCHLOROSILANE — 228.78 — 90-2°/0.25
$C_{11}H_{17}ClOSi$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[69733-73-9] HMIS: 3-2-1-X — 25g/$42.00 — 100g/$138.00

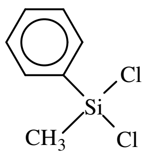
HYDROPHOBIC

	name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
	SIP6723.25 3-PHENOXYPROPYLMETHYLDICHLOROSILANE $C_{10}H_{14}OCl_2Si$ [28229-56-3] HMIS: 3-2-1-X	249.21	110°/1 25g/$84.00		
	SIP6723.3 3-PHENOXYPROPYLTRICHLOROSILANE $C_9H_{11}Cl_3OSi$ HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [60333-76-8] HMIS: 3-2-1-X	269.63 flashpoint: >110°C (>230°F) 25g/$36.00	40°/0.02	1.2574 100g/$117.00	1.5190
	SIP6723.4 11-PHENOXYUNDECYLTRICHLOROSILANE $C_{17}H_{27}Cl_3OSi$ forms SAMs that orient pentacene [526204-46-6] HMIS: 3-1-1-X	381.85	 5.0g/$210.00		
	SIP6724.7 4-PHENYLBUTYLDIMETHYLCHLOROSILANE $C_{12}H_{19}ClSi$ HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents HMIS: 3-2-1-X	226.83 flashpoint: >110°C (>230°F)	85-7°/0.6 25g/$110.00	0.964	1.4979^{25}
	SIP6724.8 4-PHENYLBUTYLMETHYLDICHLOROSILANE $C_{11}H_{16}Cl_2Si$ HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents HMIS: 3-2-1-X	247.24 flashpoint: >110°C (>230°F)	105-9°/1.5 25g/$110.00	1.09^{25}	
	SIP6724.9 4-PHENYLBUTYLTRICHLOROSILANE $C_{10}H_{13}Cl_3Si$ employed in bonded phases for HPLC HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [17886-88-3] TSCA HMIS: 3-2-1-X	267.06 flashpoint: >110°C (>230°F)	82°/0.4 25g/$110.00	1.192	1.5121
	SIP6726.0 PHENYLDIMETHYLACETOXYSILANE $C_{10}H_{14}O_2Si$ HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture [17887-60-4] TSCA HMIS: 2-2-1-X	194.30 flashpoint: 72°C (162°F)	127-9°/44 25g/$68.00	1.006	1.4907
	COMMERCIAL SIP6728.0 PHENYLDIMETHYLCHLOROSILANE $C_8H_{11}ClSi$ vapor pressure, 25°: 1 mm viscosity: 1.4 cSt HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [768-33-2] TSCA HMIS: 3-2-1-X	170.71 flashpoint: 61°C (141°F) ΔHvap: 11.4 kcal/mole 25g/$26.00	192-3° 100g/$84.00	1.032 2kg/$700.00	1.5082
	SIP6728.4 PHENYLDIMETHYLETHOXYSILANE $C_{10}H_{16}OSi$ viscosity: 1.3 cSt dipole moment: 1.34 HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture [1825-58-7] TSCA HMIS: 2-2-0-X	180.32 TOXICITY- oral rat, LD50: 2460mg/kg flashpoint: 61°C (141°F) 10g/$20.00	93°/25	0.926 50g/$80.00	1. 4799
	SIP6730.0 PHENYLETHYLDICHLOROSILANE $C_8H_{10}Cl_2Si$ ΔHvap: 11.9 kcal/mole HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [1125-27-5] TSCA HMIS: 3-2-1-X	205.16 flashpoint: 92°C (198°F) vapor pressure, 100°: 13mm	225-6° 25g/$110.00	1.184	1.5321
	SIP6736.4 6-PHENYLHEXYLTRICHLOROSILANE $C_{12}H_{17}Cl_3Si$ [18035-33-1] HMIS: 3-1-1-X	295.71	95°/0.1 5.0g/$96.00		1.5052^{25}

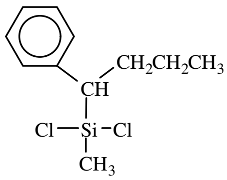
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



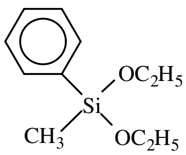
SIP6736.8
PHENYLMETHYLBIS(DIMETHYLAMINO)SILANE | 208.38 | 108-9°/11 | | 1.4982
$C_{11}H_{20}N_2Si$ | flashpoint: 78°C (172°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[33567-83-8] HMIS: 3-2-1-X | 10g/$38.00



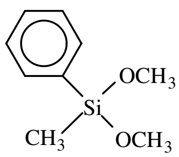
SIP6738.0
PHENYLMETHYLDICHLOROSILANE | 191.13 | 205-6° (-53°)mp | 1.187 | 1.5180
$C_7H_8Cl_2Si$
vapor pressure:, 82.5°: 13mm | TOXICITY- ipr mus, LD50: 300mg/kg
ΔHvap: 11.5 kcal/mole | flashpoint: 82°C (180°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[149-74-6] TSCA HMIS: 3-2-1-X | 25g/$12.00 | 500g/$64.00



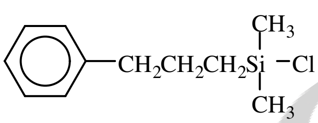
SIP6738.5
1-PHENYL-1-(METHYLDICHLOROSILYL)BUTANE | 247.24 | 87-9°/1 | 1.10 | 1.5120
$C_{11}H_{16}Cl_2Si$ | flashpoint: >110°C(>230°F)
HMIS: 3-2-1-X | 25g/$120.00



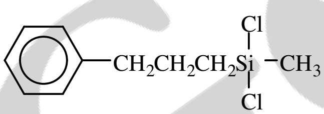
SIP6739.0
PHENYLMETHYLDIETHOXYSILANE | 210.35 | 117-8°/31 | 0.963 | 1.4690
$C_{11}H_{18}O_2Si$ | flashpoint: 89°C (192°F)
dipole moment: 1.32
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[775-56-4] TSCA HMIS: 2-2-1-X | 25g/$23.00 | 100g/$78.00



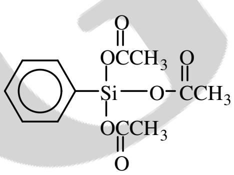
SIP6740.0
PHENYLMETHYLDIMETHOXYSILANE | 182.29 | 199-200° | 0.9934 | 1.4694
$C_9H_{14}O_2Si$ | TOXICITY- oral rat, LD50: 892 mg/kg
viscosity, 20°: 1.65 cSt | flashpoint: 76°C (168°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[3027-21-2] TSCA HMIS: 3-2-1-X | 25g/$15.00 | 250g/$105.00



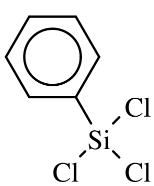
SIP6743.0
(3-PHENYLPROPYL)DIMETHYLCHLOROSILANE | 212.78 | 75°/0.5 | 0.963
$C_{11}H_{17}ClSi$ see also SIP6724.7 | flashpoint: 103°C (216°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[17146-09-7] TSCA HMIS: 3-1-1-X | 5.0g/$17.00 | 50g/$119.00



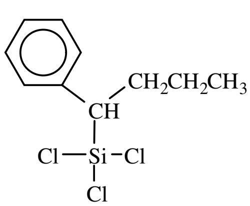
SIP6744.0
(3-PHENYLPROPYL)METHYLDICHLOROSILANE | 233.21 | 96-8°/4 | 1.086^{25} | 1.5090^{25}
$C_{10}H_{14}Cl_2Si$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[17776-66-8] HMIS: 3-2-1-X | 25g/$87.00



SIP6790.0
PHENYLTRIACETOXYSILANE | 282.32 | 158°/30 | 1.194 | 1.4708
$C_{12}H_{14}O_6Si$ | flashpoint: 102°C (216°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[18042-54-1] TSCA HMIS: 3-2-1-X | 25g/$64.00 | 100g/$208.00



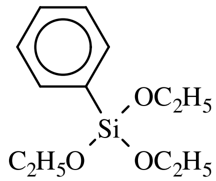
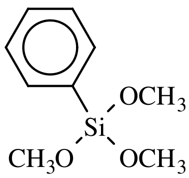
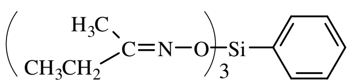
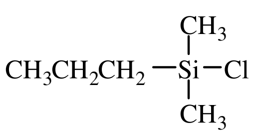
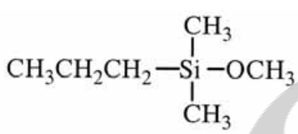
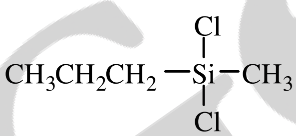
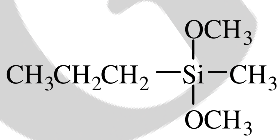
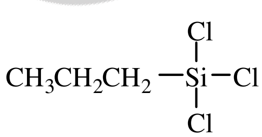
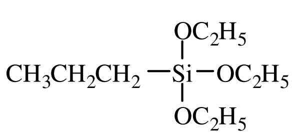
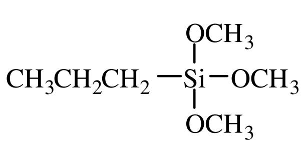
SIP6810.0
PHENYLTRICHLOROSILANE | 211.55 | 201° (-33°)mp | 1.324 | 1.5247
$C_6H_5Cl_3Si$
ΔHvap: 11.4 kcal/mole | TOXICITY- oral rat, LD50: 2340mg/kg
vapor pressure, 75°: 10mm | flashpoint: 91°C (195°F)
surface tension: 27.9 dynes/cm | viscosity: 1.08 cSt
specific heat: 0.24 cal/g/° | dipole moment: 2.41
coefficient of thermal expansion: 1.2×10^{-3} | critical temperature: 438°
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[98-13-5] TSCA HMIS: 3-2-1-X | 25g/$11.00 | 2kg/$76.00 | 18kg/$576.00



SIP6813.0
1-PHENYL-1-TRICHLOROSILYLBUTANE | 267.65 | 78-80°/0.8 | 1.201 | 1.5180
$C_{10}H_{13}Cl_3Si$ | flashpoint: >110°C(>230°F)
HMIS: 3-2-1-X | 10g/$110.00

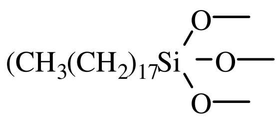
HYDROPHOBIC

COMMERCIAL

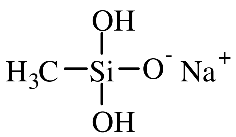
structure	name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
	SIP6821.0				
	PHENYLTRIETHOXYSILANE	240.37	112-3°/10	0.996	1.4718
	$C_{12}H_{20}O_3Si$	TOXICITY- oral rat, LD50: 2830mg/kg			
	vapor pressure, 75°: 1mm	flashpoint: 96°C (205°F)			
	coefficient of thermal expansion: 0.9 x 10^{-3}	surface tension 28 dynes/cm			
	dipole moment: 1.85 debye	dielectric constant: 4.12			
	viscosity, 25°: 1.7 cSt				
	improves photoresist adhesion to silicon nitride				
COMMERCIAL	effective treatment for organic-grafted clays[1].				
	1. K. Canrado et al, Chem. Mater. *13*, 3766, 2001.				
	HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture				
	[780-69-8] TSCA HMIS: 2-1-1-X	100g/$11.00	2kg/$112.00	17kg/$510.00	
	SIP6822.0				
	PHENYLTRIMETHOXYSILANE	198.29	211°	1.064	1.4734
	$C_9H_{14}O_3Si$		(-25°)mp		
	viscosity, 25°: 2.1 cSt	TOXICITY- ivn mus, LD50: 180mg/kg			
	vapor pressure, 108°: 20mm	flashpoint: 86°C (187 °F)			
	dipole moment: 1.77	dielectric constant: 4.44			
	intermediate for silicone resin coatings				
	HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture				
	[2996-92-1] TSCA HMIS: 3-2-1-X	100g/$11.00	2kg/$98.00	18kg/$562.00	
	SIP6826.5				
	PHENYLTRIS(METHYLETHYLKETOXIMINO)-SILANE, 95%	363.53	60-5°/3	0.995	
	$C_{18}H_{29}N_3O_3Si$	flashpoint: >61°C (>142°F)			
	HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture				
	[34036-80-1] TSCA HMIS: 3-2-1-X	50g/$17.00		250g/$68.00	
	SIP6910.0				
	n-PROPYLDIMETHYLCHLOROSILANE	136.70	113-4°	0.8726	1.4138
	$C_5H_{13}ClSi$	flashpoint: 10°C (50°F)			
	HYDROLYTIC SENSITIVITY: 8 Si-Cl reacts rapidly with water/moisture				
	[17477-29-1] TSCA HMIS: 3-4-1-X	25g/$49.00		100g/$159.00	
	SIP6911.0				
	PROPYLDIMETHYLMETHOXYSILANE	132.28	94-6°	0.787	1.3927[25]
	$C_6H_{16}OSi$				
	[18182-14-4] HMIS: 3-3-1-X		10g/$82.00		
	SIP6912.0				
	n-PROPYLMETHYLDICHLOROSILANE	157.11	125°	1.027	1.425
	$C_4H_{10}Cl_2Si$	flashpoint: 27°C (81°F)			
	viscosity, 20°: 0.8 cSt.				
	HYDROLYTIC SENSITIVITY: 8 Si-Cl reacts rapidly with water/moisture				
	[4518-94-9] TSCA HMIS: 3-3-1-X	25g/$38.00		100g/$124.00	
	SIP6914.0				
	PROPYLMETHYLDIMETHOXYSILANE	148.28	126°	0.8689	1.3931
	$C_6H_{16}O_2Si$				
	[18173-73-4] HMIS: 3-3-1-X		25g/$86.00		
	SIP6915.0				
	n-PROPYLTRICHLOROSILANE	177.53	123-4°	1.185	1.4290
	$C_3H_7Cl_3Si$	flashpoint: 35°C (95°F)			
	vapor pressure, 16°: 10mm	ΔHvap: 8.7 kcal/mole			
	HYDROLYTIC SENSITIVITY: 8 Si-Cl reacts rapidly with water/moisture				
	[141-57-1] TSCA HMIS: 3-3-1-X	25g/$13.00		2.5kg/$225.00	
	SIP6917.0				
COMMERCIAL	n-PROPYLTRIETHOXYSILANE	206.36	179-80°	0.8916	1.3956
	$C_9H_{22}O_3Si$	flashpoint: 57°C (135°F)			
	HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture				
	[2550-02-9] TSCA HMIS: 2-3-1-X	25g/$12.00		2.0kg/$160.00	
	SIP6918.0				
	n-PROPYLTRIMETHOXYSILANE	164.27	142°	0.932[25]	1.3880
	$C_6H_{16}O_3Si$	TOXICITY- oral rat, LD50: 7420mg/kg			
	γc of treated surface: 28.5 dynes/cm	flashpoint: 34°C (93°F)			
	utilized in architectural hydrophobic coatings				
	HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture				
	[1067-25-0] TSCA HMIS: 3-3-1-X	25g/$11.00	2kg/$102.00	16kg/$368.00	

