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# Hydrophobicity, Hydrophilicity and Silane Surface Modification



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**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.

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# Hydrophobicity, Hydrophilicity and Silane Surface Modification

by Barry Arkles

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Hydrophobicity, Hydrophilicity and Silane Surface Modification

Barry Arkles ©2011 Gelest, Inc.

## 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.



organic substitution allows permanent property modification

hydrolyzable alkoxy (alcohol) groups

### Property modifications include:

- Hydrophobicity
- Adhesion
- 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
- Anti-Corrosion Coatings

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

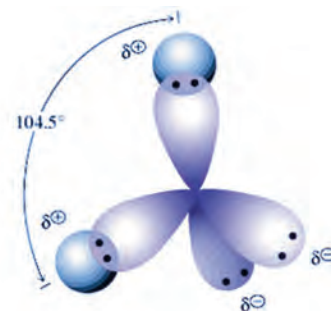
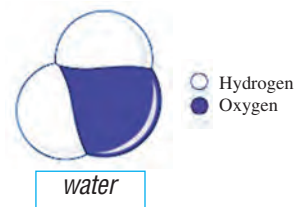
# Water, Hydrophobicity and Hydrophilicity

**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.

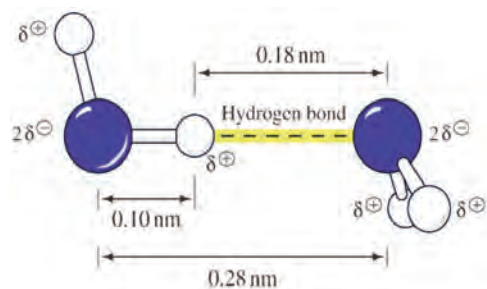
Since the interaction of water with surfaces is frequently used to define surface properties, a brief review of its structure and properties can be helpful. Although the structure of water is a subject of early discussion in the study of physical sciences, it is interesting to note that the structure 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<sub>2</sub>O molecule has evolved to the currently accepted model which demonstrates a strong dipole, but no lone electron pairs associated with sp<sup>3</sup> hybridized orbitals of oxygen. This model of isolated H<sub>2</sub>O 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 interactions. The properties of bulk liquid water are strongly influenced by hydrogen bond interactions. In the liquid state, despite 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*.

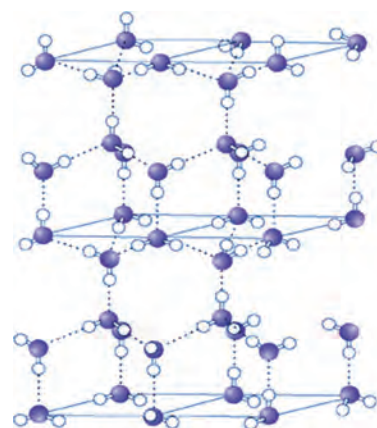
This brief description of water is provided in order to give the insight that whenever a solid surface interacts with bulk water it is interacting with a soft matter structure, not simply a collection of individual molecules. Surface interactions with water must compete with a variety of internal interactions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



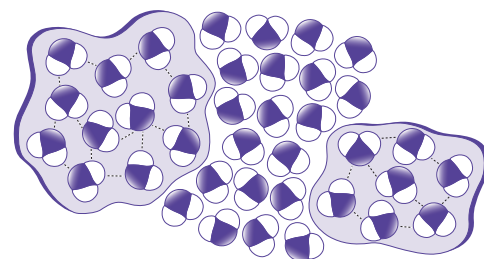
molecule of water showing dipole



2 molecules showing hydrogen bond



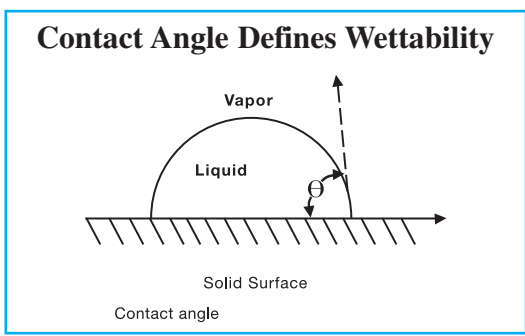
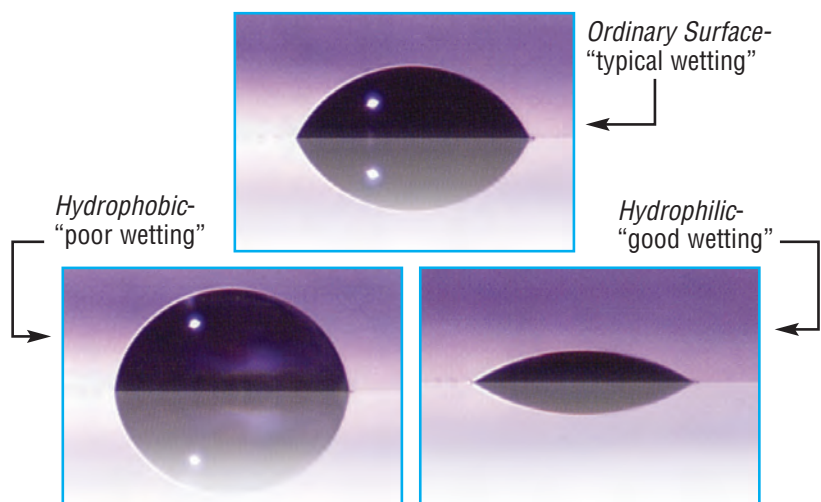
ice - molecules of water with 4 hydrogen bonds



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 the cohesive forces associated with bulk water are greater than the forces associated with the interaction of water with the surface. Practically, hydrophobicity and hydrophilicity are relative terms. A simple quantitative method for defining the relative degree of interaction of a liquid with a solid surface is the contact angle of a liquid droplet on a solid substrate. If the contact angle of water is less than 30°, the surface is designated hydrophilic since the forces of interaction between water and the surface nearly equal the cohesive forces of bulk water and water does not cleanly drain from the surface. If water spreads over a surface and the contact angle at the spreading front edge of the water is less than 10°, the surface is often designated as superhydrophilic (provided that the surface is not absorbing the water, dissolving in the water or reacting with the water). On a hydrophobic surface, water forms distinct droplets. As the hydrophobicity increases, the contact angle of the droplets with the surface increases. Surfaces with contact angles greater than 90° are designated as hydrophobic. The theoretical maximum contact angle for water on a smooth surface is 120°. Micro-textured or micro-patterned surfaces with hydrophobic asperities can exhibit apparent contact angles exceeding 150° and are associated with superhydrophobicity and the “lotus effect”.



### Contact Angle of Water on Smooth Surfaces

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

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

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## Critical Surface Tension and Adhesion

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

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

where  $\gamma_{sl}$  = interfacial surface tension,  $\gamma_{lv}$  = surface tension of liquid.

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

Liquids with a surface tension below the critical surface tension ( $\gamma_c$ ) 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.

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

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

In the reinforcement of thermosets and thermoplastics with glass fibers, one approach for optimizing reinforcement is to match the critical surface tension of the silylated glass surface to the surface tension of the polymer in its melt or uncured condition. This has been most helpful in resins with no obvious functionality such as polyethylene and polystyrene. Silane treatment has allowed control of thixotropic activity of silica and clays in paint and coating applications. Immobilization of cellular organelles, including mitochondria, chloroplasts, and microsomes, has been effected by treating silica with alkylsilanes of C<sub>8</sub> or greater substitution.

### Critical surface tensions

	$\gamma_c$ mN/m
heneicosafuorododecyltrichlorosilane	6-7
heptadecafluorodecyltrichlorosilane	12.0
poly(tetrafluoroethylene)	18.5
octadecyltrichlorosilane	20-24
methyltrimethoxysilane	22.5
nonafluorohexyltrimethoxysilane	23.0
vinyltriethoxysilane	25
paraffin wax	25.5
ethyltrimethoxysilane	27.0
propyltrimethoxysilane	28.5
glass, soda-lime (wet)	30.0
poly(chlorotrifluoroethylene)	31.0
poly(propylene)	31.0
poly(propylene oxide)	32
polyethylene	33.0
trifluoropropyltrimethoxysilane	33.5
3-(2-aminoethyl)-aminopropyltrimethoxysilane	33.5
poly(styrene)	34
p-tolyltrimethoxysilane	34
cianoethyltrimethoxysilane	34
aminopropyltriethoxysilane	35
acetoxypentyltrimethoxysilane	37.5
polymethylmethacrylate	39
polyvinylchloride	39
phenyltrimethoxysilane	40.0
chloropropyltrimethoxysilane	40.5
mercaptopropyltrimethoxysilane	41
glycidoxypentyltrimethoxysilane	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 alkoxy silanes, only methoxysilanes are effective without catalysis. The most effective silanes for vapor phase deposition are cyclic azasilanes.

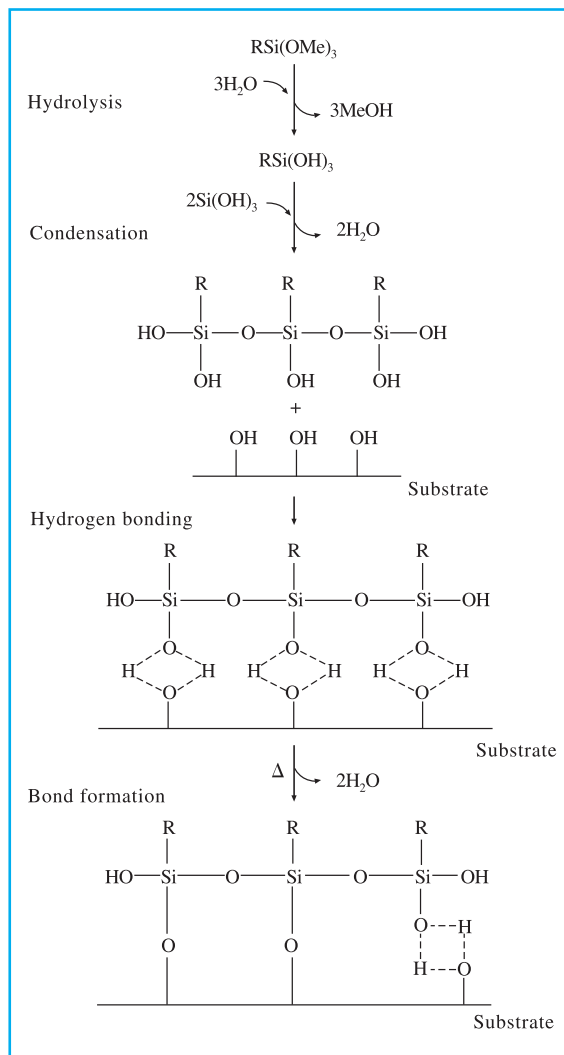
## Hydrolysis Considerations

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.

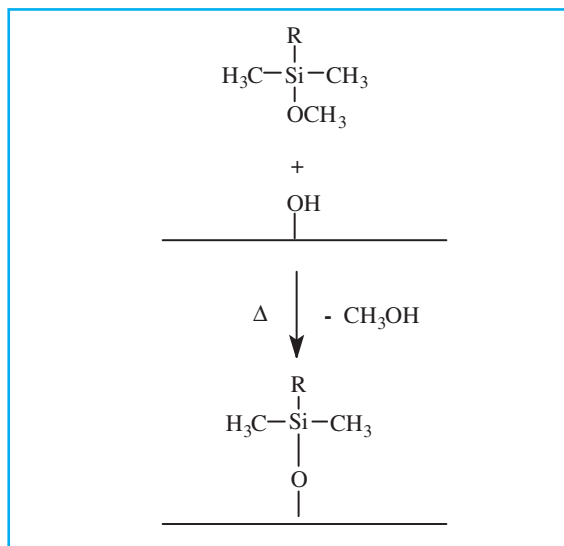
The formation of covalent bonds to the surface proceeds with a certain amount of reversibility. As water is removed, generally by heating to 120°C for 30 to 90 minutes or evacuation for 2 to 6 hours, bonds may form, break, and reform to relieve internal stress.

## 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:

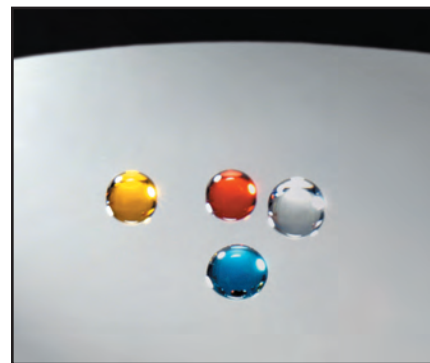
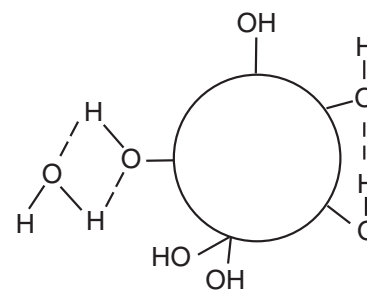
- Concentration of surface hydroxyl groups*
- Type of surface hydroxyl groups*
- Hydrolytic Stability of the bond formed*
- Physical dimensions of the substrate or substrate features*

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 alkoxy-silanes 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<sup>5</sup>x greater hydrolysis resistance making them particularly appropriate for primer applications.



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

### Silane Effectiveness on Inorganics

	SUBSTRATES	
EXCELLENT ↑	Silica	
	Quartz	
	Glass	
	Aluminum (AlO(OH))	
	Alumino-silicates (e.g. clays)	
	Silicon	
	Copper	
	Tin (SnO)	
	Talc	
	Inorganic Oxides (e.g. Fe <sub>2</sub> O <sub>3</sub> , TiO <sub>2</sub> , Cr <sub>2</sub> O <sub>3</sub> )	
GOOD ↑	Steel, Iron	
	Asbestos	
	Nickel	
	Zinc	
	Lead	
	SLIGHT ↑	Marble, Chalk (CaCO <sub>3</sub> )
		Gypsum (CaSO <sub>4</sub> )
		Barytes (BaSO <sub>4</sub> )
		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

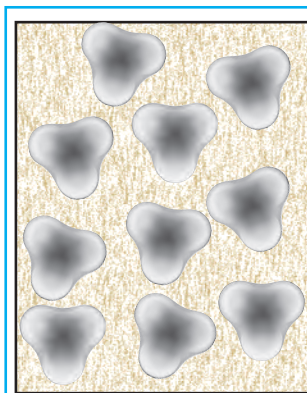
## Hydrophobic Silane Surface Treatments

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.

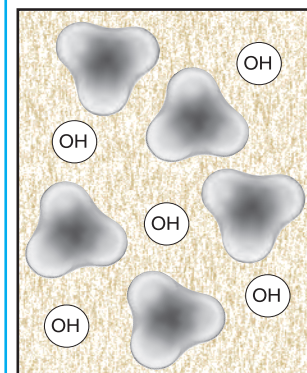
Aliphatic hydrocarbon substituents or fluorinated hydrocarbon substituents are the hydrophobic entities which enable silanes to induce surface hydrophobicity. Beyond the simple attribute that in order to generate a hydrophobic surface the organic substitution of the silane must be non-polar, more subtle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

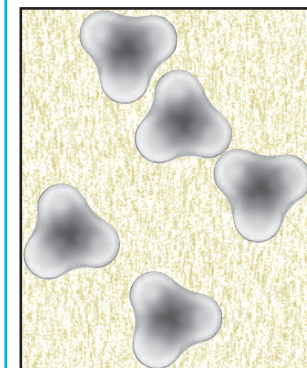
Strategies for silane surface treatment depend on the population of hydroxyl groups and their accessibility for bonding. A simple conceptual case is the reaction of organosilanes to form a monolayer. If all hydroxyl groups are capped by the silanes and the surface is effectively shielded, a hydrophobic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



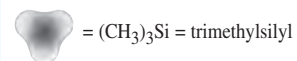
complete coverage



incomplete hydroxyl reaction



few bonding opportunities



### Hypothetical Trimethylsilylated Surfaces

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

## Superhydrophobicity and Oleophobicity

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

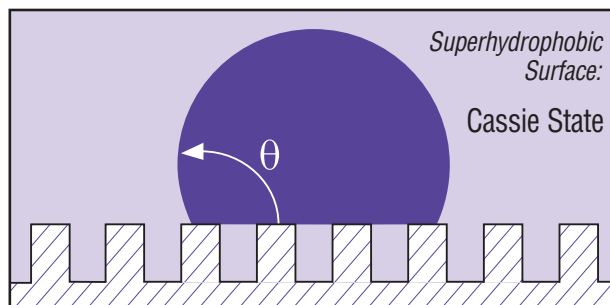
Superhydrophobic surfaces are those surfaces that present apparent contact angles that exceed the theoretical limit for smooth surfaces, i.e.  $>120^\circ$ . The most common examples of superhydrophobicity are associated with surfaces that are rough on a sub-micron scale and contact angle measurements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



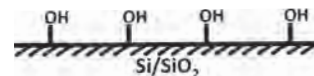
**Automotive side windows** are treated with fluoroalkylsilanes to provide self-cleaning properties. Water beads remove soil as they are blown over the glass substrate during acceleration.

### Hydrophobicity vs Water Permeability

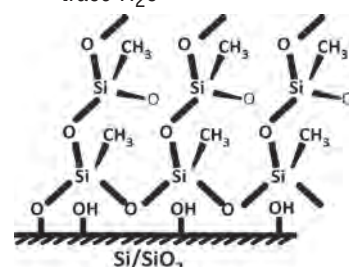
Although silane and silicone derived coatings are in general the most hydrophobic, they maintain a high degree of permeability to water vapor. This allows coatings to breathe and reduce deterioration at the coating interface associated with entrapped water. Since ions are not transported through non-polar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



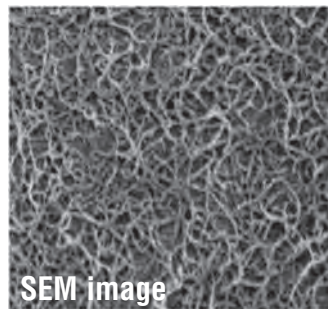
### Perfect Hydrophobicity- $180^\circ$



- 1)  $\text{CH}_3\text{SiCl}_3$   
toluene  
trace  $\text{H}_2\text{O}$
- 2) ethanol extraction



*toluene-swollen crosslinked covalently attached methylsilicone*



**SEM image**

The methylsilicone phase separates in ethanol to form a covalently attached fibrillar network. Fiber diameter is  $\sim 20$  nm. Ellipsometry indicates a film thickness of  $\sim 20$  nm.

T. McCarthy, *J. Am. Chem. Soc.*, 2006, 128, 9052.

## Hydrophilic Silane Surface Treatments

The vast majority of surfaces are hydrophilic. Water is omnipresent in the environment, yet the precise nature of interaction of water with specific surfaces is largely unknown. Water adsorption may be uniform or in isolated patches. It may be driven by a number of different physical and chemical processes. The adsorption of water by a surface may be assisted or retarded by other adsorbents present in the environment. The purpose of applying a hydrophilic surface treatment is to control both the nature and extent of interaction of water with a surface.

The controlled interaction of water with substrates can offer various degrees of hydrophilicity ranging from physisorption to chemisorption and centers for ion-interaction. The utility of hydrophilic surfaces varies widely. Anti-fog coatings exploit high surface energies to flatten water droplets rather than allowing them to form light-scattering droplets. In biological systems hydrophilic surfaces can reduce nonspecific bonding of proteins. Hydrophilic coatings with hydrogen bonding sites allow formation of tightly adherent layers of water with high lubricity in biological systems and the ability to resist oil adsorption in anti-graffiti coatings. They can also be used to disperse particles in aqueous coatings and oil-in-water emulsions. Hydrophilic coatings with ionic sites form antistatic coatings, dye receptive surfaces and can generate conductive or electrophoretic pathways. Thick films can behave as polymeric electrolytes in battery and ion conduction applications.

In general, surfaces become more hydrophilic in the series: **non-polar < polar, no hydrogen-bonding < polar, hydrogen-bonding < hydroxylic < ionic**. The number of sites and the structure and density of the interphase area also have significant influence on hydrophilicity.

Much of the discussion of hydrophobicity centers around high contact angles and their measurement. As a corollary, low or 0° contact angles of water are associated with hydrophilicity, but practically the collection of consistent data is more difficult. Discriminating between surfaces with a 0° contact angle is impossible. The use of heat of immersion is a method that generates more consistent data for solid surfaces, provided the surface does not react with, dissolve or absorb the tested liquid. Another important consideration is whether the water adsorbed is “free” or “bound.” Free water is water that is readily desorbed under conditions of less than 100% relative humidity. If water remains bound to a substrate under conditions of less than 100% relative humidity, the surface is considered hygroscopic. Another description of hygroscopic water is a boundary layer of water adsorbed on a surface less than 200nm thick that cannot be removed without heating. A measure of the relative hygroscopic nature of surfaces is given by the water activity, the ratio of the fugacity, or escaping tendency, of water from a surface compared to the fugacity of pure water.

The hydrophilicity of a surface as measured or determined by contact angle is subject to interference by loosely bound oils and other contaminants. Heats of immersion and water activity measurements are less subject to this interference. Measurements of silane-modified surfaces demonstrate true modification of the intrinsic surface properties of substrates. If the immobilized hydrophilic layer is in fact a thin hydrogel film, then swelling ratios at equilibrium water absorption can provide useful comparative data.

*Anti-fog coatings applied to one side of a visor can be prepared from combinations of polyalkylene oxide functional silanes and film-forming hydrophilic silanes.*



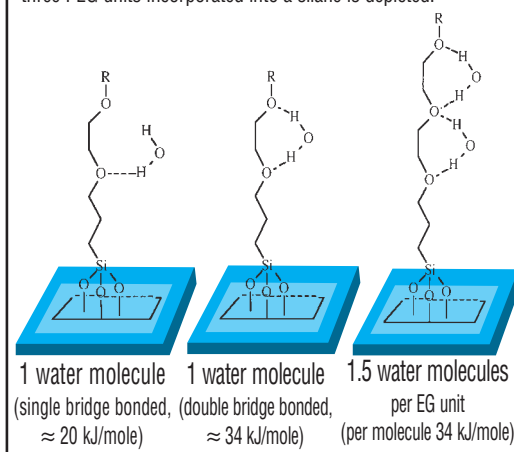
### Heats of Immersion in Water, mJ/m<sup>2</sup>

titanium dioxide	225-250
talc	220-260
aminopropyltriethoxysilane*	230-270
silicon dioxide	210-225
glass	200-205
vinyltris(methoxyethoxy)silane*	110-190
mercaptopropyltrimethoxysilane*	80-170
graphite	32-35
polytetrafluoroethylene	24-25

\*Data for silane treated surfaces in this table is primarily from B. Marciniec et al, Colloid & Polymer Science, 261, 1435, 1983 recalculated for surface area.

### Water Interaction with PEGylated Silanes

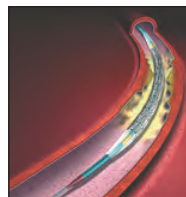
The most common strategy for non-hydroxylic polar modification of organic molecules is the incorporation of polyethylene oxide units (PEG). The interaction of water with one, two and three PEG units incorporated into a silane is depicted.



## 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 substitution 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 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, polydodal or other network forming silane as the basis for inducing hydrophilicity or as a component in the hydrophilic surface treatment is often obligatory.