PLEASE INQUIRE ABOUT BULK QUANTITIES

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



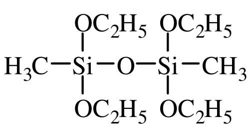
SIS6952.0
SILICLAD® — D_4^{20}: 0.88
OCTADECYL FUNCTIONAL SILANE — flashpoint: 25°C (77°F)
20% in t-AMYL ALCOHOL and DIACETONE ALCOHOL — amber liquid
γc of treated glass surface: 31 dynes/cm
coefficient of friction of treated glass surface: 0.2-0.3
surface resistivity of treated surface: 1.2 x 10^{13} ohms
reduces blood protein adsorption[1].
hydrophobic, anti-stiction coating for silicon substrates[2].
1. B. Arkles et al, in "Silanes Surfaces & Interfaces" D. Leyden ed, Gordon & Breach, 1986, p 91.
2. A. Almanza-Workman et al, J. Electro Chem. Soc. *149*, H6, 2002
for application information see Performance Products Brochure
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[39443-39-5] TSCA HMIS: 2-3-1-X — 100g/$20.00 1.5kg/$172.00 15kg/$480.00



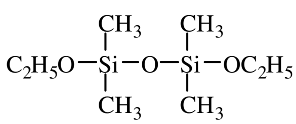
SIS6984.0
SODIUM METHYLSILICONATE, 30% in water — MW 116.12 — D_4^{20}: 1.24
CH_5NaO_3Si — pH: 13.0
viscosity: 10 cSt.
[16589-43-8] TSCA HMIS: 3-0-0-X — 500g/$17.00 2.0kg/$50.00 20kg/$420.00

$CH_3(CH_2)_{13}SiCl_3$

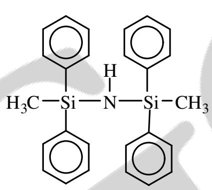
SIT7093.0
TETRADECYLTRICHLOROSILANE — MW 331.83 — bp 155-6°/3 — n_D^{20} 1.4575
$C_{14}H_{29}Cl_3Si$
[18402-22-7] TSCA HMIS: 3-1-1-X — 25g/$80.00



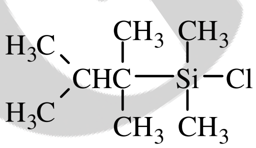
SIT7095.0
1,1,3,3-TETRAETHOXY-1,3-DIMETHYL-DISILOXANE, 95% — MW 282.48 — bp 205° — D_4^{20} 0.953 — n_D^{20} 1.3912
flashpoint: 58°C (136°F)
$C_{10}H_{26}O_5Si_2$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[18001-60-0] HMIS: 3-3-1-X — 25g/$57.00



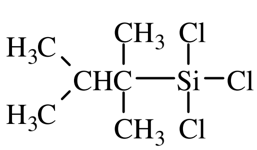
SIT7534.0
1,1,3,3-TETRAMETHYL-1,3-DIETHOXYDISILOXANE — MW 222.43 — bp 161° (-134°)mp — D_4^{20} 0.879 — n_D^{20} 1.3880
$C_8H_{22}O_3Si_2$
viscosity: 1.0 cSt — flashpoint: 38°C (100°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[18420-09-2] TSCA HMIS: 2-2-0-X — 25g/$28.00 100g/$90.00



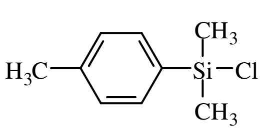
SIT7753.0
1,1,3,3-TETRAPHENYLDIMETHYLDISILAZANE — MW 409.68 — bp 218-220°/1.5 (91°)mp
$C_{26}H_{27}NSi_2$
flashpoint: >110°C (>230°F)
deactivates glass capillary columns by persilylation[1].
1. K. Grob et al, High Resol. Chrom. & Col Chrom., *3*, 197, 1980.
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[7453-26-1] TSCA-L HMIS: 2-1-0-X — 5.0g/$25.00 25g/$102.00



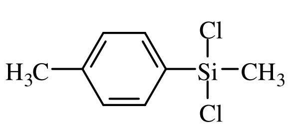
SIT7906.0
THEXYLDIMETHYLCHLOROSILANE — MW 178.78 — bp 55-6°/10 (14-15°)mp — D_4^{20} 0.911 — n_D^{20} 1.4490
t-HEXYLDIMETHYLCHLOROSILANE
$C_8H_{19}ClSi$ — flashpoint: 51°C (125°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents, protic solvents
[67373-56-2] HMIS: 3-2-1-X — 5.0g/$16.00 25g/$64.00



SIT7906.6
THEXYLTRICHLOROSILANE — MW 219.61 — bp 70-2°/15
$C_6H_{13}Cl_3Si$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents, protic solvents
[18151-53-6] HMIS: 3-3-1-X — 10g/$101.00



SIT8030.0
p-TOLYLDIMETHYLCHLOROSILANE — MW 184.74 — bp 215-7° — D_4^{25} 1.007 — n_D^{20} 1.5055
$C_9H_{13}ClSi$ — flashpoint: 67°C (153°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents, protic solvents
[35239-30-6] TSCA HMIS: 3-2-1-X — 5.0g/$37.00



SIT8035.0
p-TOLYLMETHYLDICHLOROSILANE — MW 205.16 — bp 161-5°/7 — D_4^{20} 1.1609 — n_D^{20} 1.5330
$C_8H_{10}Cl_2Si$ — flashpoint: 80°C (176°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents, protic solvents
[25898-37-7] TSCA HMIS: 3-2-1-X — 25g/$114.00

HYDROPHOBIC
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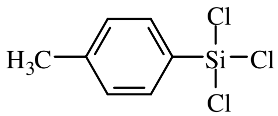
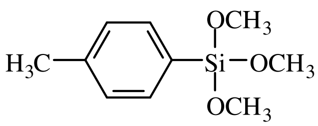
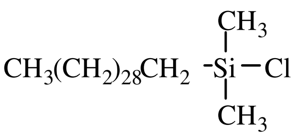
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



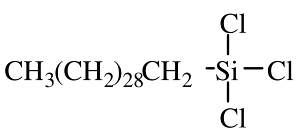
SIT8040.0
p-TOLYLTRICHLOROSILANE — 225.58 — 218-20° — 1.28 — 1.5224^{25}
$C_7H_7Cl_3Si$ — flashpoint: 92°C (197°F)
γc of treated surface: 34 dynes/cm
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents, protic solvents
[701-35-9] TSCA HMIS: 3-2-1-X — 25g/$31.00 — 100g/$101.00



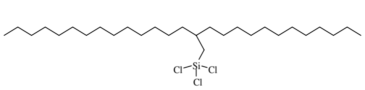
SIT8042.0
p-TOLYLTRIMETHOXYSILANE — 212.32 — 75-8°/8 — 1.033 — 1.4726^{25}
$C_{10}H_{16}O_3Si$ — flashpoint: 94°C (201°C)
γc of treated surface: 34 dynes/cm
charge control surface treatment for electrostatic copier particles[1].
1. H. Yamazaki, Jpn. Kokai, JP 06027719 A2, 1994.
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[17873-01-7] HMIS: 3-1-1-X — 10g/$38.00 — 50g/$152.00



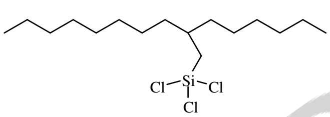
SIT8045.0
TRIACONTYLDIMETHYLCHLOROSILANE, blend — 515.42 — (60-82°)mp
$C_{32}H_{67}ClSi$ — 80% C_{30} and higher, 20% C_{22}-C_{28}
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents, protic solvents
[70851-52-4] TSCA HMIS: 3-1-0-X — 25g/$52.00 — 100g/$169.00



SIT8048.0
TRIACONTYLTRICHLOROSILANE, blend — 556.26 — (60-82°)mp
$C_{30}H_{61}Cl_3Si$ — 80% C_{30} and higher, 20% C_{22}-C_{28}
employed in bonded phases for HPLC of carotenes
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents, protic solvents
[70851-48-8] TSCA HMIS: 3-1-1-X — 25g/$52.00 — 100g/$169.00

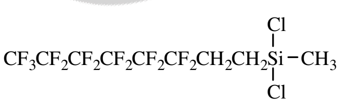


SIT8162.0
13-(TRICHLOROSILYLMETHYL)HEPTACOSANE, 95% — 528.21 — 215°/0.01 — 0.946
2-*DODECYLHEXADECYLTRICHLOROSILANE* — (20-35°)mp
$C_{28}H_{57}Cl_3Si$ contains isomers
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[194242-99-4] TSCA-L HMIS: 3-1-1-X — 10g/$127.00

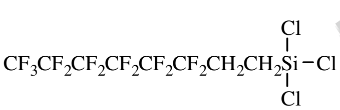


SIT8162.4
7-(TRICHLOROSILYLMETHYL)PENTADECANE — 359.88 — 146-9°/0.2 — 0.985
$C_{16}H_{33}Cl_3Si$ 2-*HEXYLDECYLTRICHLOROSILANE*
HMIS: 3-1-1-X — 10g/$174.00

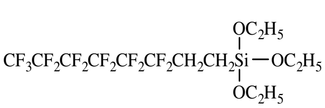
SIT8170.0
(TRIDECAFLUORO-1,1,2,2-TETRAHYDRO-OCTYL)DIMETHYLCHLOROSILANE — 440.70 — 189-91° — 1.473 — 1.3453
flashpoint: 52°C (127°F)
$C_{10}H_{10}ClF_{13}Si$ *PERFLUOROOCTYL-1H,1H,2H,2H-DIMETHYLCHLOROSILANE*
employed in column chromatography where low protein retention is required[1].
employed in solid phase extraction of fluorous phases[2].
modification of layered silicate yields material w/ film forming properties[3].
1. G. Xindu et al, J. Chromatog, *269*, 96, 1983.
2. D. Curran, J. Org. Chem. *62*,6714, 1997.
3. M. Ogawa et al, Chem. Mater., *10*, 3787, 1998.
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[102488-47-1] HMIS: 3-3-1-X — 10g/$31.00 — 50g/$126.00



SIT8172.0
(TRIDECAFLUORO-1,1,2,2-TETRAHYDRO-OCTYL)METHYLDICHLOROSILANE — 461.12 — 189-90° — 1.550^{25} — 1.3500
flashpoint: 51°C (125°F)
$C_9H_7Cl_2F_{13}Si$ — vapor pressure,76°: 12mm
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[73609-36-6] HMIS: 3-3-1-X — 10g/$41.00 — 50g/$164.00



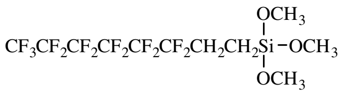
SIT8174.0
(TRIDECAFLUORO-1,1,2,2-TETRAHYDRO-OCTYL)TRICHLOROSILANE — 481.55 — 84-5°/17 — 1.639 — 1.3521
flashpoint: 54°C (129°F)
$C_8H_4Cl_3F_{13}Si$
lowers the coefficient of friction of silicon substrates[1].
1. V. DePalma et al, Langmuir, *5*, 868, 1989.
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[78560-45-9] TSCA-L HMIS: 3-3-1-X — 10g/$28.00 — 50g/$112.00



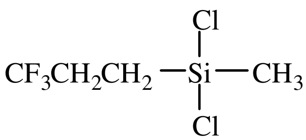
COMMERCIAL

SIT8175.0
(TRIDECAFLUORO-1,1,2,2-TETRAHYDRO-OCTYL)TRIETHOXYSILANE — 510.36 — 86°/1.5 — 1.351 — 1.3436
(<-38°)mp
$C_{14}H_{19}F_{13}O_3Si$ — flashpoint: 84°C (183°F)
viscosity: 3.5 cSt. — ΔHvap: 66.1 kj/mole
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[51851-37-7] TSCA HMIS: 2-2-1-X — 10g/$26.00 — 50g/$104.00

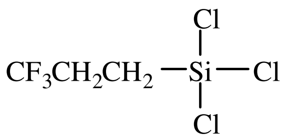
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



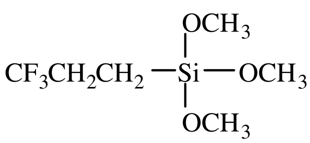
SIT8176.0
(TRIDECAFLUORO-1,1,2,2-TETRAHYDRO-OCTYL)TRIMETHOXYSILANE — 468.29 — 60-2°/0.5 — 1.44 — 1.3322
$C_{11}H_{13}F_{13}O_3Si$
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[85857-16-5] HMIS: 3-1-1-X — 10g/$37.00 — 50g/$148.00



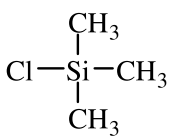
SIT8369.0
(3,3,3-TRIFLUOROPROPYL)METHYL-DICHLOROSILANE — 211.08 — 121-2° — 1.2611 — 1.3850
$C_4H_7Cl_2F_3Si$
TOXICITY- ipr mus: 254mg/kg
flashpoint: 15°C (59°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[675-62-7] TSCA HMIS: 3-4-1-X — 10g/$32.00 — 50g/$128.00



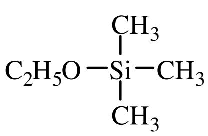
SIT8371.0
(3,3,3-TRIFLUOROPROPYL)TRICHLOROSILANE — 231.50 — 113-4° — 1.395 — 1.385
$C_3H_4Cl_3F_3Si$
flashpoint:15°C (59°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[592-09-6] TSCA HMIS: 3-4-1-X — 10g/$32.00 — 50g/$128.00



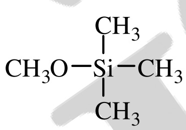
SIT8372.0
(3,3,3-TRIFLUOROPROPYL)TRIMETHOXYSILANE — 218.25 — 144° — 1.137 — 1.3546
$C_6H_{13}F_3O_3Si$
flashpoint: 38°C (100°F)
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
γc of treated surface: 33.5 dynes/cm
[429-60-7] TSCA HMIS: 3-3-1-X — 5.0g/$34.00 — 25g/$136.00



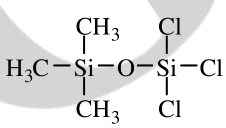
SIT8510.0
TRIMETHYLCHLOROSILANE — 108.64 — 57.6° (-57.7°)mp — 0.8580 — 1.3885
C_3H_9ClSi *TMCS*
TOXICITY- ihl mus, LDLo: 500mg/m³/10M
vapor pressure, 20°: 190mm; 50°: 591 mm
flashpoint: -27°C (-17°F)
ΔHvap: 6.6 kcal/mole
autoignition temperature: 395°
most economical and broadly used silylation reagent
[75-77-4] TSCA HMIS: 3-4-2-X — 25g/$11.00 — 750g/$48.00 — 3kg/$160.00



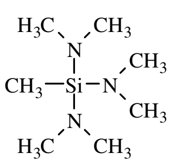
SIT8515.0
TRIMETHYLETHOXYSILANE — 118.25 — 75-6° (-83°)mp — 0.7573 — 1.3742
ETHOXYTRIMETHYLSILANE
$C_5H_{14}OSi$
flashpoint: -27°C (-17°F)
dipole moment: 1.2
vapor pressure, 25°: 111mm
ΔHcomb: 970.4 kcal/mole
ΔHvap: 33.5 kcal/mole
critical temperature: 233°
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[1825-62-3] TSCA HMIS: 2-4-1-X — 25g/$10.00 — 1.5kg/$138.00 — 14kg/$672.00



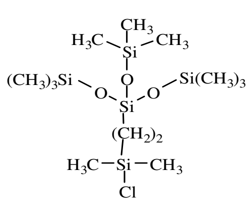
SIT8566.0
TRIMETHYLMETHOXYSILANE — 104.22 — 57-8° — 0.7560 — 1.3678
$C_4H_{12}OSi$
flashpoint: -11°C (12°F)
dipole moment: 1.18 debye
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[1825-61-2] TSCA HMIS: 3-4-1-X — 25g/$19.00 — 100g/$62.00



SIT8572.6
TRIMETHYLSILOXYTRICHLOROSILANE — 223.63 — 128° — 1.126
$C_3H_9Cl_3OSi_2$
flashpoint: 16°C (61°F)
[2750-45-0] HMIS: 3-4-1-X — 25g/$72.00



SIT8712.0
TRIS(DIMETHYLAMINO)METHYLSILANE — 175.35 — 55-6°/17 (-11°)mp — 0.850^{22} — 1.432^{22}
$C_7H_{21}N_3Si$
flashpoint: 30°C (86°F)
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[3768-57-8] TSCA HMIS: 3-3-1-X — 10g/$29.00 — 50g/$116.00



SIT8719.5
[TRIS(TRIMETHYLSILOXY)SILYLETHYL]DIMETHYL-CHLOROSILANE — 417.32 — 85°/0.6 — 0.906 — 1.43175
$C_{13}H_{37}O_3ClSi_5$
forms hydrophobic monolayers
HYDROLYTIC SENSITIVITY: 8 Si-Cl reacts rapidly with water/moisture, protic solvents
HMIS: 3-2-1-X — 10g/$84.00

$CH_3(CH_2)_9CH_2SiCl_3$

SIU9050.0
UNDECYLTRICHLOROSILANE — 289.75 — 155-60°/15 — 1.02
$C_{11}H_{23}Cl_3Si$
flashpoint: 107°C (225°)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18052-07-8] HMIS: 3-1-1-X — 25g/$104.00

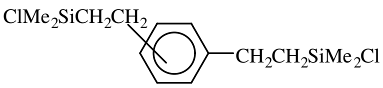
HYDROPHOBIC

COMMERCIAL

Hydrophobic Dipodal Silanes

Dipodal Surface Bonding

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



SIB1030.0
BIS[2-(CHLORODIMETHYLSILYL)-ETHYL]BENZENE mixed isomers — 319.42 — 116-7°/0.2 — 1.02
flashpoint: 187°C (369°F)
$C_{14}H_{24}Cl_2Si_2$
intermediate for silahydrocarbon polymers
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[74129-20-7] TSCA HMIS: 3-1-1-X — 50g/$204.00

$Cl(CH_3)_2SiCH_2CH_2Si(CH_3)_2Cl$

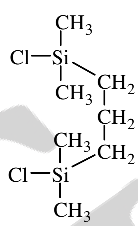
SIB1042.0
1,2-BIS(CHLORODIMETHYLSILYL)ETHANE — 215.27 — 198-9° (36-9°)mp
TETRAMETHYLDICHLORODISILETHYLENE
$C_6H_{16}Cl_2Si_2$ — flashpoint: 40°C (104°F)
reagent for protection of primary amines, including amino acids[1].
1. S. Djuric et al, Tet. Lett., *22*, 1787, 1981
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[13528-93-3] TSCA HMIS: 3-2-1-X — 25g/$21.00 — 100g/$68.00

$Cl(CH_3)_2Si(CH_2)_6Si(CH_3)_2Cl$

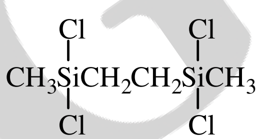
SIB1046.0
1,6-BIS(CHLORODIMETHYLSILYL)HEXANE, 95% — 271.38 — 113-6°/3 — 0.961 — 1.4538
$C_{10}H_{24}Cl_2Si_2$ — flashpoint: 150°C (302°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[14799-66-7] HMIS: 3-1-1-X — 25g/$52.00 — 100g/$169.00

$Cl(CH_3)_2Si(CH_2)_8Si(CH_3)_2Cl$

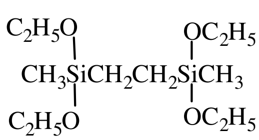
SIB1048.0
1,8-BIS(CHLORODIMETHYLSILYL)OCTANE, 95% — 299.43 — 106-7°/0.4 — 0.946 — 1.4540
$C_{12}H_{28}Cl_2Si_2$ — flashpoint: 180°C (356°F)
intermediate for sila-hydrocarbon polymers
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[5089-28-1] HMIS: 3-1-1-X — 25g/$41.00 — 100g/$134.00



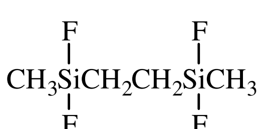
SIB1048.2
1,3-BIS(CHLORODIMETHYLSILYL)PROPANE — 229.30 — 94°/19 — 1.0244 — 1.4647
$C_7H_{18}Cl_2Si_2$
forms cyclic derivatives of polyalkyleneoxides suitable for anionic copolymerization[1].
1. T. Zundel et al, Macromol, 31, 2724, 1998
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[2295-06-9] HMIS: 3-2-1-X — 5.0g/$102.00



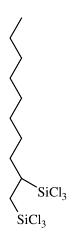
SIB1614.0
BIS(METHYLDICHLOROSILYL)ETHANE — 256.11 — 208-210° (31-3°)mp — 1.2628 — 1.4760
1,4-DIMETHYL-1,1,4,4-TETRACHLORO-1,4-DISILABUTANE
$C_4H_{10}Cl_4Si_2$ — flashpoint: 94°C (201°F)
dipodal coupling agent
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[3353-69-3] TSCA HMIS: 3-2-1-X — 25g/$31.00 — 100g/$100.00



SIB1615.0
BIS(METHYLDIETHOXYSILYL)ETHANE — 294.54 — 80°/1.5 — 0.92 — 1.4170
$C_{12}H_{30}O_4Si2$
[18043-74-8] HMIS: 2-2-1-X — 25g/$62.00

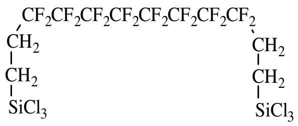


SIB1630.0
BIS(METHYLDIFLUOROSILYL)ETHANE — 190.29 — 114° — 1.118
$C_4H_{10}F_4Si_2$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
HMIS: 3-3-1-X — 10g/$69.00

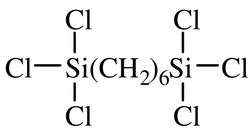


SIB1808.0
1,2-BIS(TRICHLOROSILYL)DECANE — 409.16 — 114°/1 — 1.2496 — 1.4754
$C_{10}H_{20}Cl_6Si_2$
[62987-03-3] HMIS: 3-2-1-X — 25g/$85.00

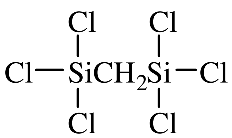
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



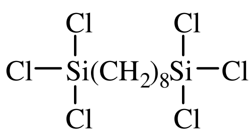
SIB1811.5
1,8-BIS(TRICHLOROSILYLETHYL)HEXADECAFLUOROOCTANE — MW 725.06 — bp/mm 142-4°/0.6 (69-70°)mp
$C_{12}H_8Cl_6F_{16}Si_2$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[445303-83-3] HMIS: 3-1-1-X — 5.0g/$170.00



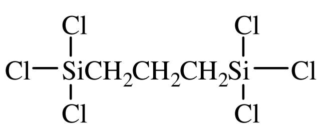
SIB1812.0
BIS(TRICHLOROSILYL)HEXANE — MW 353.05 — bp/mm 148-50°/10 — D_4^{20} 1.327 — n_D^{20} 1.4759
$C_6H_{12}Cl_6Si_2$ — flashpoint: 75°C (167°F)
forms mesoporous sol-gel structures
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[13083-94-8] TSCA HMIS: 3-2-1-X — 10g/$41.00 — 50g/$164.00



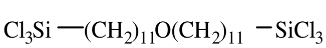
SIB1813.0
BIS(TRICHLOROSILYL)METHANE — MW 282.9 — bp/mm 183° — D_4^{20} 1.5567 — n_D^{20} 1.4740
$CH_2Cl_6Si_2$
nucleus for star polymers and dendrimers
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[4142-85-2] HMIS: 3-2-1-X — 5.0g/$80.00



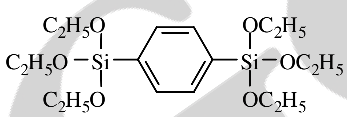
SIB1814.0
BIS(TRICHLOROSILYL)OCTANE — MW 381.10 — bp/mm 140°/1 — D_4^{20} 1.22 — n_D^{20} 1.4757
$C_8H_{16}Cl_6Si_2$ — flashpoint: 115°C (240°F)
forms mesoporous sol-gel structures
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[52217-53-5] HMIS: 3-1-1-X — 25g/$36.00 — 100g/$116.00



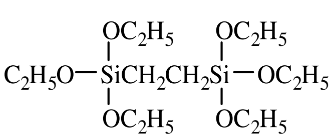
SIB1815.0
1,3-BIS(TRICHLOROSILYL)PROPANE — MW 310.97 — bp/mm 115-7°/4 (29-30°)mp — D_4^{20} 1.4394 — n_D^{20} 1.4732
$C_3H_6Cl_6Si_2$
forms mesoporous sol-gel structures
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[18171-50-1] HMIS: 3-2-1-X — 10g/$85.00



SIB1815.4
BIS(TRICHLOROSILYLUNDECYL)ETHER — MW 593.48
$C_{22}H_{44}Cl_6OSi_2$
HMIS: 3-1-1-X — 5.0g/$242.00

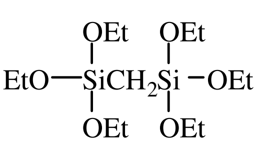


SIB1816.6
1,4-BIS(TRIETHOXYSILYL)BENZENE — MW 402.64 — bp/mm 130-2°/0.4 — D_4^{20} 1.015 — n_D^{20} 1.4549
$C_{18}H_{34}O_6Si_2$
forms thermally stable hybrid silica fibers[1].
1. Y. Yang et al, Chem. Mater., *18*, 1324, 2006
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[52217-60-4] HMIS: 2-2-1-X — 5.0g/$60.00



SIB1817.0
BIS(TRIETHOXYSILYL)ETHANE — MW 354.59 — bp/mm 96°/0.3 — D_4^{20} 0.957 — n_D^{20} 1.4052
HEXAETHOXYDISILETHYLENE — flashpoint: 107°C (225°F)
$C_{14}H_{34}O_6Si_2$ — vapor pressure, 150°: 10mm
ΔHvap: 101.5 kj/mole — TOXICITY - oral rat, LD50: 161mg/kg
additive to silane coupling agent 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].
forms mesoporous, derivatizeable molecular sieves[4].
1. W. Van Ooij et al, J. Adhes. Sci. Tech. *11*, 29, 1997.
2. W. Van Ooij et al, Chemtech., *28*, 26, 1998.
3. D. A. Loy et al, J. Am. Chem. Soc., *121*, 5413, 1999.
4. B. Molde et al, Chem. Mat., *11*, 3302, 1999.
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[16068-37-4] TSCA-S HMIS: 3-1-1-X — 25g/$15.00 — 100g/$49.00 — 2.0kg/$420.00

COMMERCIAL

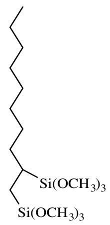


SIB1821.0
BIS(TRIETHOXYSILYL)METHANE — MW 340.56 — bp/mm 114-5°/3.5 — D_4^{20} 0.9741 — n_D^{20} 1.4098
4,4,6,6-TETRAETHOXY-3,7-DIOXA-4,6-DISILANONANE
$C_{13}H_{32}O_6Si_2$
intermediate for sol-gel coatings, hybrid inorganic-organic polymers
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[18418-72-9] HMIS: 2-3-0-X — 5.0g/$24.00 — 25g/$96.00

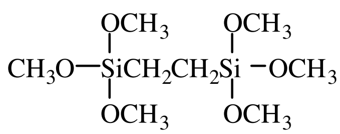
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}

$(C_2H_5O)_3Si(CH_2)_8Si(OC_2H_5)_3$

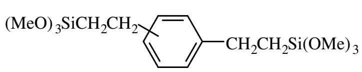
SIB1824.0
BIS(TRIETHOXYSILYL)OCTANE — 438.76 — 172-5°/0.75 — 0.926 — 1.4240
$C_{20}H_{46}O_6Si_2$
employed in sol-gel synthesis of mesoporous structures
sol-gels of α, ω-bis(trimethoxysilyl)alkanes reported[1].
1. D. A. Loy et al, J. Am. Chem. Soc., 121, 5413, 1999.
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[52217-60-4] TSCA-L HMIS: 2-1-1-X — 25g/$30.00 — 100g/$98.00