### Range of Water Interaction with Surfaces

interaction	description	surface example	measurement - parameter
low	superhydrophobic		contact angle
	oleophobic	fluorocarbon	
	lipophobic		
	oleophilic		water-sliding angle
	lipophilic	hydrocarbon	critical surface tension
moderate	hydrophobic		
	polar hydrophilic	polymer oxide surface	heat of immersion
strong	hygroscopic	polyhydroxylic	water activity
	hydrogel film		equilibrium water absorption swell

## Reacting with the Substrate

### Leaving Groups

The reaction of an organofunctional silane with a surface bearing hydroxyl group results in a substitution reaction at silicon and the formation of the silylated surface where the silicon is covalently attached to the surface via an oxygen linkage. This connection may be formed directly or in the presence of water through a reactive silanol intermediate. In general the reactivity of hydroxylated surfaces with organo-functional silanes decreases in the order:  $\text{Si-NR}_2 > \text{Si-Cl} > \text{Si-NH-Si} > \text{Si-O}_2\text{CCH}_3 > \text{Si-OCH}_3 > \text{Si-OCH}_2\text{CH}_3$ . 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 by atmospheric moisture.

## Silane Requirements for Surface Coverage

### Hydrolytic Deposition – creating a minimum uniform coverage

The majority of surface modifications are affected by the hydrolytic deposition of trialkoxysilanes. Specific Wetting Surface (SWS) is a value determined empirically for the amount of silane required to obtain minimum uniform multilayer coverage on a substrate.

$$\text{amount of silane (g)} = \frac{\text{amount of substrate (g)} \times \text{surface area of filler (m}^2\text{/g)}}{\text{specific wetting surface}}$$

Specific Wetting Surface (SWS) numbers are found throughout this brochure.

### Monolayer Deposition

Monolayer deposition is a widely used term, but the definition of a monolayer is usually contextual. The simplest definition is that there is an attachment of a surface treatment molecule to every surface atom. However, coverage of this type is probably never the case. In general, monolayer coverage refers to the reaction of the surface treatment molecule with available hydroxyl groups on the surface, but this is also almost never achieved. For example, hydrated fumed silica has 4.4-4.6  $-\text{OH}/\text{nm}^2$ . A high surface fumed silica has a surface area of  $3.25 \times 10^{20}$   $\text{nm}^2/\text{gram}$  and thus  $1.5 \times 10^{21}$  hydroxyls. If this is divided by Avogadro's number,  $6.02 \times 10^{23}$ ,  $2.4 \times 10^{-3}$  moles of silane are required to provide coverage on 1 gram of fumed silica. Monolayer bonding of a silane with a molecular weight of 200 would deposit 0.5 g silane per gram of silica. In fact, most monolayer depositions of silanes result in about 10% of the calculated requirement, i.e. 0.5g silane per gram of fumed silica.

### Bond Dissociation Energies

Bond	Dissociation Energy (kcal/mole)
$\text{Me}_3\text{Si-NMe}_2$	98
$\text{Me}_3\text{Si-N}(\text{SiMe}_3)_2$	109
$\text{Me}_3\text{Si-Cl}$	117
$\text{Me}_3\text{Si-OMe}$	123
$\text{Me}_3\text{Si-OEt}$	122
$\text{Me}_3\text{Si-OSiMe}_3$	136

### Common Leaving Groups

Type	Advantage	Disadvantage
dimethylamine	reactive, volatile byproduct	toxic
hydrogen chloride	reactive, volatile byproduct	corrosive
silazane ( $\text{NH}_3$ )	volatile	limited availability
methoxy	moderate reactivity, neutral byproduct	moderate toxicity
ethoxy	low toxicity	lower reactivity

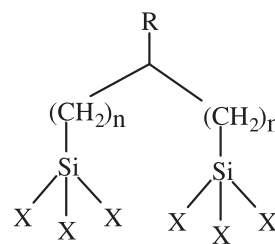
### Surface Area of Common Substrates

Type	$\text{m}^2/\text{g}$
E-Glass	0.10-0.12
Silica, ground	1-2
Silica, diatomaceous	1-3.5
Calcium silicate	2.6
Clay, kaolin	7
Talc	7
Silica, fumed	150-250

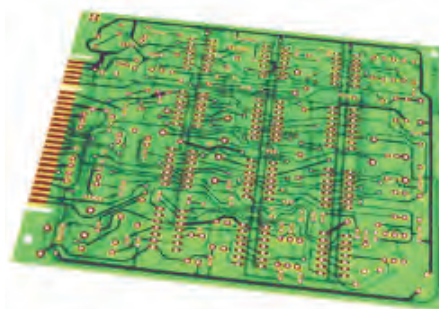
# Special Topics

## Dipodal Silanes

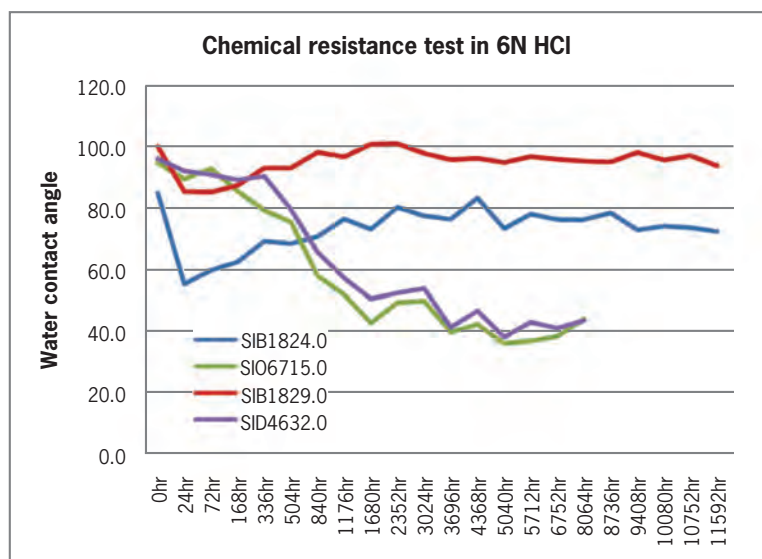
Dipodal silanes are silanes employed in surface modification that possess two silicon atoms capable of bonding to surfaces through oxane bonds. Functional dipodal silanes and combinations of non-functional dipodal silanes with functional silanes have significant impact on substrate bonding, hydrolytic 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).



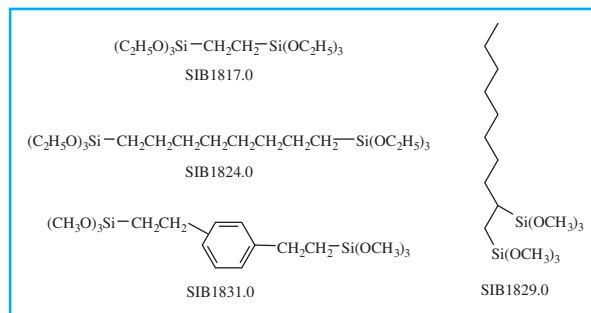
Multilayer printed circuit boards use dipodal silanes to maintain the integrity of the bond between metal and resins by reducing interfacial water adsorption.



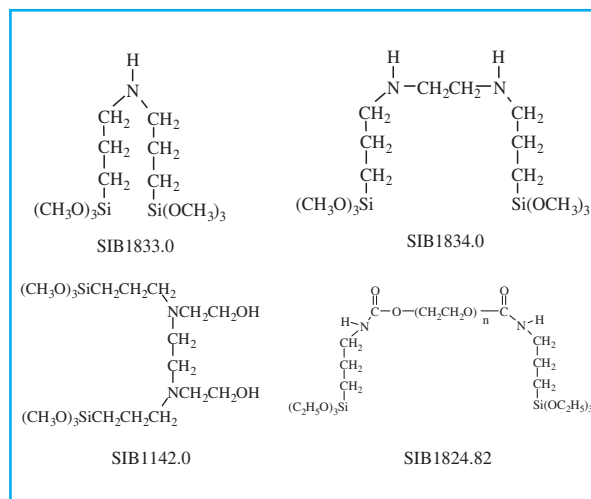
## Dipodal vs Conventional Silanes in acidic aqueous environments



### Hydrophobic Dipodal Silanes



### Hydrophilic Dipodal Silanes



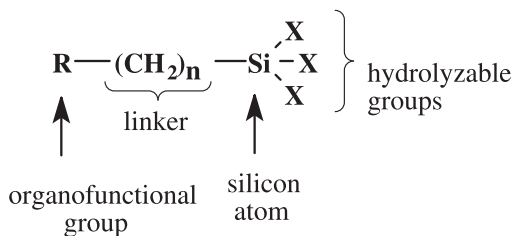
Glass surfaces treated with: bridged dipodal silane **SIB1824.0 1,8-bis(triethoxysilyl)octane**; conventional silane **SIO6715.0 n-octyltriethoxysilane**; pendant dipodal silane **SIB1829.0 1,2-bis(trimethoxysilyl)decane**; conventional silane, **SID4632.0 n-decyltriethoxysilane**.



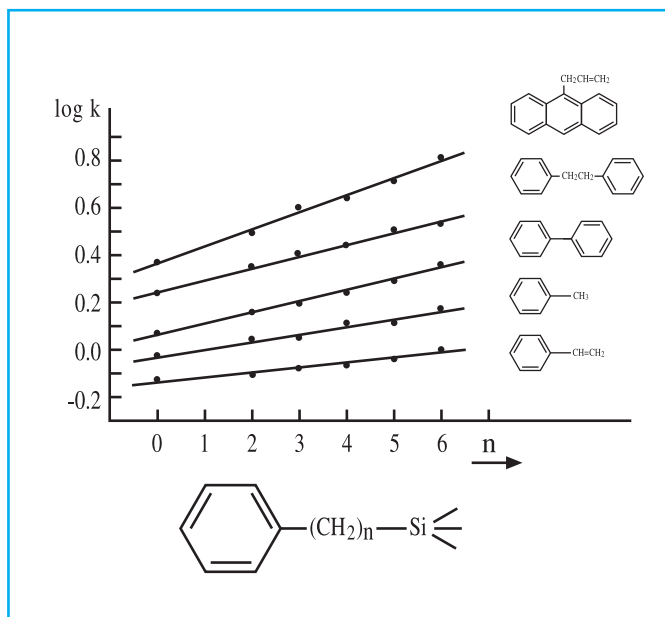
Hydrophobic coatings applied to antennas inhibit the formation of adsorbed water layers which become dielectric layers that absorb signals and cause high losses. If the water is in beads, the energy will be slightly diffracted because the water droplets have dimensions much less than a wavelength at 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 is most important in sensor applications, in heterogeneous catalysis, in fluorescent materials and in composite systems where 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 phase as 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 both synthetically accessible and has good thermal stability.

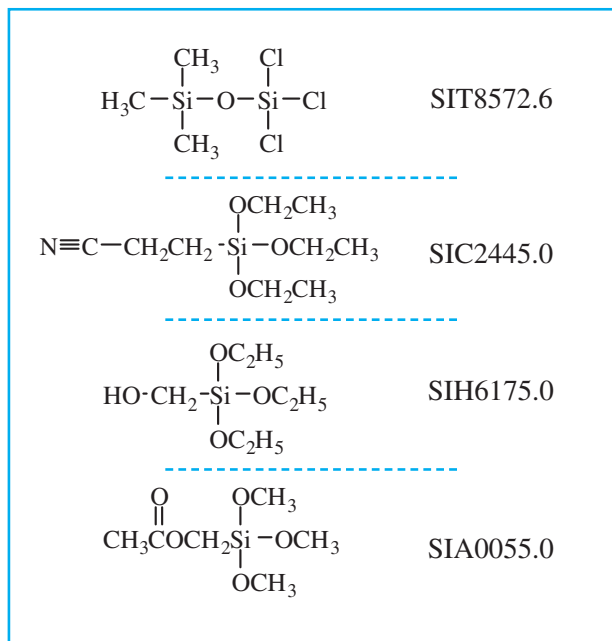


### Effect of linker length on the separation of aromatic hydrocarbons

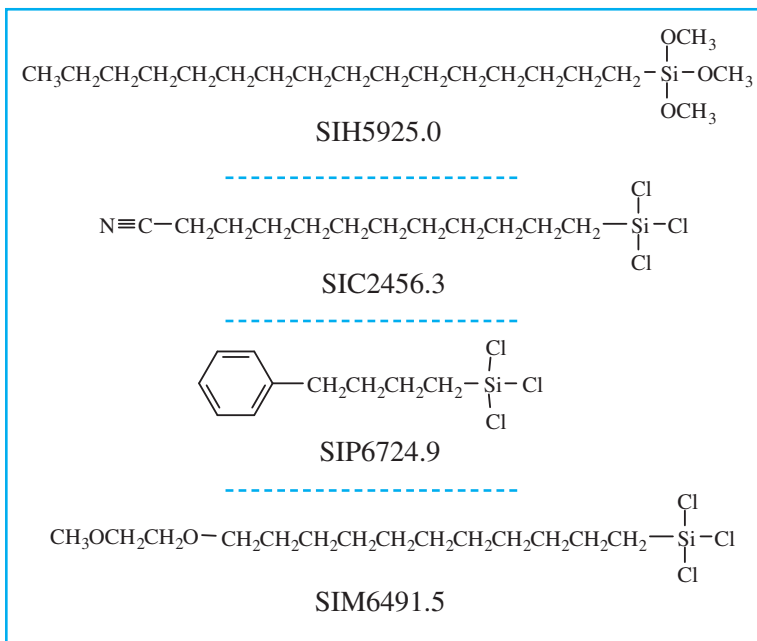


T. Den et al, in "Silanes, Surfaces, Interfaces" D. Leyden ed., 1986 p403.

#### Silanes with short linker length



#### Silanes with extended linker length





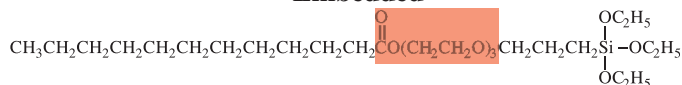
## Combining Polarity and Non-Polarity in Silane Surface Treatments

It may be desirable for a surface treatment to possess both polar groups and non-polar groups. The polarity may either be embedded below a hydrocarbon tail (i.e. proximal to the surface) or tipped at the end of the hydrocarbon (i.e. proximal to the contacting phase).

### Tipped



### Embedded



Silane surface treatments with either tipped or embedded polarity provide an avenue to overcome traditional limitations imposed by surface energetics. They allow formation of surfaces that respond to solvent, electrical potential and thermal transitions by dramatically varying wettability. Silane treated substrates associated with a variety of multiphase applications, including particle dispersion, reversed-phase HPLC and diagnostic assays can also take advantage of surfaces which combine polarity with non-polarity.

Comparative contact angle data of various silanes with polar substitution having degrees of hydrogen bonding and in which the polar groups are either embedded or are tipped along with hydrophobic and hydrophilic controls demonstrate interesting trends. Tipped polar silanes show higher contact angles with water than the embedded polar silanes, regardless of opportunities for hydrogen-bonding. The number of PEG units has relatively small impact on contact angle of the tipped silanes although an increase in number of PEG units does correlate to decreased water contact angle. PEG units embedded in silanes have a stronger effect on contact angle than PEG units in the tipped analogs. Hexadecane contact angle seems to be controlled by the number of carbon atoms in the carbon chain, although a step-change increase in contact angle is observed with C<sub>18</sub>-PEG silanes.

Polarity is generally associated with hydrophilicity. Non-polarity is generally associated with hydrophobicity. In the case of surface treatments, it may be that the term hydrophobic (“water-hating” or “water fearing”) suggests a too simplistic explanation. It appears not so much that hydrocarbons hate water, but that water hates hydrocarbons. Hydrocarbons appear indifferent to water. In the case of alkylsilanes tipped with polar groups, water molecular interaction proceeds until interaction with the hydrocarbon. In the cases of alkylsilanes in which polar groups are embedded near the surface, the hydrocarbon poses only a small barrier to the access of water to the polar groups.

## Particle Dispersion Utilizing Silanes with Embedded Polarity

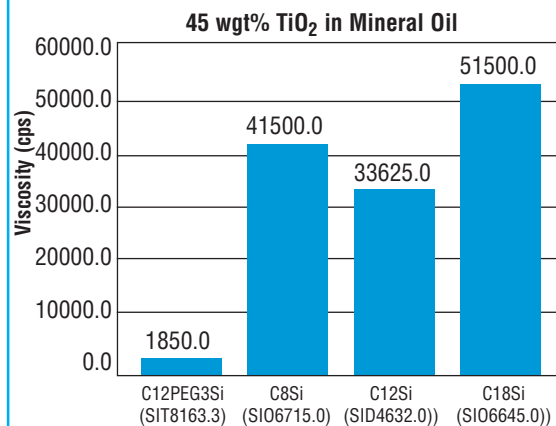
The incorporation of polar functionality into hydrocarbon substituted silanes can have dramatic effects on the dispersion of particles. Depending on the media, the appropriate mixed polarity surface treatment can improve dispersion, reduce viscosity or increase loading.

Contact Angles of Water and Hexadecane on Silane Layers with Tipped and Embedded Polar Groups

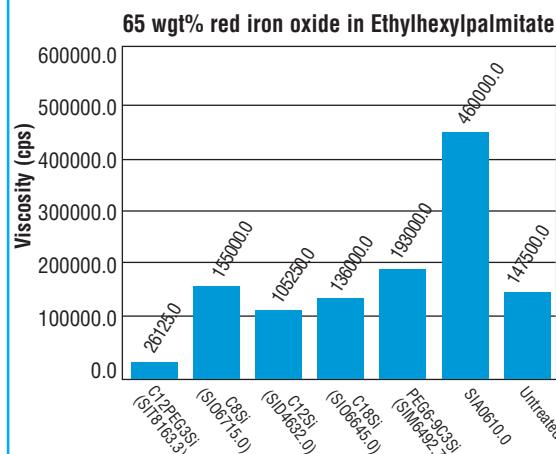
Silane	Contact angle (degrees)	
	Water	Hexadecane
<b>Hydrophobic control</b> Dodecyltriethoxysilane (SID4632.0)	100	21
<b>Hydrophilic tipped silanes</b> (Methoxytriethyleneoxy)- trimethoxysilylundecanoate (SIM6493.7)	74	7
Methoxyethoxyundecyltrichlorosilane (SIM6491.5)	73	5
<b>Hydrophilic embedded silanes</b> Triethoxysilylpropoxy(triethyleneoxy)- octadecanoate	68	28
Triethoxysilylpropoxy(triethyleneoxy)- dodecanoate (SIT8186.3)	62	6
Triethoxysilylpropoxy(hexaethyleneoxy)- octadecanoate	42	28
Triethoxysilylpropoxy(hexaethyleneoxy)- dodecanoate	35	3
<b>Hydrophilic control</b> Methoxy(polyethyleneoxy) <sub>6-9</sub> - propyltrimethoxysilane (SIM6492.7)	16	17

B. Arkles et al in "Silanes & Other Coupling Agents Vol 5, K. Mittal Ed. p.51 VSP (Brill) 2009.

## Silane Surface Treated Particles – Effect on Rheology



Dispersion viscosity of different silane treated titanium dioxide pigment at 65% loading in mineral oil. DodecanoylPEG3silane (SIT8186.3) with embedded polarity provides lower viscosity than octyl-, dodecyl- and octadecylsilanes.



Dispersion viscosity of different silane treated iron oxide pigments at 65% loading in 2-ethylhexylpalmitate. DodecanoylPEG3silane (SIT8186.3) with embedded polarity provides lower viscosity than alkyl, polyethyleneoxide, and aminopropyl substituted silanes.

# Partition, Orientation and Self-Assembly in Bonded Phases

## Chromatography

Octadecyl, cyanopropyl and branched tricocyl silanes provide bonded phases for liquid chromatography. Reverse-phase thin-layer chromatography can be accomplished by treating plates with dodecyltrichlorosilane.

## Liquid Crystal Displays

The interphase can also impose orientation of the bulk phase. In liquid crystal displays, clarity and permanence of image are enhanced if the display can be oriented parallel or perpendicular to the substrate. The use of surfaces treated with octadecyl(3-(trimethoxysilyl)propyl) ammonium chloride (perpendicular) or methylaminopropyl-trimethoxysilane (parallel) has eliminated micromachining operations. The oriented crystalline domains often observed in reinforced nylons have also been attributed to orientation effects of the silane in the interphase.

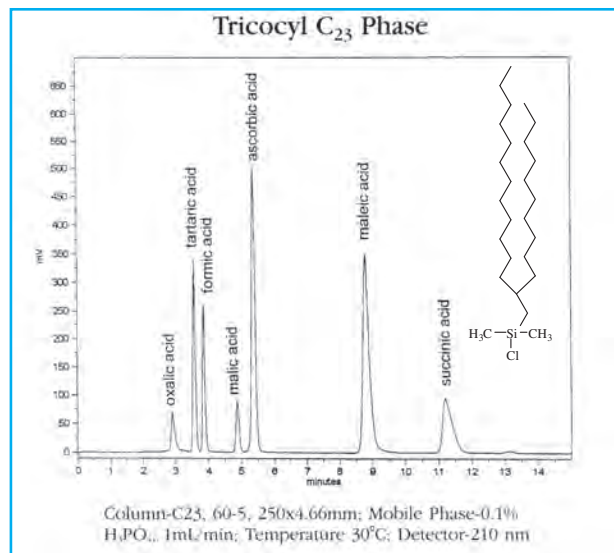
## Self-Assembled Monolayers (SAMs)

A Self-Assembled Monolayer (SAM) is a one molecule thick layer of material that bonds to a surface in an ordered way as a result of physical or chemical forces during deposition. Silanes can form SAMs by solution or vapor phase deposition processes. Most commonly, chlorosilanes or alkoxy silanes 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.

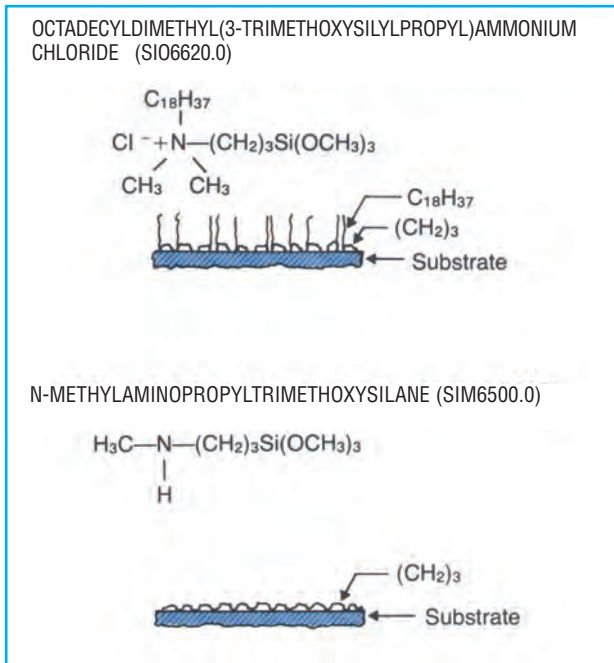
Common long chain alkyl silanes used in the formation of SAMs are simple hydrocarbon, fluoroalkyl and end-group substituted silanes. Silanes with one hydrolyzable group maintain interphase structure after deposition by forming a single oxane bond with the substrate. Silanes with three hydrolyzable groups 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<sub>10</sub> 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<sub>23</sub>-Silane Bonded Phase

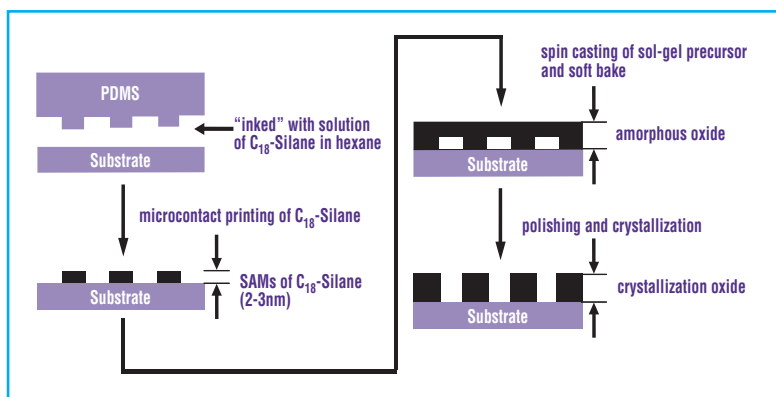


Orientation effects of silanes for passive LCDs



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

## Micro-Contact Printing Using SAMs



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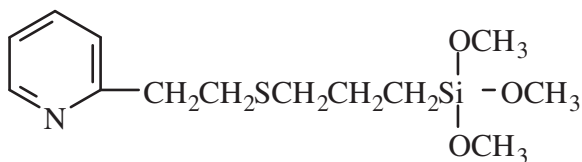
## Modification of Metal Substrates

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.