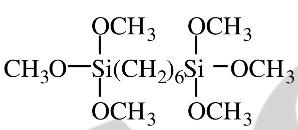
SIB1829.0
1,2-BIS(TRIMETHOXYSILYL)DECANE — 382.65 — 130-2°/0.4 — 0.984 — 1.4303
$C_{16}H_{38}O_6Si_2$
pendant dipodal silane; employed in high pH HPLC
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
HMIS: 3-2-1-X — 25g/$51.00 — 100g/$165.00



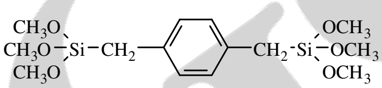
SIB1830.0
BIS(TRIMETHOXYSILYL)ETHANE — 270.43 — 103-4°/5 — 1.068 — 1.4091
$C_8H_{22}O_6Si_2$ — flashpoint: 65° (149°F)
CAUTION: INHALATION HAZARD — vapor pressure, 20°: 0.08mm
employed in fabrication of multilayer printed circuit boards
1. J. Palladino, U.S. Pat. 5,073,456, 1991.
see also SIB1817.0
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[18406-41-2] TSCA HMIS: 4-2-1-X — 25g/$64.00 — 100g/$208.00



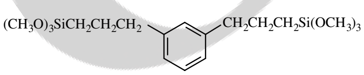
SIB1831.0
BIS(TRIMETHOXYSILYLETHYL)BENZENE — 374.58 — 148-50°/.1 — 1.08 — 1.4734
$C_{16}H_{30}O_6Si_2$ mixed isomers — flashpoint: 193°C (380°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[58298-01-4] TSCA HMIS: 2-1-0-X — 10g/$33.00 — 50g/$132.00



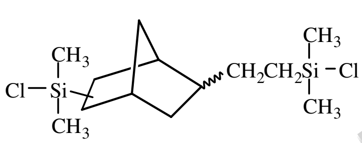
SIB1832.0
1,6-BIS(TRIMETHOXYSILYL)HEXANE — 326.54 — 161°/2 — 1.014 — 1.4213
$C_{12}H_{30}O_6Si_2$ — flashpoint: 95°C (203°F)
sol-gels of α, ω-bis(trimethoxysilyl)alkanes reported[1].
1. D. A. Loy et al, J. Am. Chem. Soc., *121*, 5413, 1999.
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[87135-01-1] HMIS: 3-2-1-X — 10g/$38.00 — 50g/$152.00



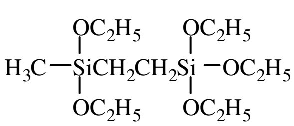
SIB1832.2
p-BIS(TRIMETHOXYSILYLMETHYL)BENZENE — 346.53 — 124-5°/0.05 — 1.097 — 1.470^{25}
$C_{14}H_{26}O_6Si_2$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[193358-40-6] HMIS: 3-1-1-X — 10g/$180.00



SIB1833.4
BIS-1,3-(TRIMETHOXYSILYLPROPYL)-BENZENE — 402.64
$C_{18}H_{34}O_6Si_2$
HMIS: 3-2-1-X — 5.0g/$145.00



SIC2265.5
(CHLORODIMETHYLSILYL)-6-[2-(CHLORODI-METHYLSILYL)ETHYL]BICYCLOHEPTANE — 309.43 — 1.03 — 1.4863
mixture of 1 and 2 regio isomers, exo and endo
$C_{13}H_{26}Cl_2Si_2$
forms polymers
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
HMIS: 3-2-1-X — 25g/$48.00



COMMERCIAL

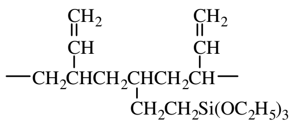
SIT8185.8
1-(TRIETHOXYSILYL)-2-(DIETHOXYMETHYL-SILYL)ETHANE — 324.56 — 100°/0.5 — 0.946 — 1.4112
$C_{13}H_{32}O_5Si$ — flashpoint:102°C (215°F)
dipodal silane; forms abrasion-resistant sol-gel coatings
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[18418-54-7] TSCA HMIS: 3-2-1-X — 25g/$40.00 — 100g/$130.00 — 2kg/$840.00

Polymeric Hydrophobic Silanes

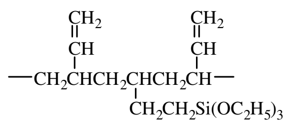
Polymeric Surface Bonding

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}

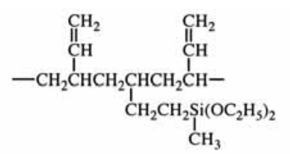
Polybutadiene



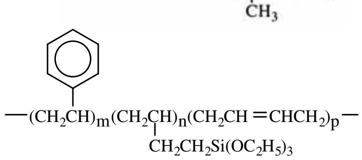
SSP-055
TRIETHOXYSILYL MODIFIED POLY-1,2-BUTADIENE, 50% in toluene — MW 3500-4500 — D_4^{20} 0.90
viscosity: 100-200 cSt.
coupling agent for EPDM resins
[72905-90-9] TSCA HMIS: 2-4-1-X store <5° — 100g/$60.00 — 2.0kg/$780.00



SSP-056
TRIETHOXYSILYL MODIFIED POLY-1,2-BUTADIENE, 50% in volatile silicone — MW 3500-4500 — D_4^{20} 0.93
viscosity: 100-200 cSt.
primer coating for silicone rubbers
[72905-90-9] TSCA HMIS: 2-3-1-X store <5° — 100g/$68.00



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/$86.00



SSP-255
(30-35%TRIETHOXYSILYLETHYL)ETHYLENE-(35-40% 1,4-BUTADIENE) - (25-30% STYRENE) terpolymer, 50% in toluene — MW 4500-5500
HMIS: 2-3-1-X viscosity: 20-30 cSt. — 100g/$86.00

Reactive Polydimethylsiloxane Oligomers

Chlorine Terminated PolyDimethylsiloxanes

CAS: [67923-13-1] TSCA

Code	Viscosity	Molecular Weight	Specific Gravity	Price/100g	Price/1kg
DMS-K05	3 - 6	425-600	1.00	$55.00	$358.00
DMS-K13	20-50	2000-4000	0.99	$120.00	
DMS-K26	500-800	15,000-20,000	0.99	$94.00	

Dimethylamino Terminated PolyDimethylsiloxanes

CAS: [67762-92-9] TSCA

Code	Viscosity	Molecular Weight	Specific Gravity	Price/100g
DMS-N05	3 - 8	450-600	0.93	$160.00

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	$32.00	$210.00

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	$29.00	$188.00

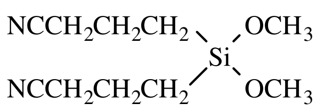
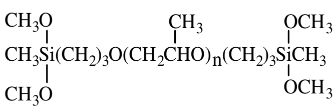
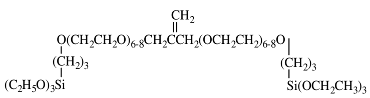
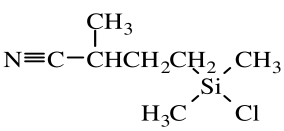
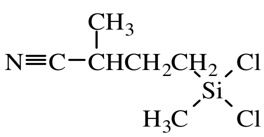
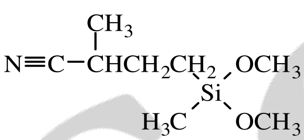
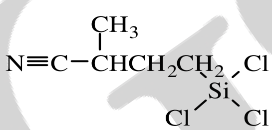
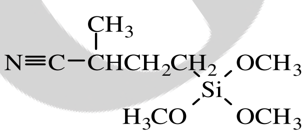
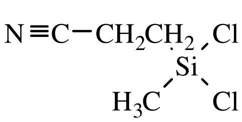
Silanol Terminated PolyDimethylsiloxanes

CAS: [70131-67-8] TSCA

Code	Viscosity	Molecular Weight	% (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	$19.00	$124.00	$496.00
DMS-S14	35-45	700-1500	3.0-4.0	1.7-2.3	0.96	1.402	$18.00	$117.00	$460.00
DMS-S15	45-85	2000-3500	0.9-1.2	0.53-0.70	0.96	1.402	$18.00	$117.00	$460.00

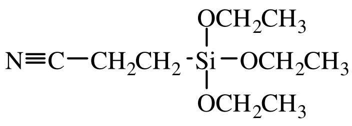
Hydrophilic Silane Properties

Polar - Non-hydrogen Bonding

	name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
	SIB1057.5 BIS(3-CYANOPROPYL)DIMETHOXYSILANE $C_{10}H_{18}N_2O_2Si$ highly polar monomer for silicones HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture [92779-73-2] HMIS: 3-2-1-X	226.35	180-2°/1 5.0g/$112.00	0.985	
 COMMERCIAL	SIB1660.0 BIS[(3-METHYLDIMETHOXYSILYL)PROPYL]-POLYPROPYLENE OXIDE viscosity: 6000-10,000 cSt. w/tin catalyst forms moisture-crosslinkable resins hydrophilic dipodal silane HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture [75009-88-0] TSCA HMIS: 3-1-1-X	600-800 flashpoint: >110°C (>230°F) 100g/$24.00		1.00 2.0kg/$288.00	1.452^{25}
	SIB1824.9 1,3-[BIS(3-TRIETHOXYSILYLPROPYL)POLY-ETHYLENOXY]-2-METHYLENEPROPANE $C_{50}H_{104}O_{20}Si_2$ (average) vinyl functional hydrophilic dipodal coupling agent for protein immobilization HMIS: 2-2-1-X	1113.5	 1.0g/$292.00		
	SIC2436.0 (3-CYANOBUTYL)DIMETHYLCHLOROSILANE $C_7H_{14}ClNSi$ HMIS: 3-2-1-X	175.73 25g/$40.00	80-4°/1	0.993 100g/$130.00	
	SIC2437.0 (3-CYANOBUTYL)METHYLDICHLOROSILANE *4-(DICHLOROMETHYLSILYL)-2-METHYLBUTYRONITRILE* $C_6H_{11}Cl_2NSi$ [71550-62-4] TSCA HMIS: 3-2-1-X	196.17 25g/$40.00	63°/0.3	1.104 100g/$130.00	
	SIC2437.5 (3-CYANOBUTYL)METHYLDIMETHOXY-SILANE $C_8H_{17}NO_2Si$ [793681-94-4] TSCA HMIS: 3-2-1-X	187.32 flashpoint: 93°C (199°F)	77°/1.5 25g/$88.00	0.947	1.4213^{25}
	SIC2438.0 (3-CYANOBUTYL)TRICHLOROSILANE $C_5H_8Cl_3NSi$ [163155-56-4] HMIS: 3-2-1-X	216.57 25g/$39.00	61-3°/0.2	1.220 100g/$127.00	1.4690^{25}
	SIC2439.0 3-CYANOBUTYLTRIETHOXYSILANE $C_{11}H_{23}NO_3Si$ HMIS: 2-2-1-X	245.39	 25g/$62.00		
	SIC2440.0 2-CYANOETHYLMETHYLDICHLOROSILANE $C_4H_7Cl_2NSi$ monomer for polar silicones used in GC phases HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents [1070-18-4] TSCA HMIS: 3-2-1-0	168.10 flashpoint: 60°C (140°F)	60-2°/4 25g/$123.00	1.2015	1.4550^{25}
	SIC2442.0 2-CYANOETHYLTRICHLOROSILANE $C_3H_4Cl_3NSi$ ΔHvap: 11.2 kcal/mole vapor pressure, 85°: 12mm HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents [10731-22-3] TSCA HMIS: 3-2-1-0-X	188.52 TOXICITY- oral rat, LD50: 2000mg/kg 10g/$27.00	84-6°/10 (32-3°)mp	1.356 50g/$108.00	1.4615

PLEASE INQUIRE ABOUT BULK QUANTITIES

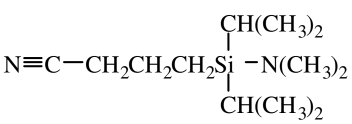
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



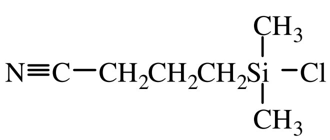
SIC2445.0
2-CYANOETHYLTRIETHOXYSILANE | 217.34 | 224-5° | 0.9792 | 1.4140
$C_9H_{19}NO_3Si$ | TOXICITY- oral rat, LD50: 5630mg/kg
flashpoint: 86°C (186°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[919-31-3] TSCA HMIS: 2-2-0-X | 25g/$15.00 | 100/$49.00 | 2kg/$360.00

$N{\equiv}C-CH_2CH_2Si(OCH_3)_3$

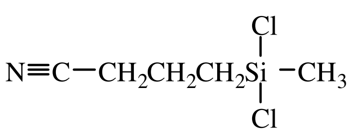
SIC2446.0
2-CYANOETHYLTRIMETHOXYSILANE | 175.26 | 112°/15 | 1.079 | 1.4126
$C_6H_{13}NO_3Si$ | flashpoint: 79°C (174°F)
γc of treated surface: 34 dynes/cm
crosslinker for moisture-cure silicone RTVs
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[2526-62-7] TSCA HMIS: 3-2-1-X | 25g/$42.00 | 100g/$138.00



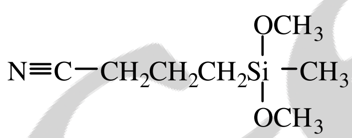
SIC2451.0
3-CYANOPROPYLDIISOPROPYLDIMETHYL-AMINOSILANE | 226.44 | 96-8°/0.2 | 0.89
4-[DIMETHYLAMINOBIS(1-METHYLETHYL)SILYL]BUTANENITRILE
$C_{12}H_{26}N_2Si$
stable cyanofunctional bonded phase
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[163794-91-0] TSCA HMIS: 3-2-1-X | 10g/$127.00



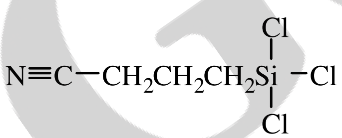
SIC2452.0
3-CYANOPROPYLDIMETHYLCHLOROSILANE | 161.71 | 108-9°/15 | 0.986 | 1.4460
4-(CHLORODIMETHYLSILYL)BUTYRONITRILE | flashpoint: 85°C (185°F)
$C_6H_{12}ClNSi$
coupling agent for antibodies[1].
1. S. Falipou et al, Bioconjugate Chem., Am. Chem. Soc., 1989
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[18156-15-5] TSCA HMIS: 3-2-1-X | 25g/$36.00 | 100g/$117.00