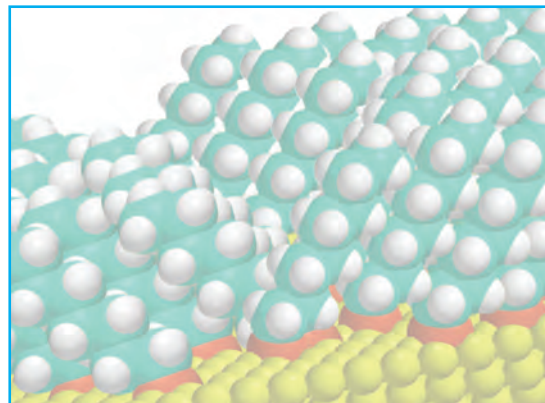
**Metals that form hydrolytically stable surface oxides, e.g. aluminum, tin, titanium.** These oxidized surfaces tend to have sufficient hydroxyl functionality to allow coupling under the same conditions applied to the siliceous substrates discussed earlier.

**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 involve two or more silanes. One silane is a chelating agent such as a diamine, polyamine or polycarboxylic acid. A second silane is selected which has a reactivity with the organic component and reacts with the first silane by co-condensation. If a functional dipodal or polymeric silane is not selected, 10-20% of a non-functional dipodal silane typically improves bond strength.

**Metals that do not readily form oxides, e.g. nickel, gold and other precious metals.** Bonding to these substrates requires coordinative bonding, typically a phosphine, sulfur (mercapto), or amine functional silane. A second silane is selected which has a reactivity with the organic component. If a functional dipodal or polymeric silane is not selected, 10-20% of a non-functional dipodal silane typically improves bond strength.



SIP6926.2

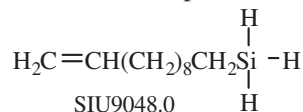


Octylsilane adsorbed on gold

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 p77.)



### 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.

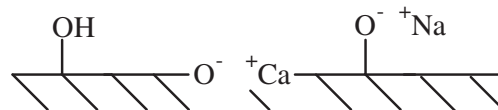
## Difficult Substrates

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<sup>1</sup>.

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 unreactive. 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<sup>1</sup>.

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<sub>2</sub>O/O<sub>2</sub> in high energy environments including steam at 1050° and water plasma<sup>1</sup>.

1. N. Alcanter et al, in "Fundamental & Applied Aspects of Chemically Modified Surfaces" ed. J. Blitz et al, 1999, Roy. Soc. Chem., p212.

PLEASE INQUIRE ABOUT BULK QUANTITIES

## 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 alkoxy silane 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 alkoxy silanes 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 devolatilization 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 benzyl dimethylamine 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.

**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 alkoxy silane 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 alkoxy silanes. 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.



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

# Applying Silanes

## Vapor Phase Deposition

Silanes can be applied to substrates under dry aprotic conditions by chemical vapor deposition methods. These methods favor monolayer deposition. Although under proper conditions almost all silanes can be applied to substrates in the vapor phase, those with vapor pressures  $>5$  torr at  $100^{\circ}\text{C}$  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  $50^{\circ}$  and below  $120^{\circ}$  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.

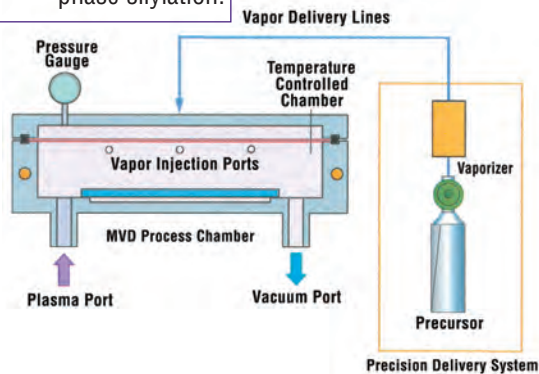
## Spin-On

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  $50^{\circ}$ . In some protocols, limited polylayer formation is induced by spinning under an atmospheric ambient with 55% relative humidity.

## 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 4.**  
Apparatus for vapor phase silylation.



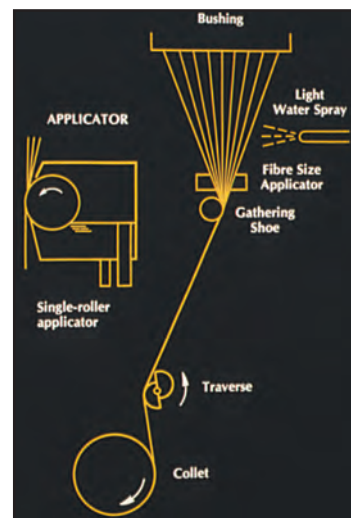
**Figure 5.**  
Spin-coater for deposition on wafers.



**Figure 6.**  
Spray application of silanes on large structures.

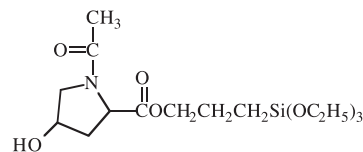


**Figure 7.**  
Spray & contact roller application of silanes on fiberglass.

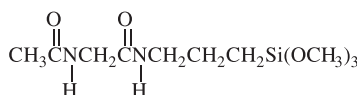


## Biomimetic Silane Surface Treatments

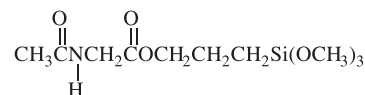
In addition to the direct metabolic and structural roles played by many biomolecules, they can also be involved in control of *in vivo* hydrophilic-lipophilic balance and specific adsorptive interactions with other biomolecules. Biomimetic silanes offer an opportunity to modify surfaces to impart a desired level of hydrophilicity and control biomolecule adsorption.



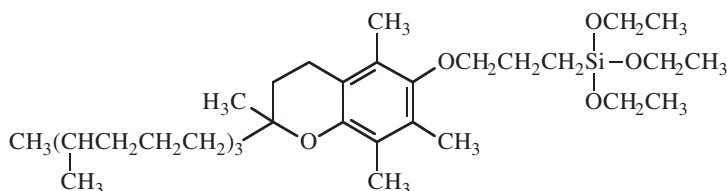
SIA0126.0  
acetylhydroxypropyl



SIA0120.2  
acetylglycinamide



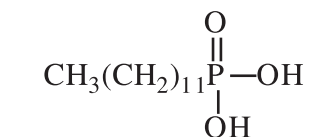
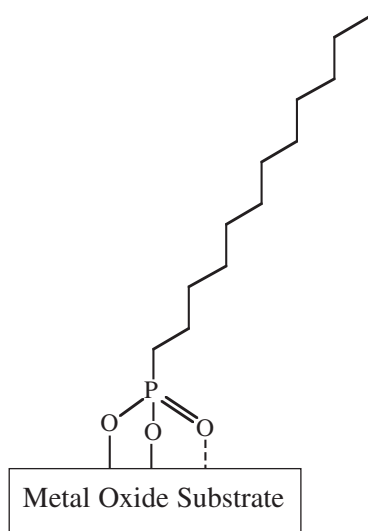
SIA0123.0  
acetylglycyl



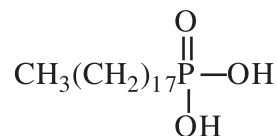
SIT8012.0 tocopheryl

## Alkylphosphonic Acids

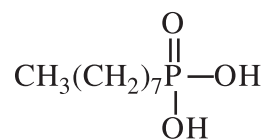
Alkylphosphonic acids are utilized as hydrophobic coatings for a variety of non-siliceous, native oxide surfaces of metals such as iron, steel, tin, aluminum and copper. Alkylphosphonic acids can react under ambient conditions to form adherent, alkane chain ordered films. They have advantages over alkylsilanes when a metal-oxide substrate does not form a hydrolytically stable silicon-oxygen-metal bond. Alkylphosphonic acids are generally deposited from dilute solutions (0.25-0.50 wgt %) in moderately polar solvents such as toluene, tetrahydrofuran and ethanol. The deposition results in self-assembled monolayers (SAMs) in which it is generally considered that two direct bonds are formed with the surface through oxygen-metal linkages and the third remaining oxygen is coordinated to the surface.



OMPH058  
dodecylphosphonic acid



OMPH062  
octadecylphosphonic acid



OMPH061  
octylphosphonic acid

For further information on alkylphosphonic acids, see Gelest Metal-Organics Catalog.

## Hydrophobic Silane Selection Guide

Hydrophobic silanes employed in surface modification form the following major categories:

Methyl-Silanes . . . . .	22
Linear Alkyl-Silanes . . . . .	24
Branched Alkyl-Silanes . . . . .	26
Aromatic-Silanes . . . . .	28
Fluorinated Alkyl-Silanes . . . . .	30
Dialkyl-Silanes . . . . .	30

**Methyl-Silanes** very hydrophobic, hydrolyzates stable to 425°C, acceptable performance to 600°C reported, volatile

### 3 Hydrolyzable Groups

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

### Methyl-SiloxanylSilanes

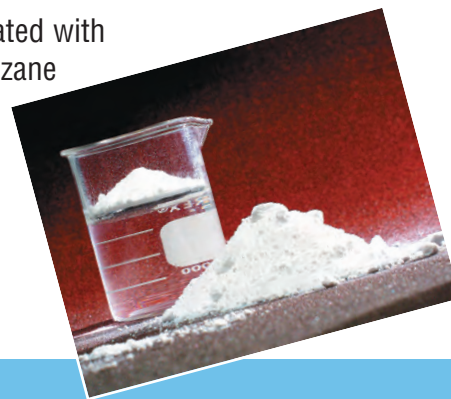
#### 3 or more Hydrolyzable Groups

Hydrolyzable Groups	Product Code	Product Name
<b>2 silicon atom compounds</b>		
chloro	SIT8572.6	trimethylsiloxytrichlorosilane
ethoxy	SIT7095.0	tetraethoxy-1,3-dimethyldisiloxane
acetoxy		
<b>3 silicon atom compounds</b>		
chloro		
methoxy		
ethoxy		
chloro		
<b>oligomeric polysiloxanes</b>		
chloro		
methoxy		
ethoxy		
amine/silazane		
silanol		
selected specialties		
	SID4236.0	dimethyltetramethoxydisiloxane

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Fumed silica treated with hexamethyldisilazane floats on water.



*2 Hydrolyzable Groups*

*1 Hydrolyzable Group*

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

Product Code	Product Name
SIT8510.0	trimethylchlorosilane
SIT8566.0	trimethylmethoxysilane
SIT8515.0	trimethylethoxysilane
SIT8568.0	trimethyl-n-propoxysilane
SIM6492.8	methoxypropoxytrimethylsilane
SIA0110.0	acetoxymethyltrimethylsilane
SID3605.0	dimethylaminotrimethylsilane
SID3398.0	diethylaminotrimethylsilane
SIH6110.0	hexamethyldisilazane

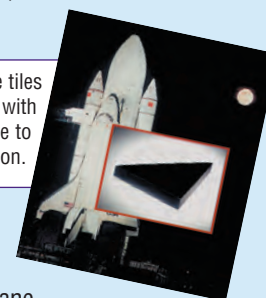
*2 Hydrolyzable Groups*

*1 Hydrolyzable Group*

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

Product Code	Product Name
SIP6717.0	pentamethylacetoxymethylsiloxane
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 Hydrolyzable Groups

	Hydrolyzable Groups	Product Code	Product Name
<b>C<sub>2</sub></b>	hydrophobic, treatment for microporous mineral powders used as fillers for plastics		
	chloro	SIE4901.0	ethyltrichlorosilane
	methoxy	SIE4901.4	ethyltrimethoxysilane
	ethoxy	SIE4901.2	ethyltriethoxysilane
<b>C<sub>3</sub></b>	hydrophobic, treatment for microporous mineral powders used as fillers for plastics		
	acetoxo	SIE4899.0	ethyltriacetoxysilane
	chloro	SIP6915.0	propyltrichlorosilane
	methoxy	SIP6918.0	propyltrimethoxysilane
<b>C<sub>4</sub></b>	moderate hydrophobicity, penetrates microporous structures, minimal organic compatibility		
	ethoxy	SIP6917.0	propyltriethoxysilane
	amine/silazane		
	chloro	SIB1982.0	n-butyltrichlorosilane
<b>C<sub>5</sub></b>	moderate hydrophobicity, penetrates microporous structures, minimal organic compatibility		
	methoxy	SIB1988.0	n-butyltrimethoxysilane
	ethoxy	SIB1986.0	n-butyltriethoxysilane
	amine/silazane		
<b>C<sub>5</sub></b>	moderate hydrophobicity with minimal organic compatibility		
	chloro	SIP6720.0	pentyltrichlorosilane
<b>C<sub>6</sub></b>	moderate hydrophobicity with moderate organic compatibility		
	ethoxy	SIP6720.2	pentyltriethoxysilane
<b>C<sub>6</sub></b>	moderate hydrophobicity with moderate organic compatibility		
	chloro	SIH6167.0	hexyltrichlorosilane
	methoxy	SIH6168.5	hexyltrimethoxysilane
<b>C<sub>7</sub></b>	moderate hydrophobicity with moderate organic compatibility		
	ethoxy	SIH6167.5	hexyltriethoxysilane
<b>C<sub>7</sub></b>	moderate hydrophobicity with moderate organic compatibility		
	chloro	SIH5846.0	heptyltrichlorosilane
<b>C<sub>8</sub></b>	hydrophobic with moderate organic compatibility - generally most economical		
	chloro	SIO6713.0	octyltrichlorosilane
	methoxy	SIO6715.5	octyltrimethoxysilane
	ethoxy	SIO6715.0	octyltriethoxysilane
	amine silazane (NH)		
<b>C<sub>10</sub></b>	hydrophobic, concentrates on surface of microporous structures		
	chloro	SID2663.0	decyltrichlorosilane
<b>C<sub>11</sub></b>	hydrophobic, concentrates on surface of microporous structures, forms SAMs		
	ethoxy	SID2665.0	decyltriethoxysilane
<b>C<sub>11</sub></b>	hydrophobic, concentrates on surface of microporous structures, forms SAMs		
	chloro	SIU9050.0	undecyltrichlorosilane
<b>C<sub>12</sub></b>	hydrophobic, concentrates on surface of microporous structures, forms SAMs		
	chloro	SID4630.0	dodecyltrichlorosilane
<b>C<sub>12</sub></b>	hydrophobic, concentrates on surface of microporous structures, forms SAMs		
	ethoxy	SID4632.0	dodecyltriethoxysilane
<b>C<sub>14</sub></b>	hydrophobic, concentrates on surface of microporous structures, forms SAMs		
	chloro	SIT7093.0	tetradecyltrichlorosilane
<b>C<sub>16</sub></b>	forms hydrophobic and oleophilic coatings, liquid a room temperature, forms SAMs		
	chloro	SIH5920.0	hexadecyltrichlorosilane
	methoxy	SIH5925.0	hexadecyltrimethoxysilane
	ethoxy	SIH5922.0	hexadecyltriethoxysilane
<b>C<sub>18</sub></b>	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
<b>C<sub>20</sub></b>	forms hydrophobic and oleophilic coatings, solid at room temperature		
	chloro	SIE4661.0	eicosyltrichlorosilane
<b>C<sub>20-24</sub></b>	forms hydrophobic and oleophilic coatings, solid at room temperature		
	chloro	SID4621.0	docosyltrichlorosilane blend
<b>C<sub>20-24</sub></b>	forms hydrophobic and oleophilic coatings, solid at room temperature		
	ethoxy	SID4622.09	docosyltriethoxysilane blend
<b>C<sub>26-C<sub>34</sub></sub></b>	forms hydrophobic and oleophilic coatings, solid at room temperature		
	chloro	SIT8048.0	triacontyltrichlorosilane blend

**2 Hydrolyzable Groups**

**1 Hydrolyzable Group**

**Product Code**

**Product Name**

**Product Code**

**Product Name**

SIE4896.0

ethylmethylchlorosilane

SIE4892.0

ethyldimethylchlorosilane

SIP6912.0

propylmethylchlorosilane

SIP6910.0

propyldimethylchlorosilane

SIP6914.0

propylmethylmethoxysilane

SIP6911.0

propyldimethylmethoxysilane

SID4591.0

dipropyltetramethyldisilazane

SIB1934.0

n-butyldimethylchlorosilane

SIB1937.0

n-butyldimethyl(dimethylamino)silane

*Long chain alkylsilanes are processing additives for crosslinked polyethylene (XLPE) used in wire and cable.*

SIH6165.6

hexylmethylchlorosilane

SIH5845.0

heptylmethylchlorosilane

SIO6712.0

octylmethylchlorosilane

SIO6711.0

octyldimethylchlorosilane

SIO6712.2

octylmethylmethoxysilane

SIO6711.1

octyldimethylmethoxysilane

SIO6711.3

octyldimethyl(dimethylamino)silane

SID4404.0

dioctyltetramethyldisilazane

SID2662.0

decylmethylchlorosilane

SID2660.0

decyldimethylchlorosilane

*Surface conductivity of glass substrates is reduced by application of hydrophobic coatings. Surface arc-tracking is eliminated on fluorescent light bulbs.*

SID4628.0

dodecylmethylchlorosilane

SID4627.0

dodecyldimethylchlorosilane

SID4629.0

dodecylmethylmethoxysilane

SIO6625.0

octadecylmethylchlorosilane

SIO6615.0

octadecyldimethylchlorosilane

SIO6629.0

octadecylmethylmethoxysilane

SIO6618.0

octadecyldimethylmethoxysilane

SIO6627.0

octadecylmethylmethoxysilane

SIO6617.0

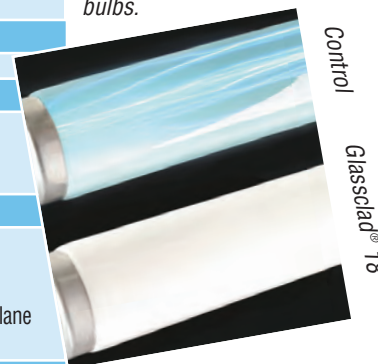
octadecyldimethyl(dimethylamino)silane

SID4620.0

docosylmethylchlorosilane blend

SIT8045.0

triacontyldimethylchlorosilane blend



Control

Glasclad® 18

## Hydrophobic Silane Selection Guide

### *Branched and Cyclic Alkyl-Silanes*

#### *3 Hydrolyzable Groups*

	Hydrolyzable Groups	Product Code	Product Name
<b>C<sub>3</sub></b>	chloro		
<b>C<sub>4</sub></b>	chloro methoxy ethoxy chloro	SI16453.0 SI16453.7 SI16453.5 SIB1985.0	isobutyltrichlorosilane isobutyltrimethoxysilane isobutyltriethoxysilane t-butyltrichlorosilane
<b>C<sub>5</sub></b>	chloro methoxy	SIC2555.0 SIC2557.0	cyclopentyltrichlorosilane cyclopentyltrimethoxysilane
<b>C<sub>6</sub></b>	chloro chloro chloro methoxy	SID4069.0 SIT7906.6 SIC2480.0 SIC2482.0	(3,3-dimethylbutyl)trichlorosilane hexyltrichlorosilane cyclohexyltrichlorosilane cyclohexyltrimethoxysilane
<b>C<sub>7</sub></b>	norbornene chloro chloro	SIB0997.0 SIC2470.0	bicycloheptyltrichlorosilane (cyclohexylmethyl)trichlorosilane
<b>C<sub>8</sub></b>	chloro methoxy ethoxy chloro	SI16457.0 SI16458.0 SI16453.5 SIC2490.0	isooctyltrichlorosilane isooctyltrimethoxysilane isooctyltriethoxysilane cyclooctyltrichlorosilane
<b>C<sub>10</sub></b>			
<b>C<sub>12</sub></b>		SIA0325.0	adamantylethyltrichlorosilane
<b>C<sub>16</sub></b>		SIT8162.4	7-(trichlorosilylmethyl)pentadecane
<b>C<sub>18</sub></b>	silahydrocarbon chloro	SID4401.5	(di-n-octylmethylsilyl)ethyltrichlorosilane
<b>C<sub>24</sub></b>	chloro		
<b>C<sub>28</sub></b>	chloro	SIT8162.0	13-(trichlorosilylmethyl)heptacosane

PLEASE INQUIRE ABOUT BULK QUANTITIES

**2 Hydrolyzable Groups**

**1 Hydrolyzable Group**

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

Product Code	Product Name	Product Code	Product Name
SII6463.0	isopropylmethyldichlorosilane	SII6462.0	isopropyl dimethylchlorosilane
SII6452.8	isobutylmethyldimethoxysilane	SII6452.5	isobutyl dimethylchlorosilane
SIB1972.2	t-butylmethyldichlorosilane	SIB1935.0	t-butyl dimethylchlorosilane
SIC2468.0 SIC2469.0	cyclohexylmethyldichlorosilane cyclohexylmethyldimethoxysilane	SID4065.0 SIT7906.0 SIC2465.0	(3,3-dimethylbutyl)dimethylchlorosilane hexyldimethylchlorosilane cyclohexyldimethylchlorosilane
		SIB0994.0	bicycloheptyldimethylchlorosilane
		SII6456.6	isooctyldimethylchlorosilane
		SID4074.0	(dimethylchlorosilyl)methylpinane
		SID4401.0	(di-n-octylmethylsilyl)ethyl dimethylchlorosilane
		SIC2266.5	11-(chlorodimethylsilylmethyl)tricosane
		SIC2266.0	13-(chlorodimethylsilylmethyl)heptacosane



# Hydrophobic Silane Selection Guide

## Phenyl- and Phenylalkyl-Silanes

### 3 Hydrolyzable Groups

Spacer Atoms	Hydrolyzable Groups	Product Code	Product Name
spacer atoms = 0 Moderate hydrophobicity, hydrolyzates stable to 325° C; UV, radiation resistant			
	chloro	SIP6810.0	phenyltrichlorosilane
	methoxy	SIP6822.0	phenyltrimethoxysilane
	ethoxy	SIP6821.0	phenyltriethoxysilane
	acetoxo	SIP6790.0	phenyltriacetoxysilane
	oxime/amine	SIP6826.5	phenyltris(methylethylketoximino)silane
spacer atoms = 1			
	chloro	SIB0970.0	benzyltrichlorosilane
	ethoxy	SIB0971.0	benzyltriethoxysilane
	chloro	SIP6813.0	1-phenyl-1-trichlorosilylbutane
spacer atoms = 2 More hydrophobic, acid resistant than phenyl			
	chloro	SIP6722.0	phenethyltrichlorosilane
	methoxy	SIP6722.6	phenethyltrimethoxysilane
	amine/silazane		
spacer atoms = 3			
	chloro	SIP6744.6	(3-phenylpropyl)trichlorosilane
spacer atoms = 4			
	chloro	SIP6724.9	4-phenylbutyltrichlorosilane
	chloro	SIP6723.3	phenoxypropyltrichlorosilane
spacer atoms > 4			
	chloro	SIP6736.4	phenoxyundecyltrichlorosilane
	chloro	SIP6723.4	phenylhexyltrichlorosilane