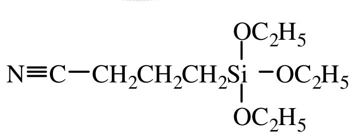
SIC2453.0
3-CYANOPROPYLMETHYLDICHLOROSILANE | 182.12 | 79-82°/1 | 1.145^{25} | 1.4551^{25}
$C_5H_9Cl_2NSi$ | TOXICITY- oral, rat, LD50: 2830mg/kg
see also SIC2448.0 | flashpoint: 92°C (198°F)
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[1190-16-5] TSCA HMIS: 3-2-1-X | 25g/$39.00 | 100g/$127.00



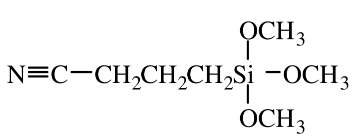
SIC2453.5
3-CYANOPROPYLMETHYLDIMETHOXYSILANE | 173.29 | 82-3°/3 | 0.9970 | 1.4235
$C_7H_{15}NO_2Si$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
HMIS: 3-2-1-X | 5.0g/$29.00 | 25g/$114.00



SIC2454.0
3-CYANOPROPYLTRICHLOROSILANE | 202.54 | 93-4°/8 | 1.302 | 1.465
$C_4H_6Cl_3NSi$ | flashpoint: 75°C (167°F)
see also SIC2449.0
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[1071-22-3] TSCA HMIS: 3-2-1-X | 25g/$24.00 | 100g/$78.00



SIC2455.0
3-CYANOPROPYLTRIETHOXYSILANE | 231.37 | 79-80°/0.6 | 0.961 | 1.4174
$C_{10}H_{21}NO_3Si$ | TOXICITY- oral rat, LD50: 2460mg/kg
viscosity: 2.3 cSt | flashpoint: 74°C (165°F)
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[1067-47-6] TSCA HMIS: 3-2-1-X | 25g/$32.00 | 100g/$104.00



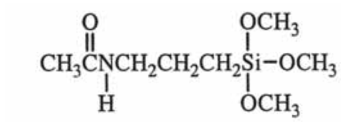
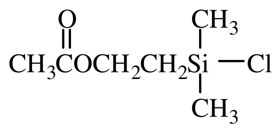
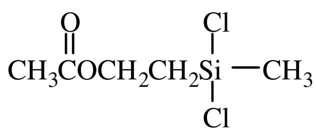
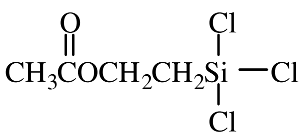
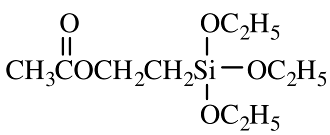
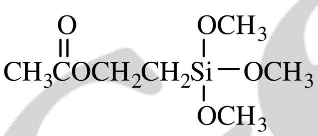
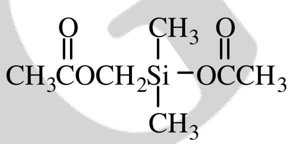
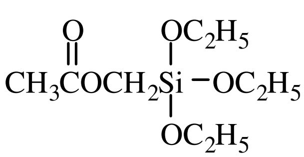
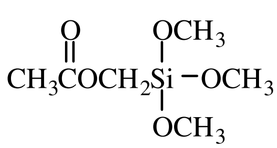
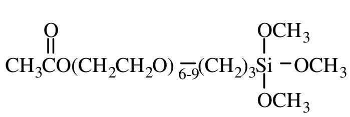
SIC2456.0
3-CYANOPROPYLTRIMETHOXYSILANE | 189.29 | 90-2°/7 | 1.026^{25} | 1.4167
$C_7H_{15}NO_3Si$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[55453-24-2] TSCA-L HMIS: 3-2-1-X | 10g/$30.00 | 50g/$140.00

$NC(CH_2)_{11}SiCl_3$

SIC2456.3
11-CYANOUNDECYLTRICHLOROSILANE | 314.76 | 162-4°/1 | 1.075
$C_{12}H_{22}Cl_3NSi$
long-chain organofunctional silane
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[724460-16-6] HMIS: 3-2-1-X | 5.0g/$155.00

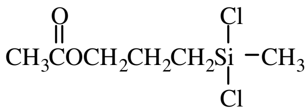
Hydrophilic Silane Properties

Polar - Hydrogen Bonding

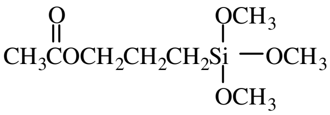
structure	name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
	SIA0006.0 ACETAMIDOPROPYLTRIMETHOXYSILANE $C_8H_{19}NO_4Si$ [57757-66-1] HMIS: 3-2-1-X	221.33	162-5°/2-3 10g/$120.00		1.4410
	SIA0010.0 ACETOXYETHYLDIMETHYLCHLOROSILANE $C_6H_{13}ClO_2Si$ HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [18306-45-1] HMIS: 3-2-1-X	180.71 flashpoint: 63°C (145°F)	108-9°/50 25g/$61.00	1.031^{25}	1.4301^{25}
	SIA0015.0 ACETOXYETHYLMETHYLDICHLOROSILANE $C_5H_{10}Cl_2O_2Si$ HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [18163-34-3] TSCA HMIS: 3-2-1-X	201.12 flashpoint: 65°C (149°F)	117°/62 25g/$55.00	1.177^{25}	1.4390^{25}
	SIA0020.0 ACETOXYETHYLTRICHLOROSILANE $C_4H_7Cl_3O_2Si$ HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents [18204-80-3] TSCA HMIS: 3-2-1-X	221.54 flashpoint: 82°C (180°F) 25g/$51.00	143°/70	1.272^{25} 100g/$166.00	1.4427^{25}
	SIA0025.0 ACETOXYETHYLTRIETHOXYSILANE $C_{10}H_{22}O_5Si$ >280° rearranges to acetoxytriethoxysilane w/ extrusion of ethylene[1]. 1. K. Ezbiansky et al, in “Chemical Process. of Dielectrics, Insulators & Electronic Ceramics MRS Proc. 2000. HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture [22538-45-0] HMIS: 2-2-1-X	250.35	60°/0.2 25g/$49.00	0.983	1.410
	SIA0030.0 ACETOXYETHYLTRIMETHOXYSILANE, 95% $C_7H_{16}O_5Si$ HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture [72878-29-6] HMIS: 3-3-1-X	208.29	108-9°/27 25g/$48.00	1.061	
	SIA0040.0 ACETOXYMETHYLDIMETHYLACETOXY- SILANE $C_7H_{14}O_4Si$ HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture [5833-57-8] HMIS:3-2-1-X	190.27 flashpoint: 63°C (145°F)	66-9°/7 25g/$72.00	1.0420	1.4388
	SIA0050.0 ACETOXYMETHYLTRIETHOXYSILANE $C_9H_{20}O_5Si$ hydrolyzes to form stable silanol solutions in neutral water HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture [5630-83-1] HMIS: 2-2-1-X	236.34 25g/$58.00	106°/15	1.042^{25} 100g/$190.00	1.4092
	SIA0055.0 ACETOXYMETHYLTRIMETHOXYSILANE, 95% $C_6H_{14}O_5Si$ HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture [65625-39-0] TSCA-L HMIS: 3-3-1-X	194.26 flashpoint: 56°C (133°F) 10g/$45.00	190-1°	1.085 50g/$180.00	
	SIA0078.0 2-[ACETOXY(POLYETHYLENEOXY)- PROPYL]TRIETHOXYSILANE 95% HMIS: 2-1-1-X	500-700	25g/$78.00	1.04	

PLEASE INQUIRE ABOUT BULK QUANTITIES

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



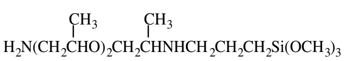
SIA0090.0
ACETOXYPROPYLMETHYLDICHLOROSILANE — 215.15 — 142°/73 — 1.151^{25} — 1.4434^{25}
flashpoint: 85°C (185°F)
$C_6H_{12}Cl_2O_2Si$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[5290-24-4] TSCA HMIS: 3-2-1-X — 25g/$58.00



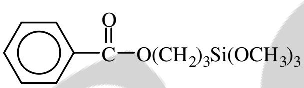
SIA0100.0
ACETOXYPROPYLTRIMETHOXYSILANE — 222.31 — 92°/2 — 1.062 — 1.4146
flashpoint: 93°C (200°F)
$C_8H_{18}O_5Si$
γc of treated surface: 37.5 dynes/cm
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[59004-18-1] HMIS: 3-1-1-X — 25g/$19.00 — 100g/$62.00

SIA0114.0
11-ACETOXYUNDECYLTRICHLOROSILANE — 347.78 — 147-9°/1 — 1.084
flashpoint: >110°C (>230°F)
$C_{13}H_{25}Cl_3O_2Si$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
HMIS: 3-1-1-X — 10g/$85.00

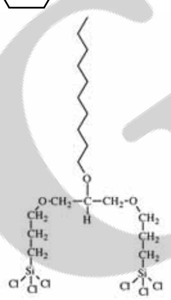
SIA0120.0
(N-ACETYLGLYCYL)-3-AMINOPROPYLTRIMETHOXYSILANE — 293.37
$C_{10}H_{21}N_2O_6Si$
amino acid-tipped silane
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
HMIS: 3-2-1-X — 5.0g/$152.00



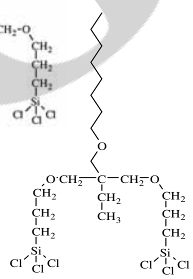
SIA0599.4
N-3-[(AMINO(POLYPROPYLENOXY)]AMINOPROPYLTRIMETHOXYSILANE 60-65% — 337-435 — 0.984 — 1.4508
3-4 propyleneoxy units
contains 30-35% amine terminated polypropylene oxide
coupling agent with film-forming capability
HMIS: 2-2-1-X — 25g/$76.00



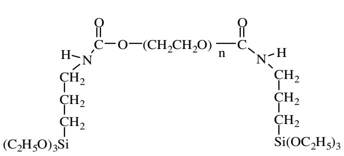
SIB0959.0
BENZOYLOXYPROPYLTRIMETHOXYSILANE — 284.38 — 145°/0.2 — 1.104 — 1.4806
$C_{13}H_{20}O_5Si$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[76241-02-6] TSCA-L HMIS: 3-2-1-X — 25g/$68.00



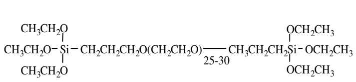
SIB1815.1
1,3-BIS(3-TRICHLOROSILYLPROPOXY)-2-DECYLOXYPROPANE — 583.40 — 190-200°/0.4 — 1.158
$C_{19}H_{38}O_3Cl_6Si_2$
dipodal C_{18} analog w/buried hydrophilicity
HMIS: 3-1-1-X — 10g/$124.00



SIB1815.3
3,3-BIS(TRICHLOROSILYLPROPOXYMETHYL)-5-OXA-TRIDECANE — 597.42 — 220-2°/0.9 — 1.13
$C_{20}H_{40}O_3Cl_6Si_2$
dipodal hydrophobic surface treatment with buried hydrophilicity for chromatography
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
HMIS: 3-1-1-X — 10g/$84.00

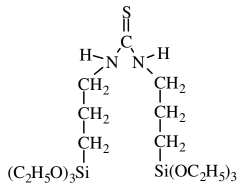


SIB1824.82
BIS[N,N'-(TRIETHOXYSILYLPROPYL)AMINOCARBONYL]POLYETHYLENE OXIDE (10-15 EO) — 1000-1200 — 1.085
dipodal hydrophilic silane
[178884-91-8] TSCA HMIS: 1-1-1-X — 25g/$60.00

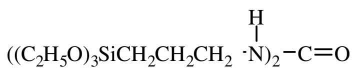


SIB1824.84
BIS(TRIETHOXYSILYLPROPYL)POLYETHYLENE OXIDE (25-30 EO) — 1400-1600
HMIS: 2-1-1-X — 25g/$104.00

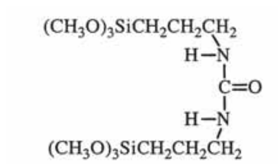
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



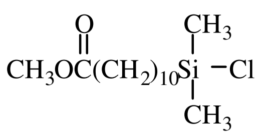
SIB1827.0
BIS[3-(TRIETHOXYSILYL)PROPYL]THIO-UREA tech -90 — 484.40
$C_{19}H_{44}N_2O_6SSi_2$
forms films on electrodes for determination of mercury[1].
1. Y. Guo et al, J. Pharm. Biol. Anal., *19*, 175, 1999
[69952-89-2] HMIS: 2-1-1-X — 25g/$134.00



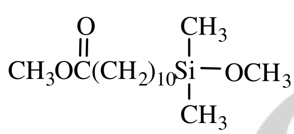
SIB1828.0
BIS[3-(TRIETHOXYSILYL)PROPYL]UREA, 60% in ethanol — 468.73 — D_4^{20}: 0.923
flashpoint: 24°C (75°F)
$C_{19}H_{44}N_2O_7Si_2$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[69465-84-5] HMIS: 2-1-1-X — 25g/$34.00 — 100g/$110.00



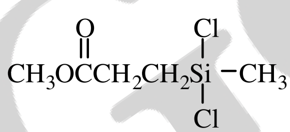
SIB1835.5
BIS(TRIMETHOXYSILYLPROPYL)UREA, 95% — 384.58 — D_4^{20}: 1.102
$C_{13}H_{32}N_2O7Si_2$ *amber liquid*
flashpoint: >110°C (>230°F)
viscosity: 100-250 cSt.
[18418-53-6] TSCA HMIS: 3-2-1-X — 25g/$20.00 — 100g/$65.00



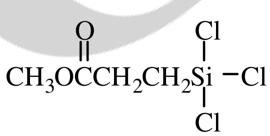
SIC2065.0
10-(CARBOMETHOXY)DECYLDIMETHYL-CHLOROSILANE — 292.92 — 133°/0.3 — 0.950 — 1.4483^{25}
flashpoint: 105°C (221°F)
$C_{14}H_{29}ClO_2Si$
long-chain organofunctional silane
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[53749-38-5] HMIS: 3-1-1-X — 10g/$42.00 — 50g/$168.00



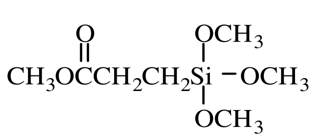
SIC2067.0
10-(CARBOMETHOXY)DECYLDIMETHYL-METHOXYSILANE — 288.50 — 130°/0.3 — 0.903 — 1.4394
$C_{15}H_{32}O_3Si$
long-chain organofunctional silane
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
HMIS: 2-1-1-X — 10g/$51.00 — 50g/$204.00