## Substituted Phenyl- and Phenylalkyl-Silanes

spacer atoms = 0 More hydrophobic than phenyl, peroxide crosslinkable			
	chloro	SIT8040.0	p-tolyltrichlorosilane
	methoxy	SIT8042.0	p-tolyltrimethoxysilane
spacer atoms = 2 Greater compatibility with styrenics, acrylics			
	methyl/chloro		
	ethyl/methoxy	SIE4897.5	ethylphenethyltrimethoxysilane
	t-butyl/chloro	SIB1973.0	p-(t-butyl)phenethyltrichlorosilane
spacer atoms = 3			
	chloro	SIM6492.5	3-(p-methoxyphenyl)propyltrichlorosilane

## Naphthyl-Silanes Form high refractive index coatings

methoxy	SIN6597.0	1-naphthyltrimethoxysilane
chloro	SIN6596.0	(1-naphthylmethyl)trichlorosilane

## Specialty Aromatic- Silanes

spacer atoms = 0			
	chloro		
spacer atoms = 4			
	chloro		

PLEASE INQUIRE ABOUT BULK QUANTITIES

<i>2 Hydrolyzable Groups</i>		<i>1 Hydrolyzable Group</i>	
Product Code	Product Name	Product Code	Product Name
SIP6738.0	phenylmethyldichlorosilane	SIP6728.0	phenyldimethylchlorosilane
SIP6740.0	phenylmethyldimethoxysilane	SIP6728.4	phenyldimethylethoxysilane
SIP6739.0	phenylmethyldiethoxysilane		
SIP6736.8	phenylmethylbis(dimethylamino)silane		
SIP6738.5	1-phenyl-1-methyldichlorosilylbutane	SIB0962.0	benzyldimethylchlorosilane
SIP6721.5	phenethylmethyldichlorosilane	SP6721.0	phenethyl dimethylchlorosilane
SIM6512.5	(2-methyl-2-phenethyl) methyldichlorosilane	SIP6721.2	phenethyl dimethyl(dimethylamino)silane
SIP6744.0	(3-phenylpropyl)methyldichlorosilane	SIP6743.0	(3-phenylpropyl)dimethylchlorosilane
SIP6724.8	4-phenylbutylmethyldichlorosilane	SIP6724.7	4-phenylbutyldimethylchlorosilane
SIP6723.25	phenoxypropylmethyldichlorosilane	SIP6723.2	phenoxypropyldimethylchlorosilane
		SIP6736.3	(6-phenylhexyl)dimethylchlorosilane
SIT8035.0	p-tolylmethyldichlorosilane	SIT8030.0	p-tolyldimethylchlorosilane
SIM6511.0	(p-methylphenethyl)methyldichlorosilane	SIB1972.5	p-(t-butyl)phenethyl dimethylchlorosilane
SIM6492.4	3-(p-methoxyphenyl)propylmethyldichlorosilane		
		SIP6723.0	m-phenoxyphenyldimethylchlorosilane
		SIN6598.0	p-nonylphenoxypropyldimethylchlorosilane

# Hydrophobic Silane Selection Guide

## Fluorinated Alkyl-Silanes - linear

### 3 Hydrolyzable Groups

	Hydrolyzable Groups	Product Code	Product Name	
<b>C<sub>3</sub></b>	Moderately polar hydrophobic coating			
	chloro methoxy amine/silazane	SIT8371.0 SIT8372.0	(3,3,3-trifluoropropyl)trichlorosilane (3,3,3-trifluoropropyl)trimethoxysilane	
<b>C<sub>6</sub></b>	Hydrophobic films			
		chloro	SIN6597.6	nonafluorohexyltrichlorosilane
		methoxy	SIN6597.7	nonafluorohexyltrimethoxysilane
		ethoxy amino/silazane	SIN6597.65 SIN6597.4	nonafluorohexyltriethoxysilane nonafluorohexyltris(dimethylamino)silane
<b>C<sub>8</sub></b>	Hydrophobic, oleophobic films			
		chloro	SIT8174.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)trichlorosilane
		methoxy ethoxy	SIT8176.0 SIT8175.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)trimethoxysilane (tridecafluoro-1,1,2,2-tetrahydrooctyl)triethoxysilane
<b>C<sub>10</sub></b>	Forms oleophobic films with extremely low surface energy			
		chloro	SIH5841.0	(heptadecafluoro-1,1,2,2-tetrahydrodecyl)trichlorosilane
		methoxy ethoxy	SIH5841.5 SIH5841.2	(heptadecafluoro-1,1,2,2-tetrahydrodecyl)trimethoxysilane (heptadecafluoro-1,1,2,2-tetrahydrodecyl)triethoxysilane
<b>C<sub>12</sub></b>	chloro	SIH5840.25	heneicosyl-1,1,2,2-tetrahydrodecyltrichlorosilane	

## Fluorinated Alkyl-Silanes - branched

<b>1 x 3 fluorinated carbons</b>	chloro	SIH5842.0	heptafluoroisopropoxytrichlorosilane
	methoxy	SIH5842.2	heptafluoroisopropoxytrimethoxysilane
<b>2 x 4 fluorinated carbons</b>	chloro	SIB1706.0	bis(nonafluorohexyldimethylsiloxy)methylsilylethyldimethylchlorosilane
<b>2 x 6 fluorinated carbons</b>	chloro	SIT8176.3	tridecafluoro-2-(tridecafluorohexyl)decyltrichlorosilane

## DiAlkyl Silanes

### 2 Hydrolyzable Groups

Highest Carbon #	Next Carbon #	Hydrolyzable Groups	Product Code	Product Name
<b>C<sub>2</sub></b>	<b>C<sub>2</sub></b>			
		chloro	SID3402.0	diethyldichlorosilane
<b>C<sub>3</sub></b>	<b>C<sub>3</sub></b>	ethoxy	SID3404.0	diethyldiethoxysilane
		chloro	SID3537.0	diisopropyldichlorosilane
<b>C<sub>4</sub></b>	<b>C<sub>4</sub></b>	methoxy	SID3538.0	diisopropyldimethoxysilane
		chloro	SID3203.0	di-n-butyl-dichlorosilane
<b>C<sub>4</sub></b>	<b>C<sub>3</sub></b>	methoxy	SID3214.0	di-n-butyl-dimethoxysilane
		methoxy	SID3530.0	diisobutyldimethoxysilane
		ethoxy	SID3528.0	diisobutyldiethoxysilane
		methoxy	SIH6452.6	isobutylisopropyldimethoxysilane
<b>C<sub>5</sub></b>	<b>C<sub>5</sub></b>	chloro	SID3390.0	dicyclopentyl-dichlorosilane
		methoxy	SID3391.0	dicyclopentyl-dimethoxysilane
<b>C<sub>6</sub></b>	<b>C<sub>6</sub></b>	chloro	SID3510.0	di-n-hexyl-dichlorosilane
		chloro	SID3382.0	dicyclohexyldichlorosilane
<b>C<sub>8</sub></b>	<b>C<sub>8</sub></b>	chloro	SID4400.0	di-n-octyl-dichlorosilane
		methoxy	SID4400.4	di-n-octyl-dimethoxysilane

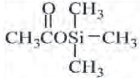

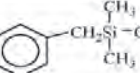
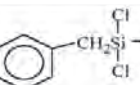
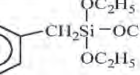


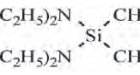
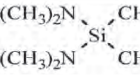
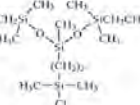


<i>2 Hydrolyzable Groups</i>		<i>1 Hydrolyzable Group</i>	
<b>Product Code</b>	<b>Product Name</b>	<b>Product Code</b>	<b>Product Name</b>
SIT8369.0 SIT8370.0	(3,3,3-trifluoropropyl)methyldichlorosilane (3,3,3-trifluoropropyl)methylmethoxysilane	SIT8364.0 SIB1828.4	(3,3,3-trifluoropropyl)dimethylchlorosilane bis(trifluoropropyl)tetramethyldisilazane
SIN6597.5	nonafluorohexylmethyldichlorosilane	SIN6597.3 SIN6597.4	nonafluorohexyldimethylchlorosilane
SIT8172.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)methyldichlorosilane	SIT8170.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)dimethylchlorosilane
SH5840.6	(heptadecafluoro-1,1,2,2-tetrahydrodecyl)methyldichlorosilane	SIH5840.4	(heptadecafluoro-1,1,2,2-tetrahydrodecyl)dimethylchlorosilane



**Pigments** treated with hydrophobic silanes resist agglomeration in highly polar vehicle and film-forming compositions such as those used in nail polish.

## Hydrophobic Silane Properties Conventional Surface Bonding

name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
 <p>SIA0110.0 ACETOXYTRIMETHYLSILANE O-TRIMETHYLSILYL ACETATE C<sub>5</sub>H<sub>12</sub>O<sub>2</sub>Si Vapor pressure, 30": 35 mm HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions</p>	132.23	103-4 (-32)	0.891	1.3890
[2754-27-0]	TSCA	EC 220-404-2 HMIS: 3-4-1-X	25g \$12.00 100g \$39.00	2kg \$290.00
 <p>SIA0325.0 ADAMANTYLETHYLTRICHLOROSILANE C<sub>12</sub>H<sub>19</sub>Cl<sub>3</sub>Si Contains approximately 25% α-isomer Forms silica bonded phases for reverse phase chromatography.<sup>1</sup> 1. Yang, S. S. and Gilpin, R. K. <i>Anal. Chem.</i> <b>1988</b>, 59, 2750. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	297.73	135 / 3 (36-7)	1.2204	1.5135
[37843-11-1]	TSCA	EC 253-687-6 HMIS: 3-1-1-X	5g \$73.00	25g \$292.00
 <p>SIB0962.0 BENZYLTRIMETHYLCHLOROSILANE C<sub>8</sub>H<sub>13</sub>ClSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	184.74	75-6 / 15	0.949	1.5040
[1833-31-4]	TSCA	HMIS: 3-2-1-X	10g \$46.00	50g \$184.00
 <p>SIB0970.0 BENZYLTRICHLOROSILANE C<sub>7</sub>H<sub>7</sub>Cl<sub>3</sub>Si Dipole moment: 1.78 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	225.58	140-2 / 10	1.288	1.527
[770-10-5]	TSCA	EC 212-219-0 HMIS: 3-2-1-X	25g \$50.00	100g \$162.00
 <p>SIB0971.0 BENZYLTRIETHOXYLSILANE C<sub>13</sub>H<sub>22</sub>O<sub>3</sub>Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	254.40	148 / 26	0.986	1.4628 <sup>25</sup>
[2549-99-7]	TSCA	EC 219-841-1 HMIS: 2-1-0-X	10g \$42.00	50g \$168.00
 <p>SIB0994.0 2-(BICYCLOHEPTYL)DIMETHYLCHLOROSILANE C<sub>9</sub>H<sub>17</sub>ClSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	188.77	52-5 / 1	0.99	
[117046-42-1]		HMIS: 3-2-1-X	25g \$72.00	100g \$234.00
 <p>SIB0997.0 2-(BICYCLOHEPTYL)TRICHLOROSILANE C<sub>9</sub>H<sub>11</sub>Cl<sub>3</sub>Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	229.61	63-4 / 4.5	1.2678	1.4919
[18245-29-9]	TSCA	EC 242-121-3 HMIS: 3-2-1-X	10g \$34.00	50g \$136.00
 <p>SIB1068.0 BIS(DIETHYLAMINO)DIMETHYLSILANE C<sub>10</sub>H<sub>26</sub>N<sub>2</sub>Si Silylates diamines to cyclic diaminosilanes.<sup>1</sup> 1. Schwartz, E. et al. <i>J. Org. Chem.</i> <b>1981</b>, 50, 5469. See also SID4040.0 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	202.42	192-5	0.826	1.435
[4669-59-4]	TSCA	EC 225-116-0 HMIS: 3-3-1-X	50g \$136.00	
 <p>SIB1072.0 BIS(DIMETHYLAMINO)DIMETHYLSILANE C<sub>8</sub>H<sub>18</sub>N<sub>2</sub>Si Couples silanol terminated siloxanes See also SIB1185.0 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	146.31	128-9 (-98)	0.810	1.4169 <sup>22</sup>
[3768-58-9]	TSCA	EC 223-200-1 HMIS: 3-4-1-X	25g \$23.00	100g \$75.00
 <p>SIB1706.0 [BIS(NONAFLUOROHEXYLDIMETHYLSILOXY)METHYL]-SILYLETHYLDIMETHYLCHLOROSILANE, 95% C<sub>21</sub>H<sub>33</sub>ClF<sub>18</sub>O<sub>2</sub>Si<sub>4</sub> Forms self-cleaning surfaces HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	807.26	128 / 0.2	1.244 <sup>25</sup>	1.3705 <sup>25</sup>
		HMIS: 3-1-1-X	5g \$120.00	

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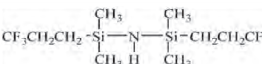
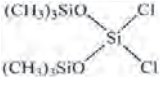
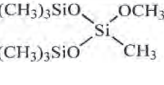
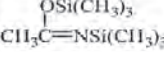
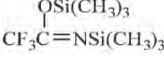
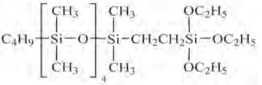
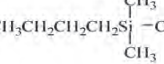
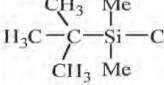
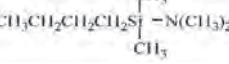
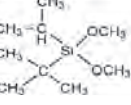
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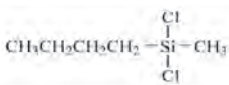
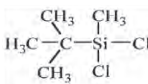
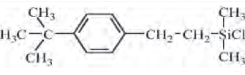
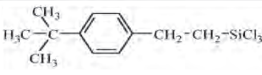
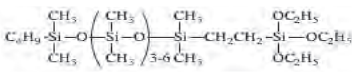
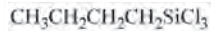
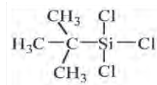
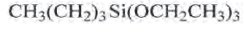
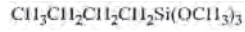
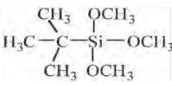

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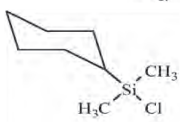
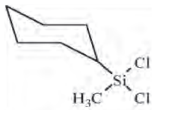
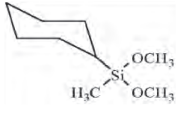
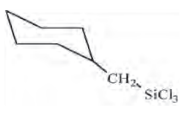
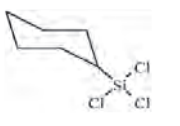
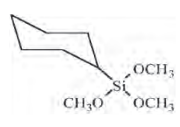
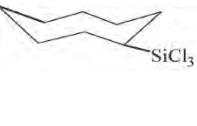
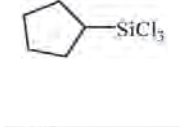
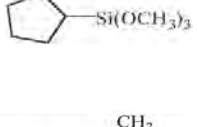
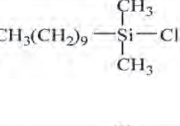
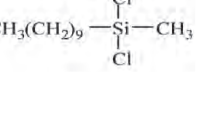
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	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIB1828.4 1,3-BIS(TRIFLUOROPROPYL)TETRAMETHYL-DISILAZANE, 95% C <sub>10</sub> H <sub>21</sub> F <sub>8</sub> NSi <sub>2</sub> Fluorinated blocking agent HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	325.45	76-9 / 10 Flashpoint: 78°C (172°F)	1.11	1.386
	[39482-87-6] TSCA EC 254-470-9 HMIS: 2-2-1-X		50g \$148.00		
	SIB1837.0 BIS(TRIMETHYLSILOXY)DICHLOROSILANE 3,3-DICHLOROHEXAMETHYLTRISILOXANE C <sub>6</sub> H <sub>16</sub> Cl <sub>2</sub> O <sub>2</sub> Si <sub>3</sub> Sterically hindered protecting group for diols HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	277.37	173 (-53) Vapor pressure, 57°: 12 mm	1.0017	1.3983
	[2750-44-9] HMIS: 3-2-1-X		25g \$96.00		
	SIB1843.0 BIS(TRIMETHYLSILOXY)METHYLMETHOXY-SILANE METHOXYHEPTAMETHYLTRISILOXANE C <sub>6</sub> H <sub>24</sub> O <sub>2</sub> Si <sub>3</sub> HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems	252.53	82 / 47	0.862	1.3883 <sup>25</sup>
	[7671-19-4] HMIS: 3-2-1-X		25g \$68.00		
	SIB1846.0 N,O-BIS(TRIMETHYLSILYL)ACETAMIDE BSA C <sub>8</sub> H <sub>21</sub> NOSi <sub>2</sub> Versatile blocking agent F&F: Vol. 13, p 34; Vol. 16, p 285; Vol. 20, p 50; Vol. 21, p 62. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	203.43	71-3 / 35 (-24) Flashpoint: 42°C (108°F) TOXICITY: oral rat, LD50: 1,580 mg/kg	0.832	1.418
	[10416-59-8] TSCA EC 233-892-7 HMIS: 3-2-1-X		25g \$16.00 100g \$52.00 2kg \$560.00		
	SIB1876.0 BIS(TRIMETHYLSILYL)TRIFLUOROACETAMIDE BSTFA C <sub>8</sub> H <sub>18</sub> F <sub>3</sub> NOSi <sub>2</sub> Silylation reagent for preparing derivatives of amino acids. <sup>1</sup> 1. Stalling, D. et al. <i>Biochem. Biophys., Res. Comm.</i> <b>1968</b> , 31, 616. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	257.40	45-50 / 15 (-10) Flashpoint: 24°C (75°F)	0.969	1.3840
	[25561-30-2] TSCA EC 247-103-9 HMIS: 3-3-1-X		25g \$52.00 100g \$169.00 2kg \$1,360.00		
	SIB1932.5 1-BUTYLDECAMETHYLPENTASILOXANYLETHYL-TRIETHOXY-SILANE Contains isomers C <sub>22</sub> H <sub>56</sub> O <sub>7</sub> Si <sub>6</sub> Phase collapse resistant bonded phase HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	603.21	140-2 / 1	0.921	
	[1000-50-6] TSCA EC 242-042-4 HMIS: 2-2-1-X		10g \$96.00		
	SIB1934.0 n-BUTYLDIMETHYLCHLOROSILANE C <sub>6</sub> H <sub>15</sub> ClSi Forms bonded phases for HPLC HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	150.72	138 Flashpoint: 39°C (102°F)	0.8751	1.4205
	[1000-50-6] TSCA EC 242-042-4 HMIS: 3-2-1-X		25g \$43.00 100g \$140.00		
	SIB1935.0 t-BUTYLDIMETHYLCHLOROSILANE C <sub>6</sub> H <sub>15</sub> ClSi Silylation reagent - derivatives resistant to Grignards, alkyl lithium compounds, etc. Blocking agent widely used in prostaglandin synthesis F&F: Vol. 4, p 57, p 176; Vol. 5, p 74; Vol. 6, p 78; Vol. 8, p 58; Vol. 9, p 77; Vol. 10, p 62; Vol. 11, p 88; Vol. 12, p 83. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	150.72	124-6 (87-90) Flashpoint: 22°C (72°F) Autoignition temperature: 405°C Vapor pressure, 100°: 476 mm	0.830	
	[18162-48-6] TSCA EC 242-042-4 HMIS: 3-4-1-X		25g \$36.00 100g \$117.00 2kg \$720.00		
	SIB1937.0 n-BUTYLDIMETHYL(DIMETHYLAMINO)SILANE C <sub>8</sub> H <sub>21</sub> NSi Highly reactive reagent for bonded phases without acidic byproduct HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	159.35	47-9 / 12 Flashpoint: 26°C (79°F)	0.772	1.422
	[181231-67-4] TSCA EC 242-042-4 HMIS: 3-3-1-X		10g \$38.00 50g \$152.00		
	SIB1971.0 t-BUTYLISOPROPYLDIMETHOXY-SILANE C <sub>9</sub> H <sub>22</sub> O <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	190.36	75 / 20	0.871	1.4189
	[109144-59-4] HMIS: 3-2-1-X		1.0g \$126.00		

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIB1972.0 n-BUTYLMETHYLDICHLOROSILANE C <sub>8</sub> H <sub>12</sub> Cl <sub>2</sub> Si Flashpoint: 30°C (86°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18147-23-4] TSCA EC 242-035-6 HMIS: 3-3-1-X 10g \$38.00	171.14	148	1.0424	1.4312
	SIB1972.2 t-BUTYLMETHYLDICHLOROSILANE C <sub>8</sub> H <sub>12</sub> Cl <sub>2</sub> Si Flashpoint: 26°C (79°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18147-18-7] TSCA EC 242-034-0 HMIS: 3-3-1-X 5g \$89.00	171.14	130-2 (88-90)		
	SIB1972.5 p-(t-BUTYL)PHENETHYLDIMETHYLCHLOROSILANE C <sub>14</sub> H <sub>23</sub> ClSi Contains ~5% meta isomer Flashpoint: 108°C (226°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [93502-75-1] HMIS: 3-2-1-X 25g \$82.00	254.87	122-3 / 2	0.95	
	SIB1973.0 p-(t-BUTYL)PHENETHYLTRICHLOROSILANE C <sub>12</sub> H <sub>17</sub> Cl <sub>3</sub> Si Mixed α,β isomers Flashpoint: 108°C (226°F) For bonded phase HPLC HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [211925-40-5] HMIS: 3-2-1-X 25g \$78.00	295.71	124-9 / 2.5	1.16	
	SIB1974.2 ω-BUTYLPOLY(DIMETHYLSILOXANYL)ETHYL- TRIETHOXSILANE, tech-95 5-8 Me <sub>2</sub> SiO groups, contains isomers HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 2-2-1-X 25g \$84.00	600-850		0.925	1.4124
	SIB1982.0 n-BUTYLTRICHLOROSILANE C <sub>4</sub> H <sub>9</sub> Cl <sub>3</sub> Si Flashpoint: 45°C (113°F) Vapor pressure, 31°: 10 mm HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [7521-80-4] TSCA EC 231-381-3 HMIS: 3-2-1-X 25g \$37.00 100g \$121.00	191.56	142-3	1.1608	1.4364
	SIB1985.0 t-BUTYLTRICHLOROSILANE C <sub>4</sub> H <sub>9</sub> Cl <sub>3</sub> Si Flashpoint: 40°C (104°F) Forms silanetriol HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18171-74-9] TSCA EC 242-059-7 HMIS: 3-2-1-X 10g \$41.00 50g \$164.00	191.56	142-3 (97-100)	1.1608	1.436
	SIB1986.0 n-BUTYLTRIETHOXSILANE C <sub>10</sub> H <sub>24</sub> O <sub>3</sub> Si Flashpoint: 49°C (120°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [4781-99-1] HMIS: 2-2-1-X 25g \$56.00	220.38	192-3	0.8883	1.4011
	SIB1988.0 n-BUTYLTRIMETHOXSILANE C <sub>7</sub> H <sub>16</sub> O <sub>3</sub> Si Flashpoint: 49°C (120°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [1067-57-8] TSCA EC 213-936-1 HMIS: 3-2-1-X 25g \$42.00 100g \$136.00	178.30	164-5	0.9312	1.3979
	SIB1989.0 t-BUTYLTRIMETHOXSILANE C <sub>7</sub> H <sub>16</sub> O <sub>3</sub> Si Flashpoint: 49°C (120°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [18395-29-4] HMIS: 3-2-1-X 10g \$143.00	178.30	140-1	0.903	1.3941
	SIC2266.0 13-(CHLORODIMETHYLSILYLMETHYL)HEPTA- COSANE, 95% C <sub>30</sub> H <sub>63</sub> ClSi Forms hydrophobic bonded phases HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [194243-00-0] TSCA HMIS: 3-1-1-X 10g \$117.00	487.37	200-10 / 0.01	0.848 <sup>25</sup>	1.4542 <sup>30</sup>