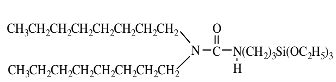
SIC2068.0
2-(CARBOMETHOXY)ETHYLMETHYL-DICHLOROSILANE, 95% — 201.12 — 98-9°/25 — 1.187^{25} — 1.4439^{25}
flashpoint: 52°C (126°F)
$C_5H_{10}Cl_2O_2Si$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[18163-42-3] TSCA HMIS: 3-2-1-X — 25g/$80.00



SIC2070.0
2-(CARBOMETHOXY)ETHYLTRICHLORO-SILANE, 95% — 221.54 — 90-2°/25 — 1.325 — 1.448
contains ~ 20% 1-(carbomethoxy)ethyltrichlorosilane isomer
METHYL(3-TRICHLOROSILYLPROPIONATE)
flashpoint: > 43°C (>110°F)
$C_4H_7Cl_3O_2Si$
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[18147-81-4] TSCA HMIS: 3-3-1-X — 25g/$36.00 — 100g/$117.00



SIC2072.0
2-(CARBOMETHOXY)ETHYLTRIMETHOXY-SILANE, 95% — 208.29 — 1.069 — 1.410
contains ~ 20% 1-(carbomethoxy)ethyltrimethoxysilane isomer
METHYL(3-TRIMETHOXYSILYLPROPIONATE)
flashpoint: > 43°C (>110°F)
$C_7H_{16}O_5Si$
[76301-00-3] HMIS: 3-3-1-X — 10g/$88.00



SID4465.0
N,N-DIOCTYL-N'-TRIETHOXYSILYLPROPYLUREA — 488.83 — 0.924^{25} — 1.4521^{25}
$C_{26}H_{56}N_2O_4Si$
forms hydrophobic phases with embedded hydrophilicity
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[259727-10-1] HMIS: 2-2-1-X — 25g/$82.00

PLEASE INQUIRE ABOUT BULK QUANTITIES

structure	name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}

$CH_3OCH_2CH_2O(CH_2)_{11}SiCl_3$

SIM6491.5
METHOXYETHOXYUNDECYLTRICHLOROSILANE — MW 363.83 — bp 145-9°/1.25 — D_4^{20} 1.07
$C_{14}H_{29}Cl_3O_2Si$
forms self-assembled monolayers with "hydrophilic tips"
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
HMIS: 3-2-1-X — 5.0g/$76.00

$CH_3O-(CH_2CH_2O)_{6\text{-}9}-(CH_2)_3SiCl_3$

SIM6492.66
2-[METHOXY(POLYETHYLENEOXY)PROPYL]-TRICHLOROSILANE, 90% — MW 472-604 — D_4^{20} 1.13
$CH_3O(C_2H_4O)_{6\text{-}9}C_3H_6Cl_3Si$
forms hydrophilic surfaces
provides protein antifouling surface[1].
1. F. Cecchet et al., Langmuir, *22*, 1173, 2006
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture
[36493-41-1] HMIS: 3-2-1-X — 10g/$76.00

$CH_3O-(CH_2CH_2O)_{6\text{-}9}-(CH_2)_3Si(OCH_3)_3$

SIM6492.7
2-[METHOXY(POLYETHYLENEOXY)PROPYL]-TRIMETHOXYSILANE, 90% — MW 460-590 — (-8°)mp — D_4^{20} 1.076 — n_D^{20} 1.403
flashpoint: 88°C (190°F)
viscosity: 29 cSt
$CH_3(OC_2H_4)_{6\text{-}9}(CH_2)_3OSi(OCH_3)_3$
reduces non-specific binding of proteins
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[65994-07-2] TSCA HMIS: 2-2-1-X — 25g/$76.00 — 100g/$247.00

$CH_3O-(CH_2CH_2O)_{9\text{-}12}-(CH_2)_3Si(OCH_3)_3$

SIM6492.72
2-[METHOXY(POLYETHYLENEOXY)PROPYL]-TRIMETHOXYSILANE, 90% — MW 596-725 — D_4^{20} 1.09
flashpoint: 88°C(190°F)
$CH_3(OC_2H_4)_{9\text{-}12}(CH_2)_3Si(OCH_3)_3$
[65994-07-2] TSCA HMIS: 2-2-1-X — 25g/$76.00 — 100g/$247.00

$CH_3OCH_2CH_2CH_2Si(OCH_3)_3$

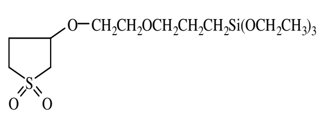
SIM6493.0
3-METHOXYPROPYLTRIMETHOXYSILANE — MW 194.30 — bp 98-9°/40 — D_4^{20} 0.995
flashpoint: 53°C (127°F)
$C_7H_{18}O_4Si$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[33580-59-5] HMIS: 3-2-1-X — 25g/$34.00 — 100g/$110.00

$CH_3O-(CH_2CH_2O)_3-(CH_2)_3SiCl_3$

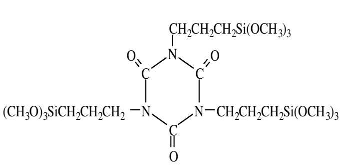
SIM6493.2
METHOXYTRIETHYLENOXYPROPYLTRICHLOROSILANE — MW 339.71 — bp 140°/0.2 — D_4^{20} 1.163
$C_{10}H_{21}Cl_3O_4Si$
[228700-87-6] HMIS: 3-2-1-X — 10g/$122.00

$CH_3O-(CH_2CH_2O)_3-(CH_2)_3Si(OCH_3)_3$

SIM6493.4
METHOXYTRIETHYLENOXYPROPYLTRIMETHOXYSILANE — MW 326.46 — bp 148°/0.3 — D_4^{20} 1.034
$C_{13}H_{30}O_7Si$
forms polymeric proton-conducting electrolytes[1].
1. J. Ritchie et al, Chem. Mater., *18*, 504, 2006
[132388-45-5] HMIS: 3-2-1-X — 10g/$128.00



SIT8186.0
(2-TRIETHOXYSILYLPROPOXY)ETHOXYSULFOLANE, 95% — MW 384.56 — bp 190-4°/0.4 — D_4^{20} 1.122
$C_{15}H_{32}O_7SSi$
forms hydrophilic surfaces
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[502925-40-8] HMIS: 2-2-1-X — 10g/$64.00

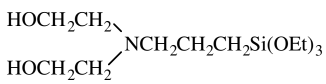


SIT8717.0
TRIS(3-TRIMETHOXYSILYLPROPYL)ISOCYANURATE, 95% — MW 615.86 — D_4^{20} 1.170 — n_D^{20} 1.4610
flashpoint: 102°C (216°F)
viscosity: 325-350 cSt.
$C_{21}H_{45}N_3O_{12}Si_3$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[26115-70-8] TSCA HMIS: 2-1-1-X — 25g/$12.00 — 100g/$39.00 — 2.0kg/$380.00

Hydrophilic Silane Properties

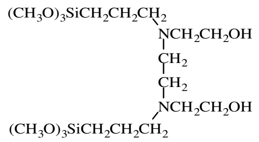
Hydroxylic

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SIB1140.0				
BIS(2-HYDROXYETHYL)-3-AMINOPROPYL-TRIETHOXYSILANE, 62% in ethanol	309.48		0.92	1.409^{25}
$C_{13}H_{31}NO_5Si$	flashpoint: 24°C (75°F)			
	specific wetting surface: 252m²/g			



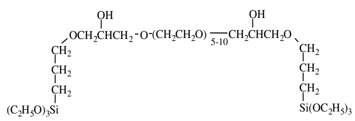
contains 2-3% hydroxyethylaminopropyltriethoxysilane
urethane polymer coupling agent
employed in surface modification for preparation of oligonucleotide arrays[1].
1. G. McGall et al, Proc. Nat'l Acad. Sci., 93, 1355, 1996.
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[7538-44-5] TSCA HMIS: 3-4-0-X — 25g/$30.00 — 100g/$98.00

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SIB1142.0				
N,N'-BIS(HYDROXYETHYL)-N,N'-BIS-(TRIMETHOXYSILYLPROPYL)ETHYLENEDIAMINE	472.73		0.985	
$C_{18}H_{44}N_2O_8Si_2$	66-68% in methanol			
	flashpoint: 11°C(52°F)			



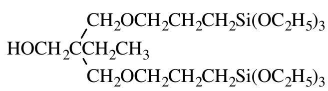
[214362-07-9] HMIS: 3-4-1-X — 25g/$66.00

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SIB1824.2				
BIS-[3-(TRIETHOXYSILYLPROPOXY)-2-HYDROXYPROPOXY]POLYETHYLENE OXIDE 65% in methanol	700-800			



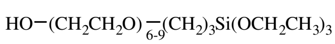
HMIS: 2-4-1-X — 25g/$74.00

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SIB1824.4				
2,2-BIS(3-TRIETHOXYSILYLPROPOXY-METHYL)BUTANOL, 50% in ethanol	542.86		0.899	
$C_{24}H_{54}O_9Si_2$ for solid state synthesis of oligonucleotides				



for solid state synthesis of oligonucleotides
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
HMIS: 2-4-1-X — 10g/$136.00

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SIH6188.0				
[HYDROXY(POLYETHYLENEOXY)PROPYL]-TRIETHOXYSILANE, (8-12 EO) 50% in ethanol	500-550	0.889	1.401	

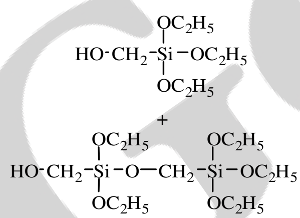


HMIS: 2-4-1-X — 25g/$78.00

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SIH6172.0				
N-(HYDROXYETHYL)-N-METHYLAMINO-PROPYLTRIMETHOXYSILANE, 75% in methanol	237.37		0.99	1.417
$C_9H_{23}NO_4Si$	flashpoint: 16°C (61°F)			

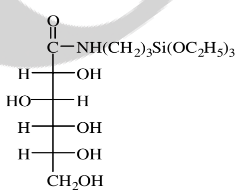
HMIS: 3-4-1-X — 25g/$55.00 — 100g/$179.00

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SIH6175.0				
HYDROXYMETHYLTRIETHOXYSILANE, 50% in ethanol	194.31		0.866	



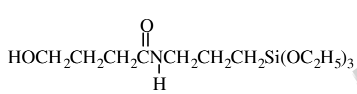
TRIETHOXYSILYLMETHANOL
$C_7H_{18}O_4Si$ contains equilibrium condensation oligomers
hydrolysis yields analogs of silica- hydroxymethylsilanetriol polymers[1].
1. B. Arkles, US Pat. 5,371,262, 1994.
[162781-73-9] HMIS: 2-4-0-X — 25g/$96.00

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SIT8189.0				
N-(3-TRIETHOXYSILYLPROPYL)GLUCONAMIDE 50% in ethanol	399.51		0.951	
$C_{15}H_{33}NO_9Si$	flashpoint: 8°C (46°F)			



water soluble, hydrophilic silane
[104275-58-3] HMIS: 2-4-1-X — 25g/$28.00 — 100g/$91.00

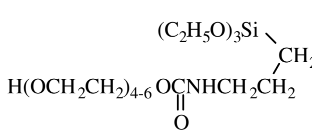
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SIT8189.5				
N-(3-TRIETHOXYSILYLPROPYL)-4-HYDROXY-BUTYRAMIDE	307.47		1.02	1.4533
$C_{13}H_{29}NO_5Si$				



anchoring reagent for light-directed synthesis of DNA on glass[1].
1. G. McGall et al, J. Am. Chem. Soc., *119*, 5081, 1997.
[186543-03-3] HMIS: 2-2-1-X — 10g/$31.00 — 50g/$124.00

COMMERCIAL

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SIT8192.0				
N-(TRIETHOXYSILYLPROPYL)-O-POLY-ETHYLENE OXIDE URETHANE, 95%	400-500		1.09	1.4540^{25}
$C_{10}H_{22}NO_4SiO(CH_2CH_2O)_{4-6}H$	viscosity: 75-125 cSt			

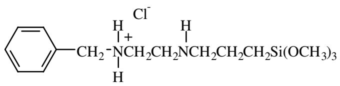


contains some bis(urethane) analog
hydrophilic surface modifier
stabilizes Si_3N_4 aqueous colloids[1].
1. J. Yanez et al, J. Eur. Ceram. Soc., *18*, 1993, 1998
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[74695-91-3] HMIS: 2-1-1-X — 25g/$16.00 — 100g/$52.00 — 2kg/$728.00

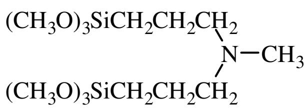
Hydrophilic Silane Properties

Ionic-Charge Inducible

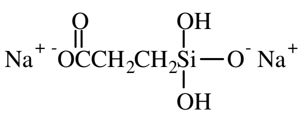
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



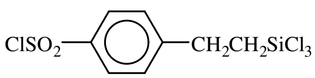
SIB0957.0
(2-N-BENZYLAMINOETHYL)-3-AMINOPROPYL-TRIMETHOXYSILANE, hydrochloride 50% in methanol — MW 348.25 — D_4^{20} 0.942 — n_D^{20} 1.4104
$C_{15}H_{28}N_2O_3Si.HCl$ amber liquid — flashpoint: 9°C (48°F)
[623938-90-9] TSCA HMIS: 3-3-1-X — 25g/$16.00 — 100g/$52.00



SIB1835.0
BIS(3-TRIMETHOXYSILYLPROPYL)-N-METHYLAMINE — MW 355.58 — bp 175°/10 — D_4^{20} 1.023 — n_D^{20} 1.4300
flashpoint: 106°C (223°F)
$C_{13}H_{33}NO_6Si_2$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[31024-70-1] HMIS: 2-1-0-X — 25g/$68.00 — 100g/$221.00



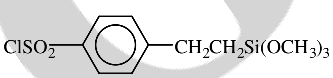
SIC2263.0
CARBOXYETHYLSILANETRIOL, SODIUM SALT, 25% in water — MW 196.14 — D_4 1.17^{25}
pH:12-12.5
$C_3H_6O_5Na_2Si$
HYDROLYTIC SENSITIVITY: 0 forms stable aqueous solutions
[18191-40-7] HMIS: 2-0-0-X — 25g/$45.00 — 100g/$146.00



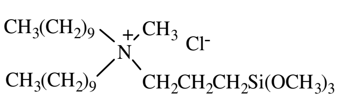
SIC2415.0
2-(4-CHLOROSULFONYLPHENYL)ETHYLTRICHLOROSILANE, 50% in methylene chloride — MW 338.11 — D_4^{20} 1.37
$C_8H_8Cl_4O_2SSi$
contains 30% free sulfonic acid analog and small amounts of silylsulfonic acid condensation products employed in preparation of solid phase extraction columns
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[79793-00-3] TSCA HMIS: 4-2-2-X — 25g/$48.00 — 100g/$156.00

Solid Phase Extraction (SPE) columns with benzenesulfonic acid functionalized silica are utilized to analyze urine samples for amino acids and drugs of abuse.