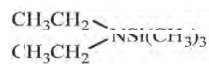
PLEASE INQUIRE ABOUT BULK QUANTITIES

name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
 <p>SIC2266.5 11-(CHLORODIMETHYLSILYL)METHYLTRICOSANE C<sub>26</sub>H<sub>55</sub>ClSi tech-95, contains ~5% isomers Forms self-assembled oleophilic monolayers Employed as bonded phase in HPLC See also SID4401.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 3-1-1-X</p>	431.27	170 / 0.075	0.887	1.4575 <sup>22</sup>
 <p>SIC2465.0 CYCLOHEXYLDIMETHYLCHLOROSILANE C<sub>8</sub>H<sub>17</sub>ClSi Silane blocking agent with good resistance to Grignard reagents HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents HMIS: 3-2-1-X</p>	176.76	52-3 / 2 Flashpoint: 63°C (145°F)	0.956	1.4626
 <p>SIC2468.0 CYCLOHEXYLMETHYLDICHLOROSILANE C<sub>7</sub>H<sub>14</sub>Cl<sub>2</sub>Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents TSCA EC 226-956-0 HMIS: 3-2-1-X</p>	197.18	83 / 15 Flashpoint: 66°C (151°F)	1.095	1.4724
 <p>SIC2469.0 CYCLOHEXYLMETHYLDIMETHOXY SILANE C<sub>9</sub>H<sub>20</sub>O<sub>2</sub>Si Vapor pressure, 20°: 12 mm Donor for polyolefin polymerization HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water TSCA HMIS: 2-2-1-X</p>	188.34	196 Flashpoint: 66°C (151°F) TOXICITY: oral rat, LD50: 3,000mg/kg	0.9472	1.4354
 <p>SIC2470.0 (CYCLOHEXYLMETHYL)TRICHLOROSILANE C<sub>7</sub>H<sub>13</sub>Cl<sub>3</sub>Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents TSCA EC 242-265-7 HMIS: 3-2-1-X</p>	231.62	94-8 / 11		
 <p>SIC2480.0 CYCLOHEXYLTRICHLOROSILANE C<sub>6</sub>H<sub>11</sub>Cl<sub>3</sub>Si Intermediate for melt-processable silsesquioxane-siloxanes.<sup>1</sup> Employed in solid-phase extraction columns.<sup>2</sup> 1. Lichtenhan, J. et al. <i>Macromolecules</i> <b>1993</b>, 26, 2141. 2. Tippins, B. <i>Nature</i> <b>1988</b>, 334, 273. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents TSCA EC 202-639-2 HMIS: 3-2-1-X</p>	217.60	90-1 / 10 Flashpoint: 91°C (196°F)	1.222	1.4774
 <p>SIC2482.0 CYCLOHEXYLTRIMETHOXY SILANE C<sub>9</sub>H<sub>20</sub>O<sub>3</sub>Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 2-3-1-X</p>	204.34	207-9		
 <p>SIC2490.0 CYCLOOCTYLTRICHLOROSILANE, 95% C<sub>9</sub>H<sub>16</sub>Cl<sub>3</sub>Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents HMIS: 3-2-1-X</p>	245.65	85-9 / 1.25	1.19	
 <p>SIC2555.0 CYCLOPENTYLTRICHLOROSILANE C<sub>5</sub>H<sub>9</sub>Cl<sub>3</sub>Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents TSCA EC 238-621-6 HMIS: 3-2-1-X</p>	203.57	178-9 Flashpoint: 77°C (171°F)	1.225	1.4713
 <p>SIC2557.0 CYCLOPENTYLTRIMETHOXY SILANE C<sub>8</sub>H<sub>18</sub>O<sub>3</sub>Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 3-2-1-X</p>	190.31	75 / 10 Flashpoint: 54°C (129°F)	0.990 <sup>25</sup>	1.4240 <sup>25</sup>
 <p>SID2660.0 n-DECYLDIMETHYLCHLOROSILANE C<sub>12</sub>H<sub>27</sub>ClSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents TSCA EC 253-761-8 HMIS: 3-1-1-X</p>	234.88	98 / 2 Flashpoint: 137°C (279°F)	0.866	1.441
 <p>SID2662.0 n-DECYLMETHYLDICHLOROSILANE C<sub>11</sub>H<sub>24</sub>Cl<sub>2</sub>Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents TSCA EC 241-962-3 HMIS: 3-1-1-X</p>	255.31	111-4 / 3 Flashpoint: 120°C (248°F)	0.960	1.4490

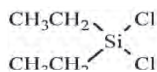
	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SID2663.0 n-DECYLTRICHLOROSILANE C <sub>10</sub> H <sub>21</sub> Cl <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [13829-21-5] TSCA EC 237-540-3 HMIS: 3-1-1-X	275.72	133-7 / 5 Flashpoint: >110°C (>230°F)	1.0540	1.4528
	SID2665.0 n-DECYLTRIETHOXYSILANE C <sub>16</sub> H <sub>36</sub> O <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [2943-73-9] EC 220-940-7 HMIS: 2-1-0-X	304.54	150 / 8	0.8790	1.4220
	SID3203.0 DI-n-BUTYLDICHLOROSILANE C <sub>8</sub> H <sub>18</sub> Cl <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [3449-28-3] TSCA HMIS: 3-2-1-X	213.22	212 Flashpoint: 64°C (147°F)	0.991	1.4448
	SID3214.0 DI-n-BUTYLDIMETHOXYSILANE C <sub>10</sub> H <sub>24</sub> O <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [18132-63-3] TSCA HMIS: 3-1-1-X	204.39	125 / 50 Flashpoint: 103°C (217°F)	0.861	
	SID3349.0 1,3-DI-n-BUTYLTETRAMETHYLDISILAZANE C <sub>12</sub> H <sub>31</sub> NSi <sub>2</sub> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [82356-80-7] HMIS: 2-2-1-X	245.55	81 / 2 Flashpoint: 86°C (187°F)	0.80	1.4353
	SID3360.0 1,5-DICHLOROHEXAMETHYLTRISILOXANE, tech-95 C <sub>6</sub> H <sub>18</sub> Cl <sub>2</sub> O <sub>2</sub> Si <sub>3</sub> ΔHvap: 11.4 kcal/mole Vapor pressure, 50°: 1 mm HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [3582-71-6] TSCA EC 222-707-5 HMIS: 3-2-1-X	277.37	184 (-53) Flashpoint: 76°C (169°F)	1.018	1.4071
	SID3367.6 DICHLOROPHENYLTRICHLOROSILANE, 95% C <sub>6</sub> H <sub>3</sub> Cl <sub>5</sub> Si Isomeric mixture Vapor pressure, 102°: 7 mm Monomer for high refractive index resins HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [27137-85-5] TSCA EC 248-254-3 HMIS: 3-1-1-X	280.44	260-1 Flashpoint: 150°C (302°F)	1.553	1.564
	SID3372.0 1,3-DICHLOROTETRAMETHYLDISILOXANE C <sub>4</sub> H <sub>12</sub> Cl <sub>2</sub> O <sub>2</sub> Si <sub>2</sub> Vapor pressure, 25°: 8 mm Diol protection reagent HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [2401-73-2] TSCA EC 219-278-1 HMIS: 3-4-1-X	203.22	138 (-37) Flashpoint: 15°C (59°F)	1.039	1.4054
	SID3382.0 DICYCLOHEXYLDICHLOROSILANE C <sub>12</sub> H <sub>22</sub> Cl <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18035-74-0] HMIS: 3-1-1-X	265.30	123 / 0.4 Flashpoint: 149°C (300°F)	1.103	
	SID3390.0 DICYCLOPENTYLDICHLOROSILANE C <sub>10</sub> H <sub>18</sub> Cl <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [139147-73-2] HMIS: 3-2-1-X	237.24	105-7 / 10 Flashpoint: 84°C (183°F)	1.110	
	SID3391.0 DICYCLOPENTYLDIMETHOXYSILANE C <sub>12</sub> H <sub>24</sub> O <sub>2</sub> Si Employed in propylene polymerization HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [126990-35-0] TSCA HMIS: 3-1-1-X	228.40	120 / 6 Flashpoint: 102°C (216°F)	1.000	1.466
	SID3394.0 1,5-DIETHOXYHEXAMETHYLTRISILOXANE C <sub>10</sub> H <sub>28</sub> O <sub>4</sub> Si <sub>3</sub> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [17928-13-1] HMIS: 2-2-1-X	296.59	51-2 / 0.8	0.912	1.389

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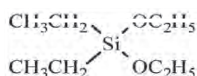
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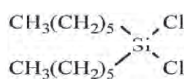
name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
SID3398.0 (DIETHYLAMINO)TRIMETHYLSILANE TMSDEA C <sub>7</sub> H <sub>19</sub> NSi Silylation reagent F&F: Vol. 3, p 317; Vol. 4, p 544; Vol. 6, p 634; Vol. 18, p 382. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	145.32	126-7 (-10)	0.7627	1.4109
		Flashpoint: 10°C (50°F) ΔHform: -87.7 kcal/mole		
[996-50-9]	TSCA	EC 213-637-6	HMIS: 3-4-1-X	25g \$28.00 100g \$90.00 2kg \$920.00



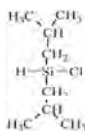
SID3402.0 DIETHYLDICHLOROSILANE C <sub>4</sub> H <sub>10</sub> Cl <sub>2</sub> Si Thermal conductivity: 0.134 W/m°C Dipole moment: 2.4 Surface tension: 30.3 mN/m HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	157.11	130 (-96.5)	1.0504	1.4309
		Flashpoint: 27°C (81°F) TOXICITY: oral rat, LD20: 1,000 mg/kg Vapor pressure: 21: 10 mm ΔHvap: 10.0 kcal/mole		
[1719-53-5]	TSCA	EC 217-005-0	HMIS: 3-3-1-X	25g \$25.00 100g \$81.00



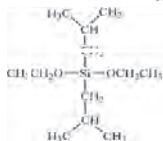
SID3404.0 DIETHYLDIETHOXYDIMETHYLSILANE C <sub>8</sub> H <sub>20</sub> O <sub>2</sub> Si Vapor pressure, 73°: 100 mm HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	176.33	157	0.8622	1.4022
		Flashpoint: 43°C (109°F)		
[5021-93-2]	TSCA	EC 225-706-8	HMIS: 2-2-1-X	10g \$36.00 50g \$144.00



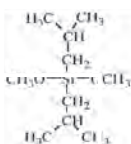
SID3510.0 DI-n-HEXYLDICHLOROSILANE C <sub>12</sub> H <sub>26</sub> Cl <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	269.33	111-3 / 6	0.962	1.4518
		Flashpoint: 88°C (190°F)		
[18204-93-8]	TSCA	EC 242-093-2	HMIS: 3-2-1-X	10g \$41.00 50g \$164.00



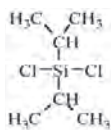
SID3526.0 DIISOBUTYLCHLOROSILANE C <sub>8</sub> H <sub>18</sub> ClSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	178.78	166-7	0.995	1.4340
		Flashpoint: 42°C (108°F)		
[18279-73-7]			HMIS: 3-2-1-X	25g \$127.00



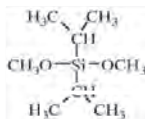
SID3528.0 DIISOBUTYLDIETHOXYDIMETHYLSILANE C <sub>12</sub> H <sub>28</sub> O <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	232.44	221	0.845	1.418
[18297-14-8]			HMIS: 2-2-1-X	10g \$86.00



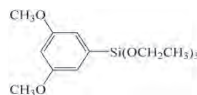
SID3530.0 DIISOBUTYLDIMETHOXYDIMETHYLSILANE C <sub>10</sub> H <sub>24</sub> O <sub>2</sub> Si Intermediate for diisobutylsilanediol, a liquid crystal Employed in polyolefin polymerization HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	204.39	120 / 6	0.87	1.4167
		Flashpoint: 102°C (216°F)		
[17980-32-4]	TSCA		HMIS: 2-1-1-X	10g \$20.00 50g \$80.00



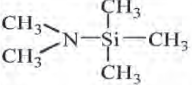
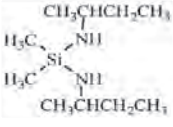
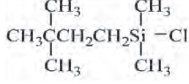
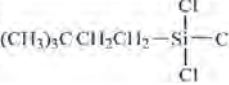
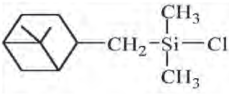
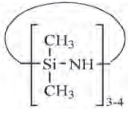
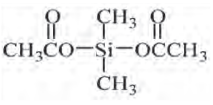
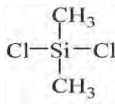
SID3537.0 DIISOPROPYLDICHLOROSILANE C <sub>6</sub> H <sub>14</sub> Cl <sub>2</sub> Si Forms bis(blocked) or tethered alcohols <sup>1,2</sup> Used as tether in ring-closing-metathesis (RCM) reaction. <sup>3</sup> 1. Bradford, C. et al. <i>Tetrahedron Lett.</i> <b>1995</b> , 36, 4189. 2. Hutchinson, J. et al. <i>Tetrahedron Lett.</i> <b>1991</b> , 32, 573. 3. Evans, P. A. et al. <i>J. Am. Chem. Soc.</i> <b>2003</b> , 125, 14702. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	185.17	64-5 / 25	1.026	1.4450
		Flashpoint: 43°C (109°F)		
[7751-38-4]			HMIS: 3-2-1-X	10g \$21.00 50g \$84.00 2kg \$1,544.00



SID3538.0 DIISOPROPYLDIMETHOXYDIMETHYLSILANE C <sub>8</sub> H <sub>20</sub> O <sub>2</sub> Si Cocatalyst for α-olefin polymerization. <sup>1</sup> 1. Lee, S. et al. U.S. Patent 5,223,466, 1993. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	176.33	85-7 / 50	0.875	1.4140
		Flashpoint: 43°C (109°F)		
[18230-61-0]	TSCA		HMIS: 3-2-1-X	10g \$14.00 50g \$56.00 2kg \$520.00



SID3544.0 3,5-DIMETHOXYPHENYLTRIETHOXY-SILANE C <sub>14</sub> H <sub>24</sub> O <sub>5</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	300.43	136-8 / 0.6	1.050	
			HMIS: 2-1-1-X	5g \$175.00

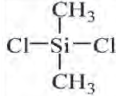
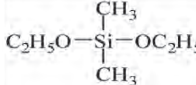
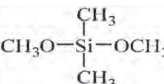
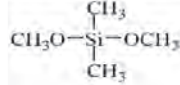
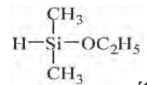
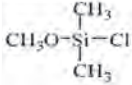
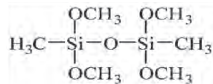
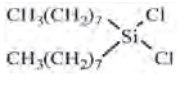
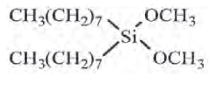
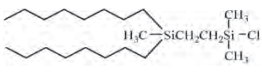
	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SID3605.0 (N,N-DIMETHYLAMINO)TRIMETHYLSILANE TMSDMA, PENTAMETHYLSILANAMINE C <sub>5</sub> H <sub>15</sub> NSi	117.27	85-6	0.741	1.3970
	Flashpoint: -19°C (-2°F) ΔHvap: 7.6 kcal/mole Selectively silylates equatorial hydroxyl groups in prostaglandin synthesis. <sup>1</sup> Stronger silylation reagent than HMDS; silylates amino acids. <sup>2</sup> Dialkylaminotrimethylsilanes are used in the synthesis of pentamethinium salts. <sup>3</sup> 1. Yankee, E. et al. <i>J. Am. Chem. Soc.</i> <b>1972</b> , <i>94</i> , 3651. 2. Rühlman, K. <i>Chem. Ber.</i> <b>1961</b> , <i>94</i> , 1876. 3. Kořínek, M. et al. <i>Synthesis</i> <b>2009</b> , 1291. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
	[2083-91-2] TSCA EC 218-222-3 HMIS: 3-4-1-X		25g \$38.00	100g \$123.00	2kg \$920.00
	SID4040.0 DIMETHYLBIS(S-BUTYLAMINO)SILANE, 95% C <sub>10</sub> H <sub>26</sub> N <sub>2</sub> Si	202.42	82 / 15 (<50)	0.810	1.4271
	Flashpoint: 40°C (104°F) TOXICITY: oral rat, LD50: 907 mg/kg Autoignition temperature: 225° Vapor pressure, 20°: 3 mm Chain extender for silicones HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents				
	[93777-98-1] TSCA EC 298-130-8 HMIS: 3-3-1-X		25g \$41.00	100g \$133.00	
	SID4065.0 (3,3-DIMETHYLBUTYL)DIMETHYLCHLOROSILANE NEOHEXYLDIMETHYLCHLOROSILANE C <sub>8</sub> H <sub>19</sub> ClSi	178.78	167	0.849	1.4240
	Flashpoint: 38°C (100°F) Blocking agent HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents				
	[96220-76-7] TSCA-L HMIS: 3-3-1-X		25g \$34.00	100g \$110.00	
	SID4069.0 (3,3-DIMETHYLBUTYL)TRICHLOROSILANE NEOHEXYLTRICHLOROSILANE C <sub>8</sub> H <sub>13</sub> Cl <sub>3</sub> Si	219.61	183-4	1.1355	1.4479
	HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents				
	[105732-02-3] HMIS: 3-3-1-X		25g \$48.00		
	SID4074.0 (DIMETHYLCHLOROSILYL)METHYLPINANE C <sub>12</sub> H <sub>23</sub> ClSi	230.85	93-4 / 2	0.957	1.478
	Flashpoint: 92°C (198°F) 1°S,2°S,5°S [α] <sub>D</sub> : -5.15; >95% optical purity Acetylenic derivative forms chiral polymer membrane that resolves amino acids. <sup>1</sup> 1. Aoki, T. et al. <i>Makromol. Chem., Rapid Commun.</i> <b>1992</b> , <i>13</i> , 565. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents				
	[2182-66-3] TSCA EC 218-562-2 HMIS: 3-2-1-X		10g \$37.00		
	SID4074.4 1,1-DIMETHYLCYCLOSILAZANES, 22-25% in hexane			0.69	
	Primarily trimer and tetramer Flashpoint: 20°C (-25°F) Hydrophobic surface treatment for silica HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
	TSCA HMIS: 2-4-1-X		100g \$20.00	1.5kg \$142.50	
	SID4076.0 DIMETHYLDIACETOXSILANE C <sub>6</sub> H <sub>12</sub> O <sub>4</sub> Si	176.24	164-6	1.054	1.4030
	Flashpoint: 37°C (99°F) Reagent for the preparation of cis-diols and corticosteroids. <sup>1</sup> 1. Kelley, R. J. <i>Chromatogr.</i> <b>1969</b> , <i>43</i> , 229. F&F: Vol. 3, p. 113. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
	[2182-66-3] TSCA EC 218-562-2 HMIS: 2-3-1-X		100g \$32.00	500g \$128.00	
	SID4120.0 DIMETHYLDICHLOROSILANE C <sub>2</sub> H <sub>6</sub> Cl <sub>2</sub> Si	129.06	70-1 (-76)	1.0637	1.4055
	Flashpoint: -10°C (14°F) TOXICITY: ihl rat, LC50: 930 ppm/4H Autoignition temperature: 410° Flammability limit: 3.4-10.4% Critical temperature: 247.2° Critical pressure: 34.4 atm Coefficient of thermal expansion: 1.3 x 10 <sup>-3</sup> Specific heat: 0.22 cal/g° AIR TRANSPORT FORBIDDEN Fundamental monomer for silicones Employed in the tethering of two olefins for the cross metathesis-coupling step in the synthesis of Attenol A. <sup>1</sup> 1. Van de Weghe, P. et al. <i>Org. Lett.</i> <b>2002</b> , <i>4</i> , 4105. F&F: Vol. 3, p 114; Vol. 4, p 183. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents				
	[75-78-5] TSCA EC 200-901-0 HMIS: 3-4-2-X		500g \$25.00	2kg \$58.00	18kg \$477.00*

\* zDR-S-019 or zCYL-S-019 container required - not included

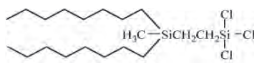
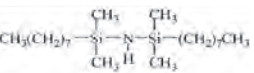
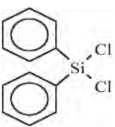
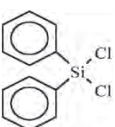
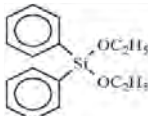
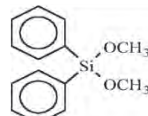
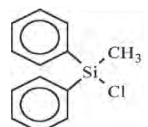
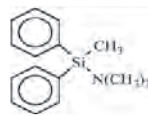
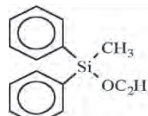
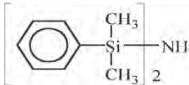
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HYDROPHOBIC  
COMMERCIAL  
COMMERCIAL  
COMMERCIAL

name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
 <p>SID4120.1 DIMETHYLDICHLOROSILANE, 99+% C<sub>2</sub>H<sub>6</sub>Cl<sub>2</sub>Si Redistilled <b>AIR TRANSPORT FORBIDDEN</b> HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [75-78-5] TSCA EC 200-901-0 HMIS: 3-4-2-X</p>	129.06	70-1 (-76)	1.0637	1.4055
Flashpoint: -10°C (14°F) 25g \$11.00 500g \$68.00 18kg \$1,210.00* * zDR-S-019 or zCYL-S-019 container required - not included				
 <p>SID4121.0 DIMETHYLDIETHOXYLSILANE C<sub>6</sub>H<sub>16</sub>O<sub>2</sub>Si Viscosity: 0.53 cSt Vapor pressure, 25°: 15 mm Dipole moment: 1.39 Coefficient of thermal expansion: 1.3 x 10<sup>-3</sup> Hydrophobic surface treatment and release agent HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [78-62-6] TSCA EC 201-127-6 HMIS: 2-4-1-X</p>	148.28	114-5 (-97)	0.8395	1.3805
Flashpoint: 11°C (52°F) TOXICITY: oral rat, LDLo: 1,000 mg/kg ΔHform: 200 kcal/mole ΔHvap: 9.8 kcal/mole ΔHcomb: -1,119 kcal/mole 100g \$12.00 2kg \$144.00 15kg \$930.00				
 <p>SID4123.0 DIMETHYLDIMETHOXYLSILANE, 96% C<sub>4</sub>H<sub>12</sub>O<sub>2</sub>Si Contains methanol Viscosity, 20°: 0.44 cSt Vapor pressure, 36°: 100 mm Coefficient of thermal expansion: 1.3 x 10<sup>-3</sup> Dipole moment: 1.33 debye Provides hydrophobic surface treatments in vapor phase applications HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [1112-39-6] TSCA EC 214-189-4 HMIS: 3-4-1-X</p>	120.22	82 (-80)	0.8646	1.3708
Flashpoint: -8°C (18°F) TOXICITY: oral rat, LD50: >2,000 mg/kg Autoignition temperature: 325° ΔHcomb: 832 kcal/mole ΔHform: 171 kcal/mole 25g \$10.00 2kg \$110.00 15kg \$600.00				
 <p>SID4123.1 DIMETHYLDIMETHOXYLSILANE, 99+% DMDMOS HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [1112-39-6] TSCA EC 214-189-4 HMIS: 3-4-1-X</p>	120.22	82 (-80)	0.8646	1.3708
500g \$84.00				
 <p>SID4125.0 DIMETHYLETHOXYLSILANE C<sub>4</sub>H<sub>12</sub>O<sub>2</sub>Si Undergoes hydrosilylation reactions Waterproofing agent for space shuttle thermal tiles.<sup>1</sup> 1. Hill, W. et al. <i>Polym. Mater. Sci. Eng.</i> <b>1990</b>, 62, 668. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [14857-34-2] TSCA EC 238-921-7 HMIS: 2-4-1-X</p>	104.22	54-5	0.757	1.3683
Flashpoint: 15°C (59°F) TOXICITY: oral rat, LD50: 5,000 mg/kg Vapor pressure, 25°: 281 mm				
 <p>SID4210.0 DIMETHYLMETHOXYCHLOROSILANE, 90% C<sub>3</sub>H<sub>9</sub>ClOSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [1825-68-9] TSCA HMIS: 3-4-1-X</p>	124.64	77	0.953 <sup>25</sup>	1.3865
Flashpoint: -9°C (16°F) 25g \$50.00 100g \$162.00				
 <p>SID4236.0 1,3-DIMETHYLTETRAMETHOXYDISILOXANE, 95% C<sub>6</sub>H<sub>18</sub>O<sub>5</sub>Si<sub>2</sub> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [18186-97-5] TSCA EC 242-072-8 HMIS: 3-3-1-X</p>	226.38	165	1.010	1.3834
Flashpoint: 30°C (86°F) 10g \$32.00 50g \$128.00				
 <p>SID4400.0 DI-n-OCTYLDICHLOROSILANE C<sub>16</sub>H<sub>34</sub>Cl<sub>2</sub>Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18416-07-4] HMIS: 3-2-1-X</p>	325.44	145 / 0.2	0.940	
25g \$44.00 100g \$143.00				
 <p>SID4400.4 DI-n-OCTYLDIMETHOXYLSILANE C<sub>18</sub>H<sub>40</sub>O<sub>2</sub>Si Hydrophobic surface treatment HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [947155-81-9] HMIS: 3-2-1-X</p>	316.60	132-4 / 0.2	0.854	1.4388
25g \$104.00				
 <p>SID4401.0 (DI-n-OCTYLMETHYLSILYL)ETHYLDIMETHYLCHLORO-SILANE C<sub>21</sub>H<sub>47</sub>ClSi<sub>2</sub> Forms bonded phases for reverse phase chromatography See also SIC2266.5 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [475213-03-7] HMIS: 3-2-1-X</p>	391.23	165-6 / 0.1	0.859	
25g \$120.00				



name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
 <p>SID4401.5 (DI-n-OCTYLMETHYLSILYL)ETHYLTRICHLOROSILANE C<sub>19</sub>H<sub>41</sub>Cl<sub>3</sub>Si<sub>2</sub> Forms bonded phases for reverse phase HPLC HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [475213-02-6] HMIS: 3-2-1-X 25g \$120.00</p>	432.06	166-8 / 0.1	0.966	
 <p>SID4404.0 1,3-DI-n-OCTYLTETRAMETHYLDISILAZANE C<sub>20</sub>H<sub>47</sub>NSi<sub>2</sub> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [69519-51-3] HMIS: 2-1-0-X 10g \$49.00</p>	357.77	160-5 / 1 Flashpoint: >110°C (>230°F)	0.826	1.4500
 <p>SID4510.0 DIPHENYLDICHLOROSILANE, 95% C<sub>12</sub>H<sub>10</sub>Cl<sub>2</sub>Si Viscosity, 25°: 4.1 cSt Dipole moment: 2.6 debye Coefficient of thermal expansion: 0.7 x 10<sup>-3</sup> Silicone monomer Forms diol on contact with water See also SID4588.0 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [80-10-4] TSCA EC 201-251-0 HMIS: 3-1-1-X 100g \$21.00 2kg \$98.00 20kg \$760.00</p>	253.20	304-5 (-22) Flashpoint: 157°C (314°F) TOXICITY: ipr mouse, LD50: 383 mg/kg Vapor pressure: 125: 2mm ΔHvap: 15.0 kcal/mole Specific heat: 0.30 cal/g/°	1.2216	1.5819
 <p>SID4510.1 DIPHENYLDICHLOROSILANE, 99% C<sub>12</sub>H<sub>10</sub>Cl<sub>2</sub>Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [80-10-4] TSCA EC 201-251-0 HMIS: 3-1-1-X 25g \$11.00 100g \$36.00 2kg \$390.00</p>	253.20	304-5 (-22) Flashpoint: 157°C (314°F) TOXICITY: ipr mouse, LD50: 383 mg/kg	1.2216	1.5819
 <p>SID4525.0 DIPHENYLDIETHOXYOSILANE C<sub>16</sub>H<sub>20</sub>O<sub>2</sub>Si Vapor pressure, 125°: 2 mm Provides hydrophobic coatings with good thermal and UV resistance HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [2553-19-7] TSCA EC 219-860-5 HMIS: 2-1-0-X 25g \$18.00 100g \$58.00 2kg \$265.00</p>	272.42	167 / 15 Flashpoint: 175°C (347°F)	1.0329	1.5269
 <p>SID4535.0 DIPHENYLDIMETHOXYOSILANE C<sub>14</sub>H<sub>16</sub>O<sub>2</sub>Si Viscosity, 25°: 8.4 cSt Intermediate for high temperature silicone resins HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [6843-66-9] TSCA EC 229-929-1 HMIS: 3-1-1-X 100g \$16.00 2kg \$190.00</p>	244.36	161 / 15 Flashpoint: 121°C (250°F)	1.0771	1.5447
 <p>SID4552.0 DIPHENYLMETHYLCHLOROSILANE C<sub>13</sub>H<sub>13</sub>ClSi Viscosity: 5.3 cSt Surface tension: 40.0 mN/m α-silylates esters, lactones; precursors to silyl enolates.<sup>1</sup> 1. Larson, G. et al. <i>J. Am. Chem. Soc.</i> <b>1981</b>, <i>103</i>, 2418. F&amp;F: Vol. 10, p 91; Vol. 12, p 321; Vol. 13, p 74. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [144-79-6] TSCA EC 205-639-0 HMIS: 3-1-1-X 25g \$26.00 100g \$84.00 2.5kg \$580.00</p>	232.78	295 (-22) Flashpoint: 141°C (286°F) Vapor pressure, 125°: 3 mm ΔHvap: 149 kcal/mole Thermal conductivity: 0.112 W/m°C	1.128	1.5742
 <p>SID4552.5 DIPHENYLMETHYL(DIMETHYLAMINO)SILANE C<sub>15</sub>H<sub>19</sub>NSi HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [68733-63-1] TSCA HMIS: 3-3-1-X 25g \$38.00 100g \$124.00</p>	241.41	98-9 / 0.25	1.011	
 <p>SID4553.0 DIPHENYLMETHYLETHOXYOSILANE C<sub>15</sub>H<sub>18</sub>OSi Viscosity, 25°: 6.5 cSt HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [1825-59-8] EC 217-368-5 HMIS: 2-0-0-X 10g \$26.00 50g \$104.00</p>	242.39	100-2 / 0.3 (-27) Flashpoint: 165°C (329°F) Vapor pressure, 125°: 3 mm ΔHvap: 14.8 kcal/mole	1.018	1.5440 <sup>25</sup>
 <p>SID4586.0 1,3-DIPHENYLTETRAMETHYLDISILAZANE C<sub>16</sub>H<sub>23</sub>NSi<sub>2</sub> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [3449-26-1] TSCA EC 222-372-5 HMIS: 3-1-1-X 5g \$36.00 25g \$144.00</p>	285.54	96-9 / 0.1 Flashpoint: 162°C (324°F)	0.985	1.5384

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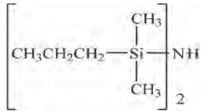
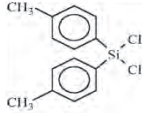
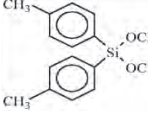
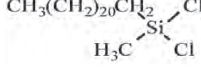
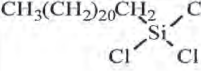
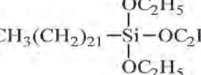
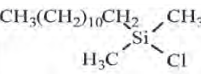
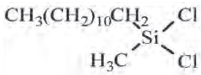
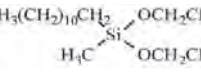
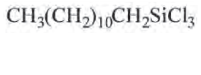
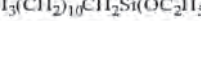
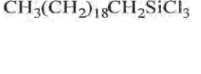
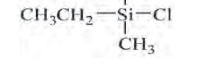
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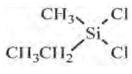
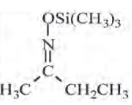
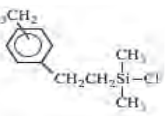

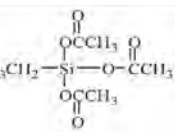
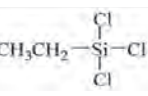
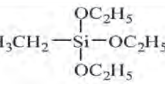
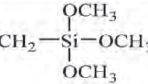
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	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SID4591.0 1,3-DI-n-PROPYLTETRAMETHYLDISILAZANE C <sub>10</sub> H <sub>27</sub> NSi <sub>2</sub> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [14579-90-9]	217.51 Flashpoint: 65°C (149°F)	84 / 9	0.80	1.429
	SID4598.0 DI(p-TOLYL)DICHLOROSILANE, tech-95 C <sub>14</sub> H <sub>14</sub> Cl <sub>2</sub> Si Contains 4,4'-dimethylbiphenyl Forms polymers with liquid crystal behavior. <sup>1</sup> 1. Lee, M. et al. <i>Polymer</i> <b>1993</b> , <i>34</i> , 4882. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18414-38-5]	281.26	225-6 / 50	1.10	1.568
	SID4599.0 DI(p-TOLYL)DIMETHOXSILANE C <sub>16</sub> H <sub>20</sub> O <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [92779-72-1]	272.42	140 / 0.5	1.023	1.5353 <sup>25</sup>
	SID4620.0 DOCOSYLMETHYLDICHLOROSILANE, blend C <sub>23</sub> H <sub>46</sub> Cl <sub>2</sub> Si Contains C <sub>20</sub> to C <sub>24</sub> homologs Flashpoint: 172°C (342°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [67892-56-2]	423.62 Flashpoint: 172°C (342°F)	218-20 / 0.5 (21-9)	0.93	
	SID4621.0 DOCOSYLTRICHLOROSILANE, blend C <sub>22</sub> H <sub>45</sub> Cl <sub>3</sub> Si Contains C <sub>20</sub> to C <sub>24</sub> homologs Flashpoint: 200°C (392°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [7325-84-0]	444.04 Flashpoint: 200°C (392°F)	210 / 0.2 (20-8)	0.94	
	SID4622.0 DOCOSYLTRITHOXYSILANE, blend C <sub>28</sub> H <sub>60</sub> O <sub>3</sub> Si Contains C <sub>20</sub> to C <sub>24</sub> homologs HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [ ]	472.87	(18-22)	0.86	
	SID4627.0 DODECYLDIMETHYLCHLOROSILANE C <sub>14</sub> H <sub>31</sub> ClSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [66604-31-7]	262.94	291-3	0.865	1.445
	SID4628.0 DODECYLMETHYLDICHLOROSILANE C <sub>13</sub> H <sub>28</sub> Cl <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18407-07-3]	283.36 Flashpoint: 143°C (289°F)	124-7 / 3	0.955	1.4581
	SID4629.0 DODECYLMETHYLDIETHOXSILANE C <sub>17</sub> H <sub>38</sub> O <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [60317-40-0]	302.57 Flashpoint: 152°C (305°F)	140 / 0.5	0.845 <sup>25</sup>	
	SID4630.0 DODECYLTRICHLOROSILANE C <sub>12</sub> H <sub>25</sub> Cl <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [4484-72-4]	303.77 Flashpoint: 165°C (329°F)	120 / 3 (-30)	1.024	1.4581
	SID4632.0 DODECYLTRITHOXYSILANE C <sub>18</sub> H <sub>40</sub> O <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [18536-91-9]	332.60 Flashpoint: >110°C (>230°F)	152-3 / 3	0.884 <sup>25</sup>	1.4330 <sup>25</sup>
	SIE4661.0 EICOSYLTRICHLOROSILANE, 95% C <sub>20</sub> H <sub>41</sub> Cl <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18733-57-8]	415.90 Flashpoint: 230°C (446°F)	225-7 / 3	0.940	
	SIE4892.0 ETHYLDIMETHYLCHLOROSILANE C <sub>4</sub> H <sub>11</sub> ClSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [6917-76-6]	122.67 Flashpoint: -4°C (25°F)	91	0.8756	1.4050

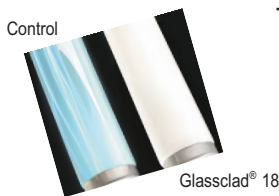
	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIE4896.0 ETHYLMETHYLDICHLOROSILANE C <sub>3</sub> H <sub>8</sub> Cl <sub>2</sub> Si Dipole moment: 2.32 debye HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	143.09 Flashpoint: 2°C (36°F)	100	1.0630	1.4197
	[4525-44-4] TSCA EC 224-860-3 HMIS: 3-4-1-X	25g \$34.00	100g \$110.00		
	SIE4897.0 (ETHYLMETHYLKETOXIMINO)TRIMETHYLSILANE, 95% O-(TRIMETHYLSILYL)OXIME-2-BUTANONE C <sub>7</sub> H <sub>17</sub> NOSi HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	159.30	65 / 75	0.826 <sup>25</sup>	1.4125 <sup>25</sup>
	[37843-14-4] HMIS: 2-3-1-X	10g \$41.00			
	SIE4897.2 m,p-ETHYLPHENETHYLDIMETHYLCHLOROSILANE C <sub>12</sub> H <sub>19</sub> ClSi tech-95 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	226.82	100 / 0.4	1.00	1.520
	[253279-88-8] HMIS: 3-2-1-X	5g \$78.00			
	SIE4897.5 m,p-ETHYLPHENETHYLTRIMETHOXY-SILANE, tech-95 C <sub>13</sub> H <sub>22</sub> O <sub>3</sub> Si Mixed isomers Component in optical hard coating resins HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	254.40 Flashpoint: 102°C (216°F)	93-6 / 4	0.996	1.4776 <sup>25</sup>
	[259818-29-6] TSCA HMIS: 3-2-1-X	25g \$102.00			
	SIE4899.0 ETHYLTRIACETOXY-SILANE C <sub>8</sub> H <sub>16</sub> O <sub>5</sub> Si Liquid cross-linker for silicone RTVs HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	243.28 Flashpoint: 106°C (223°F)	107-8 / 8 (7-9)	1.143	1.4123
	[17689-77-9] TSCA EC 241-677-4 HMIS: 3-1-1-X	25g \$10.00	2kg \$148.00		
	SIE4901.0 ETHYLTRICHLOROSILANE C <sub>2</sub> H <sub>5</sub> Cl <sub>3</sub> Si Viscosity: 0.48 cSt Dipole moment: 2.1 Coefficient of thermal expansion: 1.5 x 10 <sup>-3</sup> Vapor pressure, 20°: 26 mm Vapor pressure, 30.4°: 66 mm Employed in the cobalt-catalyzed Diels-Alder approach to 1,3-disubstituted and 1,2,3-trisubstituted benzenes. <sup>1</sup> 1. Hilt, G.; Danz, M. <i>Synthesis</i> <b>2008</b> , 2257. F&F: Vol. 16, p 98. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	163.51 Flashpoint: 27°C (81°F) TOXICITY: oral rat, LD50: 1,330 mg/kg Critical temp: 287° ΔHcomb: -644 kcal/mole ΔHform: -20 kcal/mole ΔHvap: 9.0 kcal/mole ΔHfus: 7.0 kJ/mole	100-1 (-106)	1.237	1.4260
	[115-21-9] TSCA EC 204-072-6 HMIS: 3-3-1-X	25g \$10.00	500g \$29.00	4kg \$176.00	
	SIE4901.2 ETHYLTRIETHOXY-SILANE C <sub>8</sub> H <sub>20</sub> O <sub>3</sub> Si Viscosity: 0.70 cSt Vapor pressure, 50°: 10 mm Coefficient of thermal expansion: 1.5 x 10 <sup>-3</sup> Specific heat: 0.43 cal/g/° HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	192.33 Flashpoint: 40°C (104°F) TOXICITY: oral rat, LD50: 13,720 mg/kg Autoignition temperature: 235°C (455°F) Critical temperature: 314° ΔHvap: 7.8 kcal/mole yc of treated surfaces: 26.3 mN/m	158-9 (-78)	0.896	1.3955
	[78-07-9] TSCA EC 201-080-1 HMIS: 3-2-1-X	100g \$37.00	500g \$148.00		
	SIE4901.4 ETHYLTRIMETHOXY-SILANE C <sub>5</sub> H <sub>14</sub> O <sub>3</sub> Si Viscosity: 0.5 cSt HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	150.25 Flashpoint: 27°C (81°F) ΔHcomb: 3,425 kcal/mole	124-5	0.9488	1.3838
	[5314-55-6] TSCA EC 226-172-9 HMIS: 3-3-1-X	25g \$10.00	2kg \$120.00	17kg \$816.00	

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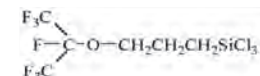
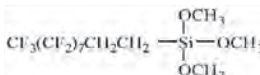
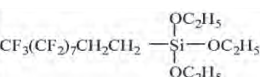
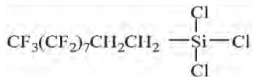
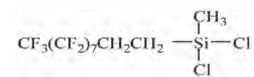
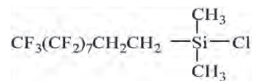
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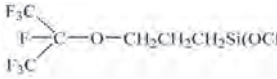
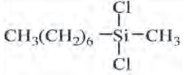
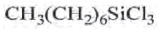
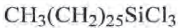
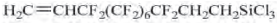
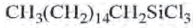
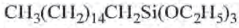
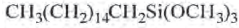
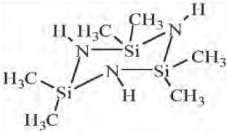
Control  
Glassclad® 18  
Surface conductivity of glass substrates is reduced by application of Glassclad® 18. Surface arc-tracking is eliminated on fluorescent light bulbs

name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>	
PP1-GC18 GLASSCLAD® 18 OCTADECYL FUNCTIONAL SILANE, 20% in t-butanol/diacetone alcohol Hazy, amber liquid Flashpoint: 10°C (50°F) yc of treated glass surface: 31 mN/m Pour point: 4°C Coefficient of friction of treated glass surface: 0.2 - 0.3 Surface resistivity of treated surface: 1.2 x 10 <sup>13</sup> ohms Water-dispersible hydrophobic surface treatment For application information see Gelest's <i>Performance Products Brochure</i> Reduces blood protein adsorption. <sup>1</sup> 1. Arkles, B. et al. In <i>Silanes Surfaces &amp; Interfaces</i> ; Leyden, D., Ed; Gordon & Breach: 1986; p 91. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water			0.88		
	TSCA	HMIS: 2-4-1-X	100g \$20.00	1.5kg \$172.00	15kg \$399.00
SIH5840.4 (HEPTADECYLFLUORO-1,1,2,2-TETRAHYDRODECYL)- DIMETHYLCHLOROSILANE Packaged over copper powder PERFLUORODECYL-1H,1H,2H,2H-DIMETHYLCHLOROSILANE C <sub>12</sub> H <sub>10</sub> ClF <sub>17</sub> Si Derivatizing agent for fluoros phase synthesis HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	540.72	197-8	1.51	1.3410	
[74612-30-9]	TSCA	HMIS: 3-2-1-X	5g \$44.00	25g \$176.00	
SIH5840.6 (HEPTADECYLFLUORO-1,1,2,2-TETRAHYDRODECYL)- METHYLCHLOROSILANE Packaged over copper powder C <sub>11</sub> H <sub>7</sub> Cl <sub>2</sub> F <sub>17</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	561.14	205-7 (26-7)	1.630	1.345	
[3102-79-2]	TSCA	HMIS: 3-2-1-X	5g \$52.00	25g \$208.00	
SIH5841.0 (HEPTADECYLFLUORO-1,1,2,2-TETRAHYDRODECYL)- TRICHLOROSILANE Packaged over copper powder PERFLUORODECYL-1H,1H,2H,2H-TRICHLOROSILANE C <sub>10</sub> H <sub>4</sub> Cl <sub>3</sub> F <sub>17</sub> Si yc of treated surfaces: 12 mN/m. <sup>1</sup> 1. Brzoska, J. et al. <i>Langmuir</i> <b>1994</b> , <i>10</i> , 4367. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	581.56	216-8	1.703	1.3490	
[78560-44-8]	TSCA	HMIS: 3-2-1-X	5g \$39.00	25g \$156.00	
SIH5841.2 (HEPTADECYLFLUORO-1,1,2,2-TETRAHYDRODECYL)- TRIETHOXYOSILANE Packaged over copper powder C <sub>16</sub> H <sub>19</sub> F <sub>17</sub> O <sub>3</sub> Si Hydrolysis in combination with polydimethoxysiloxane gives hard hydrophobic coatings. <sup>1</sup> 1. Oota, T. et al. <i>Jpn. Kokai JP</i> 06,293,782, 1993; <i>Chem. Abstr.</i> <b>1995</b> , 122: 136317d. See also SIP6720.3 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	610.38	103-6 / 3	1.407 <sup>25</sup>	1.3419	
[101947-16-4]	TSCA-S	HMIS: 3-2-1-X	5g \$45.00	25g \$180.00	
SIH5841.5 (HEPTADECYLFLUORO-1,1,2,2-TETRAHYDRODECYL)- TRIMETHOXYOSILANE Packaged over copper powder C <sub>13</sub> H <sub>13</sub> F <sub>17</sub> O <sub>3</sub> Si Treated surface contact angle, water: 115° yc of treated surfaces: 12 mN/m Forms inorganic hybrids with photoinduceable refractive index reduction. <sup>1</sup> 1. Park, J.-U. et al. <i>J. Mater. Chem.</i> <b>2003</b> , <i>13</i> , 738. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	568.30	247	1.54	1.331 <sup>25</sup>	
[83048-65-1]	TSCA-S	HMIS: 3-2-1-X	5g \$42.00	25g \$168.00	
SIH5842.0 (3-HEPTAFLUOROISOPROPOXY)PROPYLTRICHLORO- SILANE C <sub>6</sub> H <sub>6</sub> Cl <sub>3</sub> F <sub>7</sub> O <sub>3</sub> Si Specific wetting surface area: 356 m <sup>2</sup> /g HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	361.55	85-7 / 35	1.497	1.3710	
[15538-93-9]	EC 239-589-6	HMIS: 3-3-1-X	5g \$69.00		



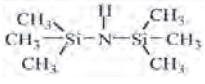
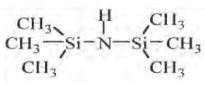
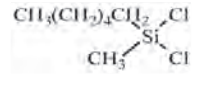
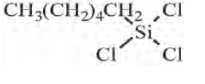
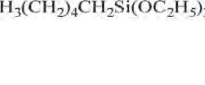
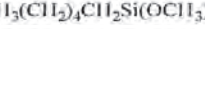
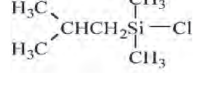
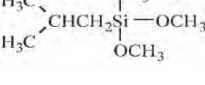
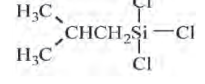
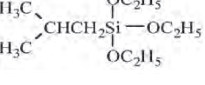
Water droplets on silicon wafer treated with SIH5841.5 exhibit high contact angle