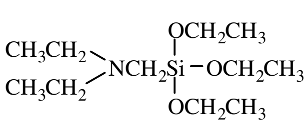
SIC2415.4
2-(4-CHLOROSULFONYLPHENYL)ETHYLTRICHLOROSILANE, 50% in toluene — MW 338.11 — D_4^{20} 1.08
$C_8H_8Cl_4O_2SSi$
contains 30% free sulfonic acid analog and small amounts of silylsulfonic acid condensation products
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with water/moisture, protic solvents
[79793-00-3] TSCA HMIS: 4-4-2-X — 25g/$52.00 — 100g/$169.00



SIC2417.0
2-(4-CHLOROSULFONYLPHENYL)ETHYLTRIMETHOXYSILANE, 50% in methylene chloride — MW 324.85 — D_4 1.30^{25}
$C_{11}H_{17}ClO_5SSi$ contains free sulfonic acid; amber color
treated silica acts as etherification catalyst[1].
treatment of surface oxidized PMDSO supports electroosmotic flow[2].
1. B. Sow et al, Microporous & Mesoporous Materials, *79*, 129, 2005
2. B. Wang et al, Micro Total Analysis Systems 2004 Vol 2., Roy Soc. Chem., 297, p109
[126519-89-9] HMIS: 3-2-1-X — 25g/$72.00 — 100g/$234.00

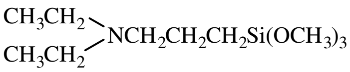


SID3392.0
N,N-DIDECYL-N-METHYL-N-(3-TRIMETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 42% in methanol — MW 510.32 — D_4^{20} 0.863 — n_D^{20} 1.4085
flashpoint: 13°C (55°F)
$C_{27}H_{60}ClNO_3Si$ contains 3-5% $Cl(CH_2)_3Si(OMe)_3$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[68959-20-6] TSCA HMIS: 3-4-0-X — 25g/$49.00

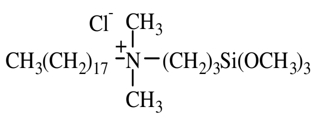


SID3395.4
DIETHYLAMINOMETHYLTRIETHOXYSILANE — MW 249.43 — bp 74-6°/3 — D_4 0.9336^{25} — n_D 1.4142^{25}
$C_{11}H_{27}NO_3Si$
catalyst for neutral cure 1-part RTVs
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[15180-47-9] HMIS: 2-2-1-X — 25g/$49.00

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}

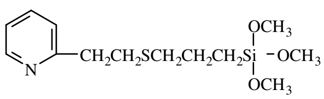


SID3396.0
(N,N-DIETHYL-3-AMINOPROPYL)TRIMETHOXYSILANE — 235.40 — 120°/20 — 0.934 — 1.423
flashpoint: 100°C (212°F)
$C_{10}H_{25}NO_3Si$
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[41051-80-3] TSCA HMIS: 2-2-1-X — 25g/$62.00 — 100g/$202.00

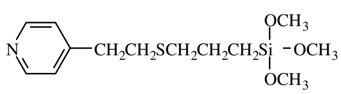


COMMERCIAL

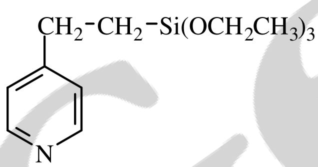
SIO6620.0
OCTADECYLDIMETHYL(3-TRIMETHOXYSILYLPROPYL)AMMONIUM CHLORIDE, 60% in methanol — 496.29 — 0.89
$C_{26}H_{58}ClNO_3Si$ contains 3-5% $Cl(CH_2)_3Si(OMe)_3$ — flashpoint: 15°C (59°F)
employed as lubricant/anti-static surface treatment
orients liquid crystals
dispersion/coupling agent for high density magnetic recording media[1].
application as immobilizeable antimicrobial reported[2].
1. H. Vincent in "Chemically Modified Oxide Surfaces," ed. D. Leyden, Gordon & Breach,1990, p. 305.
2. W. White et al in "Silanes, Surfaces & Interfaces" ed. D. Leyden, Gordon & Breach, 1986, p. 107.
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[27668-52-6] TSCA HMIS: 3-4-0-X — 25g/$18.00 — 2kg/$280.00



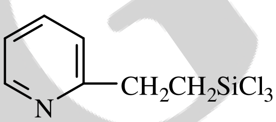
SIP6926.2
2-(2-PYRIDYLETHYL)THIOPROPYLTRIMETHOXYSILANE — 301.48 — 156-7°/0.25 — 1.089 — 1.498
$C_{13}H_{23}NO_3SSi$
chelates metal ions
[29098-72-4] HMIS: 3-2-1-X — 10g/$118.00



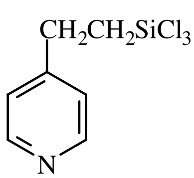
SIP6926.4
2-(4-PYRIDYLETHYL)THIOPROPYLTRIMETHOXYSILANE — 301.48 — 160-2°/0.2 — 1.09 — 1.5037
pKa: 4.8
$C_{13}H_{23}NO_3SSi$
immobilizeable ligand for immunoglobulin IgG separation using hydrophobic charge induction chromatography (HCIC)
[198567-47-4] HMIS: 3-2-1-X — 10g/$124.00



SIP6928.0
2-(4-PYRIDYLETHYL)TRIETHOXYSILANE — 269.43 — 105°/0.9 — 1.00 — 1.4624^{24}
amber liquid
$C_{13}H_{23}NO_3Si$
see also SIT8396.0
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture
[98299-74-2] HMIS: 3-2-1-X — 10g/$119.00

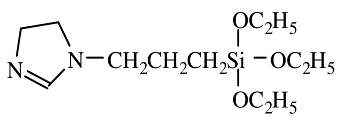


SIT8157.0
2-[2-(TRICHLOROSILYL)ETHYL]PYRIDINE — 240.59 — 280°-decomposes (207°)mp
$C_7H_8Cl_3NSi$
fuming solid, moisture sensitive
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[17082-69-8] TSCA HMIS: 3-2-1-X — 25g/$45.00 — 100g/$146.00



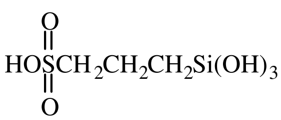
SIT8158.0
4-[2-(TRICHLOROSILYL)ETHYLPYRIDINE, 15-20% in toluene — 240.59 — 0.93
flashpoint: 4°C (39°F)
$C_7H_8Cl_3NSi$
hazy liquid; extremely moisture sensitive
see also SIT8396.0 2-(TRIMETHOXYSILYLETHYL)PYRIDINE
employed in polypyridine self-assembled monolayers[1].
1. S. Paulson et al, J. Chem. Soc. Chem. Comm., *21*, 1615, 1992.
HYDROLYTIC SENSITIVITY: 8 reacts rapidly with moisture, water, protic solvents
[17082-70-1] TSCA HMIS: 3-4-1-X — 25g/$29.00 — 100g/$96.00

name | **MW** | **bp/mm (mp)** | **D_4^{20}** | **n_D^{20}**

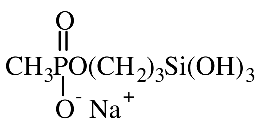


SIT8187.5
N-(3-TRIETHOXYSILYLPROPYL)-4,5-DIHYDROIMIDAZOLE — 274.43 — 134°/2 — 1.005 — 1.452
flashpoint: >110°C (>230°F)
3-(2-IMIDAZOLIN-1-YL)PROPYLTRIETHOXYSILANE
$C_{12}H_{26}N_2O_3Si$ — viscosity: 5 cSt.
utilized in HPLC of metal chelates[1].
forms proton vacancy conducting polymers w/sulfonamides by sol-gel[2].
ligand for molecurlarly imprinting silica w/ chymotrypsin transition state analog[3].
1. T. Suzuki et al, Chem. Lett, 881, 1994.
2. V. De Zea Bermudez et al, Sol-Gel Optics II, SPIE Proc. *1728*, 180, 1992.
3. M. Markowitz et al, Langmuir, 1989.
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[58068-97-6] TSCA HMIS: 2-1-1-X — 25g/$18.00 — 100g/$62.00 — 2.0kg/$680.00

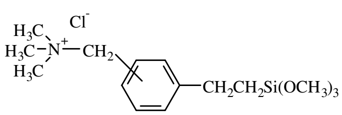
COMMERCIAL



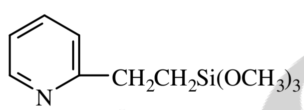
SIT8378.3
3-(TRIHYDROXYSILYL)-1-PROPANE-SULFONIC ACID 30-35% in water — 202.26 — (-62°) — 1.12
pH: <1
$C_3H_{10}O_6SSi$
HYDROLYTIC SENSITIVITY: 0 forms stable aqueous solutions
[70942-24-4] TSCA HMIS: 3-0-0-X — 25g/$51.00 — 100g/$ 166.00



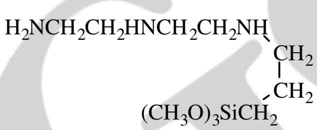
SIT8378.5
3-TRIHYDROXYSILYLPROPYLMETHYL-PHOSPHONATE, SODIUM SALT, 42% in water — 238.18 — 1.25
flashpoint: 79°C (174°F)
$C_4H_{12}NaO_6PSi$ contains 4-5% methanol, sodium methylphosphonate
HYDROLYTIC SENSITIVITY: 0 forms stable aqueous solutions
[84962-98-1] TSCA HMIS: 1-2-0-X — 100g/$16.00 — 500g/$64.00



SIT8395.0
N-(TRIMETHOXYSILYLETHYL)BENZYL-N,N,N-TRIMETHYLAMMONIUM CHLORIDE, 60% in methanol — 333.93 — 0.966
$C_{15}H_{28}ClNO_3Si$ — flashpoint: 25°C (77°F)
candidate for exchange resins and extraction phases
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
HMIS: 3-3-1-X — 25g/$80.00

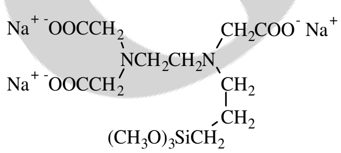


SIT8396.0
2-(TRIMETHOXYSILYLETHYL)PYRIDINE — 227.33 — 105°/0.3 — 1.06 — 1.4755
$C_{10}H_{17}NO_3Si$ see also SIP6928.0 — flashpoint: >110°C (>230°F)
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[27326-65-4] HMIS: 3-2-1-X — 10g/$41.00 — 50g/$164.00

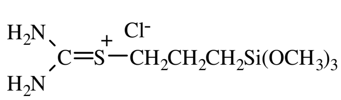


SIT8398.0
(3-TRIMETHOXYSILYLPROPYL)DIETHYLENE-TRIAMINE tech-95 — 265.43 — 114-8°/2 — 1.030 — 1.4590
flashpoint: 137°C (279°F)
$C_{10}H_{27}N_3O_3Si$ — Υc of treated surface: 37.5 dynes/cm
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
[35141-30-1] TSCA HMIS: 3-1-1-X — 100g/$20.00 — 2.0kg/$248.00

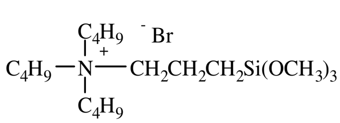
COMMERCIAL



SIT8402.0
N-(TRIMETHOXYSILYLPROPYL)ETHYLENE-DIAMINE TRIACETIC ACID, TRISODIUM SALT, 45% in water — 462.42 — 1.26
$C_{14}H_{25}N_2Na_3O_9Si$ essentially silanetriol, contains NaCl
chelates metal ions
HYDROLYTIC SENSITIVITY: 0 forms stable aqueous solutions
[128850-89-5] TSCA HMIS: 2-0-0-X — 25g/$42.00 — 100g/$137.00

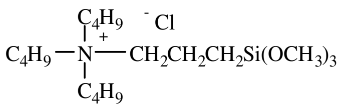


SIT8405.0
N-(TRIMETHOXYSILYLPROPYL)ISOTHIO-URONIUM CHLORIDE, 50% in water — 274.84 — 1.190 — 1.441
essentially silanetriol
TRIHYDROXYPROPYLCARBAMIDOTHIOIC ACID HYDROCHLORIDE
$C_7H_{19}ClN_2O_3SSi$ — pH: 6
antimicrobial activity reported
HYDROLYTIC SENSITIVITY: 0 forms stable aqueous solutions
[84682-36-0] TSCA HMIS: 2-0-0-X — 25g/$45.00



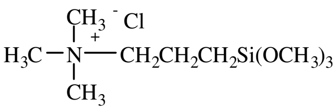
SIT8412.0
N-TRIMETHOXYSILYLPROPYL-N,N,N-TRI-n-BUTYLAMMONIUM BROMIDE, 50% in methanol — 428.52 — 0.92
$C_{18}H_{42}BrNO_3Si$ — flashpoint: 11°C (52°F)
immobilizable phase transfer catalyst
HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture
HMIS: 3-4-1-X — 25g/$89.00

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SIT8414.0 N-TRIMETHOXYSILYLPROPYL-N,N,N-TRI-n-BUTYLAMMONIUM CHLORIDE, 50% in methanol $C_{18}H_{42}ClNO_3Si$ contains 3-5% chloropropyltrimethoxysilane and $Bu_3NH^+Cl^-$ HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture HMIS: 3-4-1-X	384.08 flashpoint: 11°C (52°F) 25g/$81.00		0.88	



COMMERCIAL

name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SIT8415.0 N-TRIMETHOXYSILYLPROPYL-N,N,N-TRI-METHYLAMMONIUM CHLORIDE, 50% in methanol *N,N,N-TRIMETHYL-3-(TRIMETHOXYSILYL)-1-PROPANAMINIUM CHLORIDE* $C_9H_{24}ClNO_3Si$ employed for bonded chromatographic phases anti-static agent used to treat glass substrates employed in electroblotting see also SIT8395.0 HYDROLYTIC SENSITIVITY: 7 reacts slowly with water/moisture [35141-36-7] TSCA HMIS: 2-4-1-X	257.83 flashpoint: 16°C (61°F) 25g/$18.00		0.927 2.0kg/$390.00	1.3966