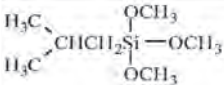

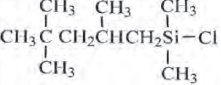
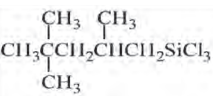
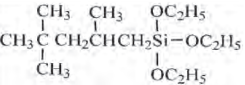
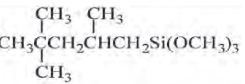
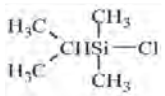
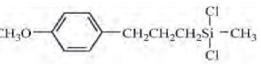
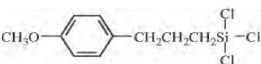
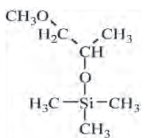
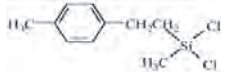
COMMERCIAL HYDROPHOBIC

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIH5842.2 3-(HEPTAFLUOROISOPROPOXY)PROPYL- TRIMETHOXY SILANE C <sub>9</sub> H <sub>15</sub> F <sub>7</sub> O <sub>4</sub> Si Branched fluoroalkylsilane with low surface energy Contact angle, water on treated glass surface: 109-112° Aligns liquid crystals. <sup>1</sup> 1. Jap. Pat. 57177121, 1982 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	348.29	39 / 0.5		1.3841
	[19116-61-1] HMIS: 3-2-1-X		10g \$96.00		
	SIH5845.0 n-HEPTYLDIMETHYLCHLOROSILANE C <sub>8</sub> H <sub>18</sub> Cl <sub>2</sub> Si Flashpoint: 66°C (151°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	213.22	207-8	0.978	1.4396 <sup>25</sup>
	[18395-93-2] TSCA EC 242-274-6 HMIS: 3-2-1-X		25g \$82.00		
	SIH5846.0 n-HEPTYLTRICHLOROSILANE C <sub>7</sub> H <sub>15</sub> Cl <sub>3</sub> Si Flashpoint: 64°C (147°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	233.64	211-2	1.087	1.4439 <sup>25</sup>
	[871-41-0] TSCA EC 212-807-7 HMIS: 3-2-1-X		25g \$80.00		
	SIH5917.0 HEXACOSATRICHLOROSILANE, blend C <sub>26</sub> H <sub>53</sub> Cl <sub>3</sub> Si Contains C <sub>24</sub> -C <sub>30</sub> homologs A distilled cut product with more reproducible deposition than triacontylsilanes HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	500.15	(35-55)		
	[60085-14-5] HMIS: 3-3-1-X		25g \$68.00		
	SIH5918.0 HEXADECAFLUORODODEC-11-EN-1-YLTRICHLORO- SILANE C <sub>12</sub> H <sub>7</sub> Cl <sub>3</sub> F <sub>16</sub> Si Forms self-assembled monolayers; reagent for immobilization of DNA HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	589.61	94-6 / 0.6	1.626	1.3713
	HMIS: 3-1-1-X		1.0g \$160.00		
	SIH5920.0 n-HEXADECYLTRICHLOROSILANE, 95% C <sub>16</sub> H <sub>33</sub> Cl <sub>3</sub> Si yc of treated surfaces: 21 mN/m HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	359.88	202 / 10	0.98	1.4592
	[5894-60-0] TSCA EC 227-575-2 HMIS: 3-1-1-X		25g \$20.00 100g \$65.00		
	SIH5922.0 HEXADECYLTRIETHOXY SILANE, 95% C <sub>22</sub> H <sub>46</sub> O <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	388.71	160-1 / 1 (-9)	0.888	1.4370
	[16415-13-7] TSCA EC 240-465-9 HMIS: 2-1-1-X		25g \$23.00 100g \$75.00		
	SIH5925.0 HEXADECYLTRIMETHOXY SILANE, 95% C <sub>19</sub> H <sub>39</sub> O <sub>3</sub> Si Viscosity: 7 cSt Employed as rheology modifier for moisture crosslinkable HDPE Modifier for moisture crosslinkable polyethylene (XLPE) Water scavenger HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	346.63	155 / 0.2 (-1)	0.89	1.4356
	[16415-12-6] TSCA EC 240-464-3 HMIS: 2-2-1-X		25g \$18.00 2kg \$290.00 16kg \$1,536.00		
	SIH6102.0 1,1,3,3,5,5-HEXAMETHYLCYCLOTRISILAZANE C <sub>6</sub> H <sub>21</sub> N <sub>3</sub> Si <sub>3</sub> Viscosity, 20°: 1.7 cSt Dipole moment: 0.92 Modifies positive resists for O <sub>2</sub> plasma resistance. <sup>1</sup> Polymerizes to polydimethylsilazane oligomer in presence of Ru/H <sub>2</sub> . <sup>2</sup> Silylation reagent for diols. <sup>3</sup> 1. Babich, E. et al. <i>Microelectron. Eng.</i> <b>1990</b> , <i>11</i> , 503. 2. Blum, Y. et al. US Patent 4,216,383, 1986; US Patent 4,788,309, 1988. 3. Birkofer, L. et al. <i>J. Organomet. Chem.</i> <b>1980</b> , <i>187</i> , 21. See also SID4074.4 1,1-DIMETHYLCYCLOSILAZANES HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	219.51	186-8 (-10)	0.922	1.4448
	[1009-93-4] TSCA EC 213-773-6 HMIS: 2-2-1-X		25g \$29.00 100g \$94.00 2kg \$636.00		

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name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
<b>SIH6110.0</b> HEXAMETHYLDISILAZANE <i>HMDS, HMDZ</i> C <sub>6</sub> H <sub>18</sub> NSi <sub>2</sub> Vapor pressure, 50°: 50 mm Viscosity: 0.90 cSt Dielectric constant: 1000 Hz: 2.27 pKa: 7.55 Ea, reaction w/SiO <sub>2</sub> surface: 17.6 kcal/mole  Versatile silylation reagent; creates hydrophobic surfaces Converts acid chlorides and alcohols to amines in a three-component reaction. <sup>1</sup> Reacts with formamide and ketones to form pyrimidines. <sup>2</sup> 1. Li, H.-H. et al. <i>Eur. J. Org. Chem.</i> <b>2008</b> , 3623. 2. Tyagarajan, S. and Chakravarty, P. K. <i>Tetrahedron Lett.</i> <b>2005</b> , 46, 7889. F&F: Vol. 1, p 427; Vol. 2, p 159; Vol. 5, p 323; Vol. 6, p 273; Vol. 7, p 167; Vol. 8, p 29; Vol. 9, p 234; Vol. 11, p 38; Vol. 12, p 239; Vol. 13, p 141; Vol. 14, p 300. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	161.39	126-7	0.7742	1.4080
				
[999-97-3] TSCA EC 213-668-5 HMIS: 2-4-1-X	25g \$10.00	1.5kg \$60.00	14kg \$305.00	
<b>SIH6110.1</b> HEXAMETHYLDISILAZANE, 99% <i>HMDS, HMDZ</i> C <sub>6</sub> H <sub>18</sub> NSi <sub>2</sub> <5ppm chloride Photoresist adhesion promoter HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	161.39	126-7	0.7742	1.4080
				
[999-97-3] TSCA EC 213-668-5 HMIS: 2-4-1-X	25g \$13.00	1.5kg \$85.00		
<b>SIH6165.6</b> HEXYLMETHYLDICHLOROSILANE C <sub>7</sub> H <sub>16</sub> Cl <sub>2</sub> Si Flashpoint: 85°C (185°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	199.19	204-6	0.993	1.439
				
[14799-94-1] TSCA EC 238-864-8 HMIS: 3-2-1-X	25g \$34.00			
<b>SIH6167.0</b> HEXYLTRICHLOROSILANE C <sub>6</sub> H <sub>13</sub> Cl <sub>3</sub> Si Flashpoint: 85°C (185°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	219.61	191-2	1.107	1.3473
				
[928-65-4] TSCA EC 213-178-1 HMIS: 3-2-1-X	25g \$20.00	100g \$65.00		
<b>SIH6167.5</b> HEXYLTRITHOXYSILANE C <sub>12</sub> H <sub>28</sub> O <sub>3</sub> Si Flashpoint: 95°C (203°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	248.44	115 / 18	0.860	1.408 <sup>25</sup>
				
[18166-37-5] HMIS: 2-1-1-X	25g \$31.00	100g \$100.00		
<b>SIH6168.5</b> HEXYLTRIMETHOXYSILANE C <sub>9</sub> H <sub>22</sub> O <sub>3</sub> Si Surface modification of TiO <sub>2</sub> pigments improves dispersion HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	206.35	202-3	0.911 <sup>25</sup>	1.4070
				
[3069-19-0] TSCA EC 221-331-9 HMIS: 3-2-1-X	50g \$31.00	2kg \$190.00		
<b>SIH6452.5</b> ISOBUTYLDIMETHYLCHLOROSILANE C <sub>6</sub> H <sub>15</sub> ClSi Flashpoint: 18°C (64°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	150.72	131-3	0.863	1.4187 <sup>25</sup>
				
[27490-70-6] EC 248-493-3 HMIS: 3-4-1-X	10g \$32.00			
<b>SIH6452.8</b> ISOBUTYLMETHYLDIMETHOXYSILANE C <sub>7</sub> H <sub>18</sub> O <sub>2</sub> Si Flashpoint: 38°C (100°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	162.30	63 / 40	0.851	1.396
				
[18293-82-8] EC 242-171-6 HMIS: 2-2-1-X	25g \$57.00			
<b>SIH6453.0</b> ISOBUTYLTRICHLOROSILANE C <sub>4</sub> H <sub>9</sub> Cl <sub>3</sub> Si Flashpoint: 37°C (99°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	191.56	140	1.162	1.4335
				
[18169-57-8] TSCA EC 242-053-4 HMIS: 3-3-1-X	25g \$12.00	100g \$39.00		
<b>SIH6453.5</b> ISOBUTYLTRITHOXYSILANE C <sub>10</sub> H <sub>24</sub> O <sub>3</sub> Si Flashpoint: 63°C (145°F) TOXICITY: oral rat, LD50: >5,000 mg/kg Hydrophobic surface treatment for microporous minerals HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	220.38	190-1	0.9104	1.3908
				
[17980-47-1] TSCA EC 402-810-3 HMIS: 2-2-1-X	25g \$10.00	2kg \$92.00	16kg \$528.00	

name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
<p>SII6453.7 ISOBUTYLTRIMETHOXYSILANE TRIMETHOXYSILYL-2-METHYLPROPANE C<sub>7</sub>H<sub>18</sub>O<sub>3</sub>Si</p>   <p><i>Branched structure provides hydrophobic surface treatments for architectural coatings</i></p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	178.30	154	0.933	1.3960
<p>[18395-30-7] TSCA EC 242-272-5 HMIS: 3-2-1-X</p> <p>50g \$11.00 2kg \$110.00 17kg \$493.00</p>				
<p>SII6456.6 ISOOCYLDIMETHYLCHLOROSILANE C<sub>10</sub>H<sub>23</sub>ClSi</p>  <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	206.83	83-5 / 10	0.852	
<p>[79957-95-2] EC 279-358-7 HMIS: 3-3-1-X</p> <p>25g \$72.00</p>				
<p>SII6457.0 ISOOCYLTRICHLOROSILANE 1-TRICHLOROSILYL-2,4,4-TRIMETHYLPENTANE C<sub>8</sub>H<sub>17</sub>Cl<sub>3</sub>Si</p>  <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	247.67	117 / 50	1.0684	1.4510
<p>[18379-25-4] TSCA EC 242-262-0 HMIS: 3-2-1-X</p> <p>25g \$22.00 100g \$72.00</p>				
<p>SII6457.5 ISOOCYLTRIETHOXYSILANE C<sub>14</sub>H<sub>32</sub>O<sub>3</sub>Si</p>  <p>Flashpoint: &gt;65°C (&gt;150°F) TOXICITY: oral rat, LD50: &gt;2,000 mg/kg Autoignition temperature: 265°C</p> <p>Viscosity: 2.1 cSt Vapor pressure, 112°: 10mm Architectural water-repellent Water scavenger for sealed lubricant systems</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	276.48	236 (<-80)	0.880	1.4160
<p>[35435-21-3] TSCA EC 252-558-1 HMIS: 1-2-1-X</p> <p>50g \$12.00 2kg \$168.00</p>				
<p>SII6458.0 ISOOCYLTRIMETHOXYSILANE C<sub>11</sub>H<sub>23</sub>O<sub>3</sub>Si</p>  <p>Flashpoint: 52°C (126°F) Autoignition temperature: 310°C</p> <p>Viscosity: 2 cSt Component in Anti-Graffiti coatings</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	234.41	90 / 10	0.887	1.4176
<p>[34396-03-7] TSCA EC 251-995-5 HMIS: 3-2-1-X</p> <p>25g \$12.00 100g \$39.00 2kg \$190.00</p>				
<p>SII6462.0 ISOPROPYLDIMETHYLCHLOROSILANE C<sub>5</sub>H<sub>13</sub>ClSi</p>  <p>See also SID4065.0</p> <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	136.69	114	0.873	1.4138
<p>[3634-56-8] TSCA HMIS: 3-4-1-X</p> <p>25g \$52.00 100g \$169.00</p>				
<p>SIM6492.4 3-(p-METHOXYPHENYL)PROPYLMETHYLDICHLOROSILANE C<sub>11</sub>H<sub>16</sub>Cl<sub>2</sub>Osi</p>  <p>Flashpoint: &gt;110°C (&gt;230°F)</p> <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	263.24	115-6 / 0.3	1.13	
<p>[134438-26-9] HMIS: 3-1-1-X</p> <p>store &lt;5°C 25g \$74.00</p>				
<p>SIM6492.5 3-(p-METHOXYPHENYL)PROPYLTRICHLOROSILANE C<sub>10</sub>H<sub>13</sub>Cl<sub>3</sub>Osi</p>  <p>Flashpoint: &gt;110°C (&gt;230°F)</p> <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	283.66	128-9 / 1	1.226	
<p>[163155-57-5] HMIS: 3-1-1-X</p> <p>25g \$74.00</p>				
<p>SIM6492.8 (1-METHOXY-2-PROPOXY)TRIMETHYLSILANE C<sub>7</sub>H<sub>18</sub>O<sub>2</sub>Si</p>  <p>Flashpoint: 20°C (68°F)</p> <p>Viscosity: 2 cSt Vapor pressure, 50°: 30 mm</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	162.30	132 (-40)	0.83	1.3965
<p>[55816-62-1] HMIS: 3-4-1-X</p> <p>25g \$70.00</p>				
<p>SIM6511.0 p-(METHYLPHENETHYL)METHYLDICHLOROSILANE, -95% (p-TOLYLETHYL)METHYLDICHLOROSILANE C<sub>10</sub>H<sub>14</sub>Cl<sub>2</sub>Si</p>  <p>Mixed o-, m-, p- isomers α:β ~ 40:60</p> <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	233.21	103-5 / 2	1.10	1.5100 <sup>25</sup>
<p>[718635-97-3]/[63126-87-4] TSCA-L HMIS: 3-1-1-X</p> <p>50g \$88.00</p>				

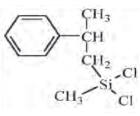
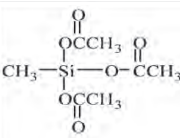
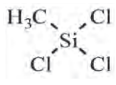
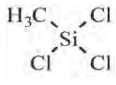
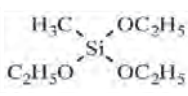
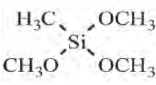
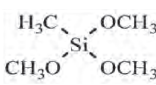
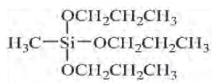
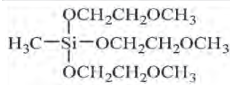
COMMERCIAL

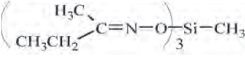
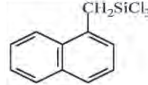
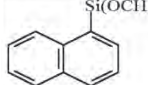
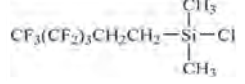
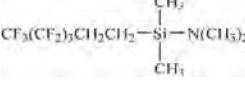
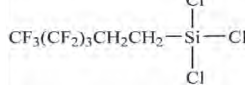
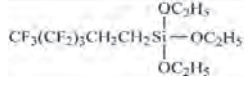
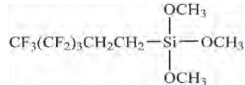
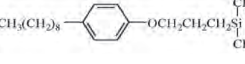
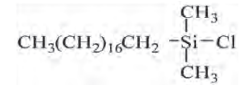
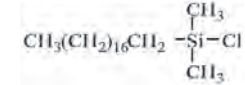
COMMERCIAL

COMMERCIAL

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name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
 <p>SIM6512.5 (2-METHYL-2-PHENYLETHYL)METHYLDICHLORO-SILANE METHYL(<math>\alpha</math>-METHYLPHENETHYL)DICHLOROSILANE C<sub>10</sub>H<sub>14</sub>Cl<sub>2</sub>Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [13617-28-2] TSCA EC 237-102-1 HMIS: 3-1-1-X</p>	233.21	104-5 / 9	1.1165	1.5152
 <p>SIM6519.0 METHYLTRIACETOXSILANE, 95% C<sub>7</sub>H<sub>12</sub>O<sub>6</sub>Si Most common cross-linker for condensation cure silicone RTVs HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [4253-34-3] TSCA EC 224-221-9 HMIS: 3-2-1-X</p>	220.25	87-8 / 3 (40) Flashpoint: 85°C (185°F) Vapor pressure, 94°: 9 mm	1.175	1.4083
 <p>SIM6520.0 METHYLTRICHLOROSILANE CH<sub>3</sub>Cl<sub>3</sub>Si Viscosity: 0.46 cSt Vapor pressure, 13.5°: 100 mm Surface tension: 20.3 mN/m Ionization potential: 11.36 eV Coefficient of thermal expansion: 1.3 x 10<sup>-3</sup> Specific heat: 0.22 cal/g° HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [75-79-6] TSCA EC 200-902-6 HMIS: 3-4-2-X</p>	149.48	66.4 (-78) Flashpoint: -15°C (5°F) TOXICITY: ihl rat, LDLo: 450 ppm/4H Autoignition temperature: 395° Critical temperature: 243° Critical pressure: 39 atm $\Delta$ Hvap: 7.4 kcal/mole	1.275	1.4110
 <p>SIM6520.1 METHYLTRICHLOROSILANE, 99% CH<sub>3</sub>Cl<sub>3</sub>Si In combination with H<sub>2</sub> forms SiC by CVD.<sup>1</sup> 1. Josiek, A. et al. <i>Chem. Vap. Dep.</i> <b>1996</b>, 2, 17. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [75-79-6] TSCA EC 200-902-6 HMIS: 3-4-2-X</p>	149.48	66.4 (-78)	1.275	1.4110
 <p>SIM6555.0 METHYLTRIETHOXSILANE C<sub>7</sub>H<sub>16</sub>O<sub>3</sub>Si Viscosity: 0.6 cSt Vapor pressure, 25°: 6 mm Low cost hydrophobic surface treatment HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [2031-67-6] TSCA EC 217-983-9 HMIS: 1-3-1-X</p>	178.30	142 Flashpoint: 30°C (86°F) TOXICITY: oral rat, LD50: 12,500 mg/kg Autoignition temperature: 225°C (437°F) Dipole moment: 1.72 debye	0.8948	1.3832
 <p>SIM6560.0 METHYLTRIMETHOXSILANE C<sub>4</sub>H<sub>12</sub>O<sub>3</sub>Si Viscosity: 0.50 cSt Dipole moment: 1.60 debye Intermediate for coating resins HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [1185-55-3] TSCA EC 214-685-0 HMIS: 3-4-1-X</p>	136.22	102-3 (-78) Flashpoint: 8°C (46°F) TOXICITY: oral rat, LD50: 12,500 mg/kg Autoignition temperature: 255° $\Delta$ Hcomb: 1,142 kcal/mole	0.955	1.3696
 <p>SIM6560.1 METHYLTRIMETHOXSILANE, 99% C<sub>4</sub>H<sub>12</sub>O<sub>3</sub>Si Viscosity: 0.50 cSt Dipole moment: 1.60 debye Intermediate for coating resins HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [1185-55-3] TSCA EC 214-685-0 HMIS: 3-4-1-X</p>	136.22	102-3 (-78) Flashpoint: 8°C (46°F) TOXICITY: oral rat, LD50: 12,500 mg/kg Autoignition temperature: 255° $\Delta$ Hcomb: 1,142 kcal/mole	0.955	1.3696
 <p>SIM6579.0 METHYLTRI-n-PROPOXYSILANE C<sub>10</sub>H<sub>24</sub>O<sub>3</sub>Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [5581-66-8] TSCA EC 226-978-0 HMIS: 2-2-1-X</p>	220.38	83-4 / 13 Flashpoint: 60°C (140°F)	0.878	1.4085
 <p>SIM6585.0 METHYLTRIS(METHOXYETHOXY)SILANE C<sub>10</sub>H<sub>24</sub>O<sub>6</sub>Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [17980-64-2] TSCA EC 241-906-8 HMIS: 3-1-0-X</p>	268.38	145 / 15	1.045	1.4178

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>	
	<b>SIM6590.0</b> METHYLTRIS(METHYLETHYLKETOXIMO)SILANE, tech-95 <i>METHYLTRIS(2-BUTANONEOXIME)SILANE</i> C <sub>13</sub> H <sub>27</sub> N <sub>3</sub> O <sub>3</sub> Si Neutral cross-linker for condensation cure silicones HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	301.46	110-1 / 2 (-22)	0.982	1.4548 <sup>25</sup>	COMMERCIAL
	[22984-54-9] TSCA EC 245-366-4 HMIS: 2-2-1-X		100g \$16.00	2kg \$170.00		
	<b>SIN6596.0</b> (1-NAPHTHYLMETHYL)TRICHLOROSILANE C <sub>11</sub> H <sub>9</sub> Cl <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	275.64	150-1 / 7	1.3112	1.5974	COMMERCIAL
	[17998-59-3] HMIS: 3-2-1-X		10g \$116.00			
	<b>SIN6597.0</b> 1-NAPHTHYLTRIMETHOXYSILANE C <sub>13</sub> H <sub>16</sub> O <sub>3</sub> Si Employed in high refractive index surface modification HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	248.35	150 / 2 (33-5)		1.5562	COMMERCIAL
	[18052-76-1] HMIS: 3-2-1-X		5g \$180.00			
	<b>SIN6597.3</b> NONAFLUROHEXYLDIMETHYLCHLOROSILANE C <sub>8</sub> H <sub>10</sub> ClF <sub>9</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	340.69	162-4	1.3422		COMMERCIAL
	[119386-82-2] HMIS: 3-3-1-X		10g \$45.00			
	<b>SIN6597.4</b> NONAFLUROHEXYLDIMETHYL(DIMETHYLAMINO)SILANE C <sub>10</sub> H <sub>18</sub> F <sub>9</sub> NSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	349.31	86-8 / 35 Flashpoint: 42°C (108°F)	1.214		COMMERCIAL
	[119386-82-2] HMIS: 3-3-1-X		10g \$88.00			
	<b>SIN6597.6</b> NONAFLUROHEXYLTRICHLOROSILANE C <sub>6</sub> H <sub>4</sub> Cl <sub>3</sub> F <sub>9</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	381.53	70-2 / 15	1.542		COMMERCIAL
	[78560-47-1] TSCA-L HMIS: 3-2-1-X		10g \$27.00	50g \$108.00		
	<b>SIN6597.65</b> NONAFLUROHEXYLTRIETHOXYSILANE C <sub>12</sub> H <sub>19</sub> F <sub>9</sub> O <sub>3</sub> Si Critical surface tension, treated surface: 23 mN/m Oleophobic, hydrophobic surface treatment HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	410.35	96 / 15	1.201	1.3502	COMMERCIAL
	[102390-98-7] TSCA-L HMIS: 2-2-1-X		25g \$56.00	100g \$182.00		
	<b>SIN6597.7</b> NONAFLUROHEXYLTRIMETHOXYSILANE C <sub>9</sub> H <sub>13</sub> F <sub>9</sub> O <sub>3</sub> Si Improves hydrolytic stability of dental composites. <sup>1</sup> 1. Nikei, S. et al. <i>J. Dent. Res.</i> <b>2002</b> , <i>81</i> (7), 482. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	368.27	68-9 / 15	1.335	1.3376	COMMERCIAL
	[85877-79-8] TSCA-L HMIS: 3-2-1-X		10g \$32.00	50g \$128.00		
	<b>SIN6598.0</b> p-NONYLPHENOXYPROPYLDIMETHYLCHLOROSILANE C <sub>20</sub> H <sub>35</sub> ClO <sub>3</sub> Si tech-95 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	355.04	181 / 0.75	0.963	1.4925	COMMERCIAL
	[18643-08-8] TSCA EC 242-472-2 HMIS: 3-1-1-X		10g \$95.00			
	<b>SIO6615.0</b> n-OCTADECYLDIMETHYLCHLOROSILANE <i>DIMETHYL-n-OCTADECYLCHLOROSILANE</i> C <sub>20</sub> H <sub>43</sub> ClSi Contains 5-10% C <sub>18</sub> isomers Employed in bonded HPLC reverse phases. <sup>1</sup> 1. Wise, S. et al. In <i>Silanes Surfaces &amp; Interfaces</i> ; Leyden, D., Ed.; Gordon & Breach: 1986; p349. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	347.10	159 / 0.1 (28-30) Flashpoint: 201°C (394°F)	0.856 <sup>29</sup>	1.4498 <sup>29</sup>	COMMERCIAL
	[18643-08-8] TSCA EC 242-472-2 HMIS: 3-1-1-X		25g \$25.00	2kg \$412.00		
	<b>SIO6615.1</b> n-OCTADECYLDIMETHYLCHLOROSILANE, 97% <i>DIMETHYL-n-OCTADECYLCHLOROSILANE</i> C <sub>20</sub> H <sub>43</sub> ClSi Contains 3-6% C <sub>18</sub> isomers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	347.10	159 / 0.1 (28-30) Flashpoint: 201°C (394°F)	0.856 <sup>29</sup>	1.4998 <sup>29</sup>	COMMERCIAL
	[18643-08-8] TSCA EC 242-472-2 HMIS: 3-1-1-X		25g \$51.00	100g \$165.00		