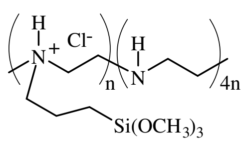


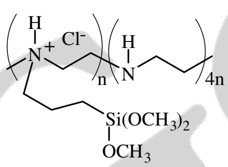
Polymeric Hydrophilic Silanes

Polymeric Amine

COMMERCIAL

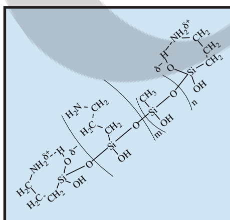
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
SSP-060 TRIMETHOXYSILYLPROPYL MODIFIED (POLYETHYLENIMINE) 50% in isopropanol visc: 125-175 cSt employed as a coupling agent for polyamides[1]. in combination with glutaraldehyde immobilizes enzymes[2]. 1. B. Arkles et al, SPI 42nd Composite Inst. Proc., 21-C, 1987 2. S. Cramer et al, Biotech. & Bioeng., *33(3)*, 344, 1989. [136856-91-2] TSCA HMIS: 2-4-1-X	1500-1800 ~20% of nitrogens substituted 100g/$28.00		0.92 2.0kg/$364.00	
SSP-065 DIMETHOXYMETHYLSILYLPROPYL MODIFIED (POLYETHYLENIMINE) 50% in isopropanol visc: 100-200 cSt primer for brass [1255441-88-5] TSCA HMIS: 2-4-1-X	1500-1800 ~20% of nitrogens substituted 100g/$38.00		0.92 2.0kg/$494.00	





Water-borne Aminoalkyl Silsesquioxane Oligomers

TSCA



Code	Functional Group	Mole %	Molecular Weight	Weight % in solution	Specific Gravity	Viscosity	pH	Price/100g	3kg
WSA-7011	Aminopropyl	65-75	250-500	25-28	1.10	5-15	10-10.5	$29.00	$435.00
WSA-9911*	Aminopropyl	100	270-550	22-25	1.06	5-15	10-10.5	$24.00	$360.00
WSA-7021	Aminoethylaminopropyl	65-75	370-650	25-28	1.10	5-10	10-11	$29.00	$435.00
WSAV-6511**	Aminopropyl, vinyl	60-65	250-500	25-28	1.11	3-10	10-11	$35.00	$480.00

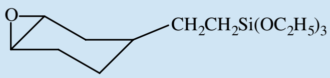
*CAS [29159-37-3] **[207308-27-8]

Aqueous exposure of treated surfaces converts Epoxy-Silanes to Hydrophilic-Diols

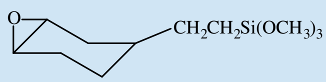
Epoxy Functional Silanes

Epoxy Functional Silanes - Trialkoxy

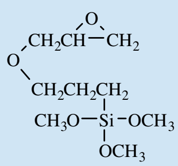
COMMERCIAL



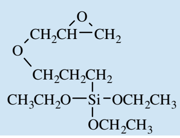
SIE4668.0
2-(3,4-EPOXYCYCLOHEXYL)ETHYL-TRIETHOXYSILANE — 288.46 — 114-7°/0.4 — 1.015 — 1.4455
flashpoint: 104°C (220°F)
$C_{14}H_{28}O_4Si$
[10217-34-2] TSCA HMIS: 2-1-1-X — 25g/$14.00 — 100g/$46.00 — 2.0kg/$320.00



SIE4670.0
2-(3,4-EPOXYCYCLOHEXYL)ETHYL-TRIMETHOXYSILANE — 246.38 — 95-7°/0.25 — 1.065 — 1.449
TOXICITY- oral rat, LD50: 12,300mg/kg
$C_{11}H_{22}O_4Si$
flashpoint: 146°C (295°F)
viscosity: 5.2 cSt
γc of treated surface: 39.5 dynes/cm
coefficient of thermal expansion: 0.8 x 10^{-3}
specific wetting surface: 317 m^2/g
vapor pressure, 152°: 10mm
ring epoxide more reactive than glycidoxypropyl systems.
UV initiated polymerization of epoxy group with weak acid donors.
forms UV-cureable coating resins by controlled hydrolysis[1].
1. J. Crivello et al, Chem. Mater. *9*, 1554, 1997.
[3388-04-3] TSCA HMIS: 3-1-1-X — 100g/$24.00 — 2.0kg/$270.00 — 18kg/$1044.00

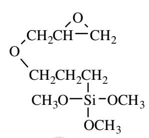


SIG5840.0
(3-GLYCIDOXYPROPYL)TRIMETHOXYSILANE — 236.34 — 120°/2 (<-70°)mp — 1.070 — 1.4290
3-(2,3-EPOXYPROPOXY)PROPYLTRIMETHOXYSILANE
$C_9H_{20}O_5Si$
TOXICITY- oral rat, LD50: 8,400 mg/kg
coupling agent for epoxy composites employed in electronic "chip" encapsulation.
[2530-83-8] TSCA HMIS: 3-1-1-X — 100g/$16.00 — 2.0kg/$138.00 — 18kg/$693.00



SIG5839.0
(3-GLYCIDOXYPROPYL)TRIETHOXYSILANE — 278.4 — 124°/3 — 1.00 — 1.425
$C_{12}H_{26}O_5Si$
flashpoint: 144°C (291°F)
[2602-34-8] TSCA HMIS:3-2-1-X — 25g/$38.00 — 100g/$124.00 — 2.0kg/$580.00

DEVELOPMENTAL

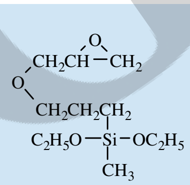


SIG5840.1
(3-GLYCIDOXYPROPYL)TRIMETHOXYSILANE 99+% — 236.34 — 120°/2 (<-70°)mp — 1.070 — 1.4290
3-(2,3-EPOXYPROPOXY)PROPYLTRIMETHOXYSILANE
$C_9H_{20}O_5Si$
TOXICITY- oral rat, LD50: 8,400 mg/kg
[2530-83-8] TSCA HMIS: 3-1-1-X — 25g/$180.00 in fluoropolymer bottle

SIE4675.0
5,6-EPOXYHEXYLTRIETHOXYSILANE — 262.42 — 115-9°/1.5 — 0.960^{25} — 1.4254^{25}
$C_{12}H_{26}O_4Si$
flashpoint: 99°C (210°F)
[86138-01-4] HMIS: 3-2-1-X — 10g/$89.00

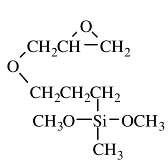
Epoxy Functional Silanes - Dialkoxy

COMMERCIAL



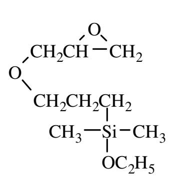
SIG5832.0
(3-GLYCIDOXYPROPYL)METHYLDIETHOXY-SILANE — 248.39 — 122-6°/5 — 0.978^{25} — 1.431
TOXICITY- oral rat, LD50: >2000mg/kg
$C_{11}H_{24}O_4Si$
flashpoint: 122°C (252°F)
viscosity: 3.0 cSt
employed in scratch-resistant coatings for eyeglasses.
[2897-60-1] TSCA HMIS: 2-1-1-X — 25g/$38.00 — 100g/$124.00 — 2.0kg/$580.00

DEVELOPMENTAL



SIG5836.0
(3-GLYCIDOXYPROPYL)METHYLDIMETHOXY-SILANE — 220.34 — 100°/4 — 1.02 — 1.431^{25}
flashpoint: 105°C (221°F)
$C_9H_{20}O_4Si$
relative hydrolysis rate vs. SIG5840.0: 7.5:1
[65799-47-5] TSCA-L HMIS: 3-1-1-X — 25g/$50.00 — 100g/$162.00

Epoxy Functional Silanes - Monoalkoxy

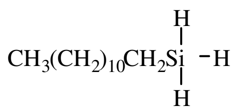


SIG5825.0
(3-GLYCIDOXYPROPYL)DIMETHYLETHOXY-SILANE — 218.37 — 100°/3 — 0.950 — 1.4337^{25}
flashpoint: 87°C (189°F)
$C_{10}H_{22}O_3Si$
[17963-04-1] TSCA HMIS: 3-2-1-X — 10g/$40.00 — 50g/$160.00

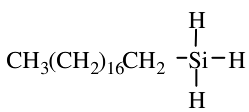
Silyl Hydrides

Silyl Hydrides are a distinct class of silanes that behave and react very differently than conventional silane coupling agents. Their application is limited to deposition on metals (see discussion on p. 17). They liberate hydrogen on reaction and should be handled a with appropriate caution.

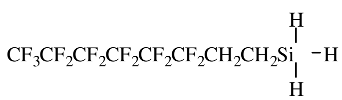
name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}



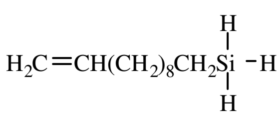
SID4629.6
DODECYLSILANE — MW 200.44 — bp 80°/7 — D_4^{20} 0.7753 — n_D^{20} 1.4380[25]
$C_{12}H_{28}Si$
forms SAMS on gold surfaces
872-19-5 HMIS: 2-2-1-X — 10g/$78.00



SIO6635.0
n-OCTADECYLSILANE — MW 284.60 — bp 195°/15 (29°)mp — D_4^{20} 0.794
$C_{18}H_{40}Si$ contains 4-6% C_{18} isomers
forms self-assembled monolayers on titanium[1]. flashpoint: >110°C (>230°F)
1. A. Fadeau et al, J. Am. Chem. Soc., *121*, 12184, 1999
[18623-11-5] TSCA HMIS: 2-1-1-X — 25g/$46.00 — 100g/$150.00

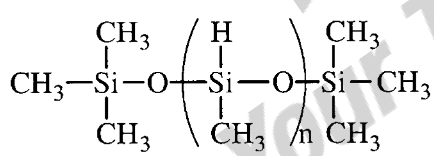


SIT8173.0
(TRIDECAFLUORO-1,1,2,2-TETRA-HYDROOCTYL)SILANE — MW 378.22 — bp 75°/251.446 — D_4^{20} 1.3184
$C_8H_7F_{13}Si$
provides vapor-phase hydrophobic surfaces on titanium, gold, silicon
[469904-32-3] HMIS: 3-3-1-X — 10g/$190.00



SIU9048.0
10-UNDECENYLSILANE — MW 184.40 — D_4^{20} 0.78
$C_{11}H_{24}Si$
HMIS: 2-3-1-X — 2.5g/$180.00

MethylHydrosiloxane homopolymers are used as water-proofing agents, reducing agents and as components in some foamed silicone systems.



polyMethylHydrosiloxanes, Trimethylsiloxy terminated Tg: -119° V.T.C: 0.50 CAS: [63148-57-2] TSCA

COMMERCIAL

Code	Viscosity	Molecular Weight	Mole % (MeHSiO)	Equivalent Weight	Specific Gravity	Refractive Index	Price/100g	Price/3 kg
HMS-991	15-25	1400-1800	100	67	0.98	1.395	$14.00	$96.00
HMS-992	25-35	1800-2100	100	65	0.99	1.396	$19.00	$134.00
HMS-993	35-45	2100-2400	100	64	0.99	1.396	$24.00	$168.00

Surface Modification with Silanes: What's not covered in "Hydrophobicity, Hydrophilicity and Silane Surface Modification"?

Silanes which are expected to form covalent bonds after deposition onto surfaces are discussed in the Gelest brochure entitled **"Silane Coupling Agents: Connecting Across Boundaries"** Aminosilanes which are important in some hydrophilic surface treatments are covered in detail.

Further Reading

Silane Coupling Agents - General References and Proceedings

1. B. Arkles, Tailoring Surfaces with Silanes, CHEMTECH, 7, 766-778, 1977.
2. E. Plueddemann, "Silane Coupling Agents," Plenum, 1982.
3. K. Mittal, "Silanes and Other Coupling Agents," VSP, 1992.
4. D. Leyden and W. Collins, "Silylated Surfaces," Gordon & Breach, 1980.
5. D. E. Leyden, "Silanes, Surfaces and Interfaces," Gordon & Breach 1985.
6. J. Steinmetz and H. Mottola, "Chemically Modified Surfaces," Elsevier, 1992.
7. J. Blitz and C. Little, "Fundamental & Applied Aspects of Chemically Modified Surfaces," Royal Society of Chemistry, 1999.

Substrate Chemistry - General References and Proceedings

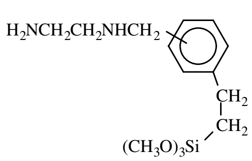
8. R. Iler, "The Chemistry of Silica," Wiley, 1979.
9. S. Pantelides, G. Lucovsky, "SiO_2 and Its Interfaces," MRS Proc. 105, 1988.

Hydrophobicity & Hydrophilicity

10. C. Tanford, "The Hydrophobic Effect" Wiley, 1973.
11. H. Butt, K. Graf, M. Kappl, "Physics and Chemistry of Interfaces," Wiley, 2003.
12. A. Adamson, "Physical Chemistry of Surfaces". Wiley, 1976.
13. F. Fowkes, "Contact Angle, Wettability and Adhesion," American Chemical Society, 1964.
14. D. Quere "Non-sticking Drops" Rep. Prog. Phys. *68,* 2495, 2005.
15. McCarthy, T. A Perfectly Hydrophobic Surface, J. Am. Chem. Soc., 2006, 128, 9052.

Product Information

Product Code — Product Name — Molecular Weight — Boiling Point/mm (Melting Point) — Specific Gravity — Refractive Index



SIA0588.0
(AMINOETHYLAMINOMETHYL)PHENETHYL-298.46 126-30°/0.2 1.02 1.5083
TRIMETHOXYSILANE, 90% mixed m,p isomers flashpoint: > 110°C (>230°F) — Other Physical Properties
$C_{14}H_{26}N_2O_3Si$
coupling agent for polyimides
photochemically sensitive (194nm)[1] self-assembled monolayers[2].
1. W. Dressick et al, Thin Solid Films, *284*, 568, 1996.
2. C Harnett et al, Appl. Phys. Lett., *76*, 2466, 2000.
HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with water/moisture — References
[74113-77-2] TSCA HMIS: 3-1-1-X 25g/$82.00 100g/$266.00

CAS#

Hazardous Rating Information (Health-Flammability-Reactivity)

Indicates Product listed in TSCA Inventory (L = Low Volume Exemption; S = Significant New Use Restriction)

Cover background photo:
Fluoroalkylsilane treated multi-color red granite is both hydrophobic and oleophobic.

The Stenocara beetle, an African desert species, harvests water that adsorbs on superhydrophilic bumps on its back, then transfers droplets into superhydrophophic channels that lead to its mouth.

Gelest Inc.
11 East Steel Road
Morrisville, PA 19067
Phone (215) 547-1015
Fax: (215) 547-2484
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