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COMMERCIAL  
HYDROPHOBIC

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIO6615.2 n-OCTADECYLDIMETHYLCHLOROSILANE 70% in toluene Contains 5-10% C <sub>18</sub> isomers C <sub>20</sub> H <sub>43</sub> ClSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18643-08-8] TSCA EC 242-472-2 HMIS: 3-4-1-X	347.10	159 / 0.1 Flashpoint: 5°C (41°F)	0.854	
			25g \$21.00	2kg \$350.00	
	SIO6617.0 n-OCTADECYLDIMETHYL(DIMETHYLAMINO)SILANE C <sub>22</sub> H <sub>49</sub> NSi Contains 5-10% C <sub>18</sub> isomers HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [76328-77-3] TSCA HMIS: 3-3-1-X	355.72	160 / 0.1	0.818	1.4512
			10g \$42.00	50g \$168.00	
	SIO6618.0 n-OCTADECYLDIMETHYLMETHOXYSILANE C <sub>21</sub> H <sub>46</sub> O <sub>2</sub> Si Contains 5-10% C <sub>18</sub> isomers Employed in SAM resist. <sup>1</sup> 1. Oh, T. et al. <i>Mol. Cryst. Liq. Cryst. Sci. Technol., Sect. A</i> <b>1999</b> , 337, 7. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [71808-65-6] TSCA EC 276-039-4 HMIS: 2-1-0-X	342.68	184-6 / 0.2	0.83 <sup>25</sup>	1.444
			25g \$52.00	100g \$169.00	
	SIO6624.0 n-OCTADECYLMETHOXYDICHLOROSILANE, tech-95 C <sub>19</sub> H <sub>40</sub> Cl <sub>2</sub> O <sub>2</sub> Si Contains 5-10% C <sub>18</sub> isomers Maintains reactivity of octadecyltrichlorosilane, but with reduced HCl byproduct HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [211934-50-8] HMIS: 3-1-1-X	383.51	144-7 / 1.5	0.94 <sup>25</sup>	1.452
			25g \$39.00	100g \$127.00	
	SIO6625.0 n-OCTADECYLMETHYLDICHLOROSILANE C <sub>19</sub> H <sub>40</sub> Cl <sub>2</sub> Si Contains 5-10% C <sub>18</sub> isomers Viscosity: 7 cSt HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [5157-75-5] TSCA EC 225-931-1 HMIS: 3-1-1-X	367.52	185 / 2.5 (24-6) Flashpoint: 185°C (365°F) TOXICITY: oral rat, LD50: 200-2,000 mg/kg Autoignition temperature: 230°C	0.930	
			25g \$20.00	500g \$262.00	
	SIO6627.0 n-OCTADECYLMETHYLDIETHOXYSILANE C <sub>23</sub> H <sub>50</sub> O <sub>2</sub> Si Contains 5-10% C <sub>18</sub> isomers HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [67859-75-0] TSCA EC 267-423-2 HMIS: 2-1-0-X	386.73	197 / 2 Flashpoint: >110°C (>230°F)	0.852	1.4407
			25g \$38.00		
	SIO6629.0 n-OCTADECYLMETHYLDIMETHOXYSILANE C <sub>21</sub> H <sub>46</sub> O <sub>2</sub> Si Contains 5-10% C <sub>18</sub> isomers HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [70851-50-2] TSCA EC 274-936-5 HMIS: 3-1-0-X	358.68	190 / 3 (12-18) Flashpoint: >110°C (>230°F) Autoignition temperature: 225°C	0.85	1.4427
			25g \$52.00	100g \$169.00	
	SIO6640.0 n-OCTADECYLTRICHLOROSILANE, 95% OTS Contains 5-10% C <sub>18</sub> isomers C <sub>18</sub> H <sub>37</sub> Cl <sub>3</sub> Si Provides lipophilic surface coatings Employed in patterning and printing of electroactive molecular films. <sup>1,2</sup> Immobilizes physiologically active cell organelles. <sup>3</sup> Treated substrates increase electron transport of pentacene films. <sup>4</sup> 1. Huan, Z. et al. <i>Synth. Met.</i> <b>1997</b> , 85, 1375. 2. Jeon, J. et al. <i>Langmuir</i> <b>1997</b> , 13, 3382. 3. Arkles, B. et al. <i>J. Biol. Chem.</i> <b>1976</b> , 250, 8856. 4. Skankar, K. et al. <i>J. Mater. Res.</i> <b>2004</b> , 19, 2003. See also SIO6624.0 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [112-04-9] TSCA EC 203-930-7 HMIS: 3-1-1-X	387.93	160-2 / 3 (22) Flashpoint: 189°C (372°F)	0.950 <sup>22</sup>	1.4602
			25g \$11.00	1kg \$119.00	15kg \$962.00
	SIO6640.1 n-OCTADECYLTRICHLOROSILANE C <sub>18</sub> H <sub>37</sub> Cl <sub>3</sub> Si Contains <3% C <sub>18</sub> isomers Highest concentration of terminal silane substitution HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [112-04-9] TSCA EC 203-930-7 HMIS: 3-1-1-X	387.93	160-2 / 3 (22)	0.950 <sup>22</sup>	1.4602
			25g \$22.00	100g \$72.00	
	SIO6642.0 n-OCTADECYLTRIETHOXYSILANE, 95% C <sub>24</sub> H <sub>52</sub> O <sub>3</sub> Si Contains 5-10% C <sub>18</sub> isomers Forms hydrophobic, oleophilic coatings HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [7399-00-0] EC 230-995-9 HMIS: 2-1-0-X	416.76	165-9 / 2 (10-12) Flashpoint: >150°C (>302°F)	0.87	1.4386
			25g \$30.00	100g \$96.00	

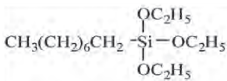
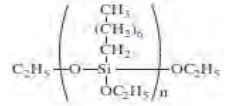
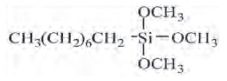
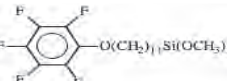
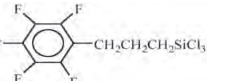
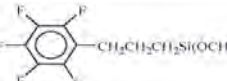
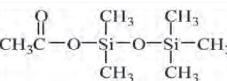
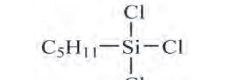
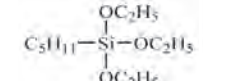
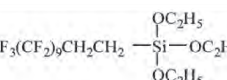
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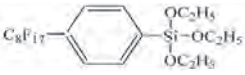
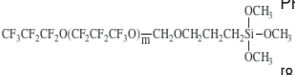
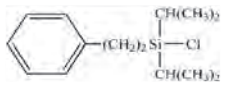
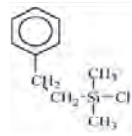
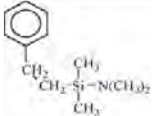
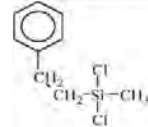
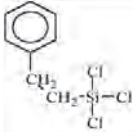
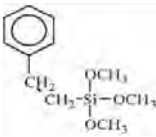
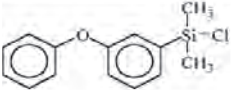
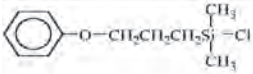
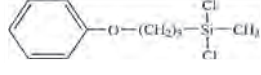
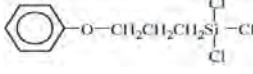
	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIO6645.0 n-OCTADECYLTRIMETHOXY-SILANE, 95% C <sub>21</sub> H <sub>46</sub> O <sub>3</sub> Si Contains 5-10% C <sub>18</sub> isomers	374.68	170 / 0.1 (13-17)	0.885	1.439
	Forms hydrophobic, oleophilic coatings Forms clear, ordered films w/ tetramethoxysilane. <sup>1</sup> Undergoes oscillatory adsorption to form SAMs. <sup>2</sup> 1. Shimjima, A. et al. <i>J. Am. Chem. Soc.</i> <b>1998</b> , 120, 4528. 2. Thomsen, L. et al. <i>Surf. &amp; Interface Analysis</i> <b>2005</b> , 37, 472. See also SIS6952.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
	[3069-42-9] TSCA EC 221-339-2 HMIS: 2-1-1-X		25g \$15.00	2kg \$520.00	
	SIO6698.0 OCTAMETHYLCYCLOTETRASILAZANE OCTAMETHYLSILANETETRAMINE C <sub>8</sub> H <sub>28</sub> N <sub>4</sub> Si <sub>4</sub>	292.68	225 (97)	0.950 <sup>22</sup>	1.458 <sup>25</sup>
	Forms α-Si <sub>3</sub> N <sub>4</sub> by ammonia thermal synthesis. <sup>1</sup> 1. Schaible, S. et al. <i>Applied Organomet. Chem.</i> <b>1993</b> , 7, 53. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
	[1020-84-4] TSCA EC 213-817-4 HMIS: 2-2-1-X		25g \$36.00	100g \$117.00	
	SIO6710.5 n-OCTYLDIISOPROPYLCHLOROSILANE C <sub>14</sub> H <sub>31</sub> ClSi	262.94	95-9 / 0.5	0.875	1.4550
	Reagent for preparation of HPLC stationary phases w/ high stability and efficiency. <sup>1</sup> 1. Kirkland, J. et al. <i>J. Chromatogr. Sci.</i> <b>1994</b> , 32, 473. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
	[117559-37-2] HMIS: 3-1-1-X		10g \$64.00		
	SIO6710.7 n-OCTYLDIISOPROPYL(DIMETHYLAMINO)SILANE C <sub>18</sub> H <sub>37</sub> NSi	271.57	105 / 0.7	0.833	1.4560
	HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
	[151613-25-1] TSCA HMIS: 3-2-1-X		25g \$250.00		
	SIO6711.0 n-OCTYLDIMETHYLCHLOROSILANE C <sub>10</sub> H <sub>23</sub> ClSi	206.83	222-5	0.873	1.4328 <sup>25</sup>
	HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents				
	[18162-84-0] TSCA EC 242-044-5 HMIS: 3-1-1-X		25g \$30.00	100g \$98.00	
	SIO6711.1 n-OCTYLDIMETHYLMETHOXY-SILANE C <sub>11</sub> H <sub>25</sub> O <sub>2</sub> Si	202.42	221-223	0.813	1.4230
	HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
	[93804-29-6] EC 298-404-7 HMIS: 3-2-1-X		25g \$84.00		
	SIO6711.3 n-OCTYLDIMETHYL(DIMETHYLAMINO)SILANE C <sub>12</sub> H <sub>29</sub> NSi	215.45	94-6 / 10	0.80 <sup>25</sup>	1.4347
	HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
	[110348-62-4] HMIS: 3-2-1-X		25g \$56.00		
	SIO6712.0 n-OCTYLMETHYLDICHLOROSILANE C <sub>9</sub> H <sub>20</sub> Cl <sub>2</sub> Si	227.25	94 / 6	0.9761	1.4440
	HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents				
	[14799-93-0] TSCA EC 238-863-2 HMIS: 3-2-1-X		25g \$20.00	500g \$174.00	
	SIO6712.2 n-OCTYLMETHYLDIETHOXY-SILANE C <sub>13</sub> H <sub>30</sub> O <sub>2</sub> Si	246.47	80-2 / 2	0.8478	1.4190
	HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
	[2652-38-2] HMIS: 2-1-0-X		25g \$21.00	100g \$69.00	
	SIO6712.4 n-OCTYLMETHYLDIMETHOXY-SILANE C <sub>11</sub> H <sub>26</sub> O <sub>2</sub> Si	218.42	87-9 / 5	0.858	1.4190
	HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
	[85712-15-8] EC 288-374-3 HMIS: 3-2-1-X		25g \$30.00	100g \$98.00	
	SIO6713.0 n-OCTYLTRICHLOROSILANE C <sub>8</sub> H <sub>17</sub> Cl <sub>3</sub> Si	247.67	224-6 (<-50)	1.0744	1.4490
	Vapor pressure, 125°: 1 mm HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents				
	[5283-66-9] TSCA EC 226-112-1 HMIS: 3-1-1-X		25g \$11.00	2kg \$170.00	

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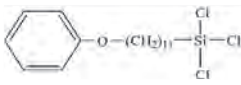
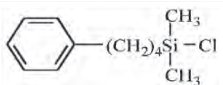
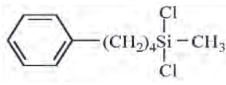
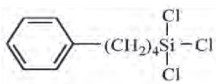
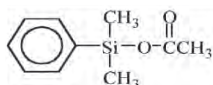
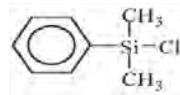
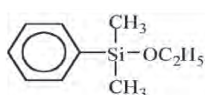
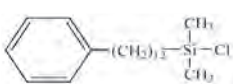
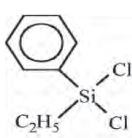
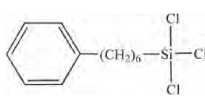
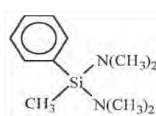
PLEASE INQUIRE ABOUT BULK QUANTITIES

name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
 <p>SIO6715.0 n-OCTYLTRIETHOXSILANE C<sub>14</sub>H<sub>32</sub>O<sub>3</sub>Si Flashpoint: 109°C (228°F) TOXICITY: oral rat, LD50: &gt;5,110 mg/kg</p> <p>Viscosity: 1.9 cSt Widely used in architectural hydrophobation May be formulated to stable water emulsions.<sup>1</sup> 1. Depasquale, R. et al. US Patent 4,648,904, 1987. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	276.48	98-9 / 2 (<-40)	0.8750	1.4160
[2943-75-1] TSCA EC 220-941-2 HMIS: 2-1-0-X		50g \$10.00 2kg \$140.00 15kg \$585.00		
 <p>SIO6715.2 OCTYLTRIETHOXSILANE, oligomeric hydrolysate Flashpoint: 68°C (154°F) Viscosity: 400-600 cSt Reactive hydrophobic surface treatment with reduced volatile by-products HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>			0.979	
HMIS: 2-2-1-X		100g \$48.00		
 <p>SIO6715.5 n-OCTYLTRIMETHOXSILANE C<sub>11</sub>H<sub>26</sub>O<sub>3</sub>Si Flashpoint: 68°C (154°F) Viscosity: 1 cSt</p> <p>Vapor pressure, 75°: 0.1 mm Treatment for particles used in non-aqueous liquid dispersions See also SIH6458.0 ISOCTYLTRIMETHOXSILANE HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	234.41	191-2	0.907	1.417
[3069-40-7] TSCA EC 221-338-7 HMIS: 3-1-1-X		25g \$10.00 2kg \$190.00		
 <p>SIP6716.0 PENTAFLUOROPHENOXYUNDECYLTRIMETHOXY-SILANE C<sub>20</sub>H<sub>31</sub>F<sub>5</sub>O<sub>3</sub>Si Flashpoint: 40°C (104°F)</p> <p>For non-covalent immobilization of proteins HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	458.54			
[944721-47-5] HMIS: 3-2-1-X		5g \$240.00		
 <p>SIP6716.4 PENTAFLUOROPHENYLPROPYLTRICHLOROSILANE C<sub>9</sub>H<sub>6</sub>Cl<sub>3</sub>F<sub>5</sub>Si Flashpoint: 30°C (86°F)</p> <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	343.58	99 / 0.75 (27-30)	1.495	1.4620
[78900-02-4] HMIS: 3-1-1-X		2.5g \$64.00		
 <p>SIP6716.6 PENTAFLUOROPHENYLPROPYLTRIMETHOXSILANE C<sub>12</sub>H<sub>15</sub>F<sub>5</sub>O<sub>3</sub>Si Flashpoint: 40°C (104°F)</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	330.33	97 / 0.75	1.27	
[303191-26-6] HMIS: 2-1-1-X		2.5g \$76.00		
 <p>SIP6717.0 1,1,1,3,3-PENTAMETHYL-3-ACETOXYDISILOXANE C<sub>7</sub>H<sub>18</sub>O<sub>3</sub>Si<sub>2</sub> Flashpoint: 40°C (104°F)</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	206.39	149-50	0.90	1.3887 <sup>25</sup>
[70693-47-9] TSCA EC 274-767-7 HMIS: 2-2-1-X		10g \$36.00 50g \$144.00		
 <p>SIP6720.0 PENTYLTRICHLOROSILANE AMYLTRICHLOROSILANE C<sub>5</sub>H<sub>11</sub>Cl<sub>3</sub>Si Flashpoint: 30°C (86°F)</p> <p>Mixed isomers See also SIH6453.5 Specific heat: 0.35 cal/g/° Viscosity: 1.1 cSt HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	209.59	171-2	1.142	1.4456
[107-72-2] TSCA EC 203-515-0 HMIS: 3-3-1-X		25g \$52.00		
 <p>SIP6720.2 PENTYLTRIETHOXSILANE AMYLTRIETHOXSILANE C<sub>11</sub>H<sub>26</sub>O<sub>3</sub>Si Flashpoint: 68°C (154°F)</p> <p>Mixed isomers Viscosity: 2.1 cSt HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	234.41	95-6 / 1.3	0.895	1.4059
[2761-24-2] TSCA EC 220-429-9 HMIS: 2-2-1-X		25g \$58.00		
 <p>SIP6720.5 PERFLUORODODECYL-1H,1H,2H,2H-TRIETHOXY-SILANE - PERFLUOROTETRADECYL-1H,1H,2H,2H-TRIETHOXSILANE MIXTURE, 80% C<sub>17</sub>H<sub>28</sub>F<sub>11</sub>O<sub>3</sub>Si Flashpoint: 68°C (154°F)</p> <p>Contains ~ 5% SIH5841.2, balance higher homologs For the preparation of low surface energy substrates See also SIH5840.25 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	710-810	157-198 / 1.5 (70-85)		
HMIS: 2-1-1-X		5g \$132.00		

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIP6720.71 (PERFLUOROOCETYL)PHENYLTRIETHOXYSILANE C <sub>20</sub> H <sub>19</sub> F <sub>17</sub> O <sub>3</sub> Si Thermally stable to >300° Contact angle treated glass surface, water: 115°. <sup>1</sup> 1. Kondo, Y. <i>J. Oleoscience</i> , <b>2004</b> , 53, 143 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	658.50	101-3 / 1 Flashpoint: >110°C (>230°F)	1.448	
			1.0g \$232.00		
	SIP6720.72 [PERFLUORO(POLYPROPYLENEOXY)]METHOXY-PROPYLTRIMETHOXYSILANE, 20% in fluorinated hydrocarbon Contact angle, water: 112° HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	4,000-8,000		1.5	
			10g \$180.00		
	SIP6720.8 PHENETHYLDIISOPROPYLCHLOROSILANE C <sub>14</sub> H <sub>23</sub> ClSi Mixed α-, β-isomers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	254.86	105-9 / 0.3	0.970	
			5g \$120.00		
	SIP6721.0 PHENETHYLDIMETHYLCHLOROSILANE C <sub>10</sub> H <sub>15</sub> ClSi Contains α-, β-isomers See also SIP6724.7 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	198.77	56 / 0.2 Flashpoint: 70°C (158°F)	0.999	1.5185
			50g \$170.00		
	SIP6721.2 PHENETHYLDIMETHYL(DIMETHYLAMINO)SILANE C <sub>12</sub> H <sub>21</sub> NSi Contains 10-15% α-isomer HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	207.39	109 / 2	0.890	1.4946
			10g \$117.00		
	SIP6721.5 PHENETHYLMETHYLDICHLOROSILANE METHYL(PHENETHYL)DICHLOROSILANE C <sub>9</sub> H <sub>12</sub> Cl <sub>2</sub> Si Contains α-, β-isomers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	219.19	99 / 6 Flashpoint: 80°C (176°F)	1.127	1.5120
			25g \$38.00	100g \$124.00	
	SIP6722.0 PHENETHYLTRICHLOROSILANE C <sub>8</sub> H <sub>9</sub> Cl <sub>3</sub> Si Contains α-, β-isomers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	239.60	93-6 / 3 Flashpoint: 91°C (196°F) TOXICITY: oral rat, LD50: 2,830 mg/kg	1.240	1.5185
			25g \$25.00	100g \$82.00	
	SIP6722.6 PHENETHYLTRIMETHOXYSILANE C <sub>11</sub> H <sub>16</sub> O <sub>3</sub> Si Contains α-, β-isomers Component in optical coating resins In combination with TEOS forms hybrid silicalite-1 molecular sieves. <sup>1</sup> 1. Yeong, Y. et al. <i>Adv. Mater. Res.</i> <b>2008</b> , 47-50, 238. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	226.35	95-6 / 2 Flashpoint: 109°C (228°F)	1.037	1.4753
			25g \$42.00	100g \$136.00	2kg \$420.00
	SIP6723.0 m-PHENOXYPHENYLDIMETHYLCHLOROSILANE, 95% C <sub>14</sub> H <sub>15</sub> ClOSi Contains other isomers End-capper for low-temperature lubricating fluids. <sup>1</sup> 1. Gardos, M. <i>ASLE Transactions</i> <b>1972</b> , 18, 31. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	262.81	102-6 / 1	1.11 <sup>25</sup>	1.5603 <sup>25</sup>
			5g \$94.00		
	SIP6723.2 3-PHENOXYPROPYLDIMETHYLCHLOROSILANE C <sub>11</sub> H <sub>17</sub> ClOSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	228.78	90-2 / 0.25	1.034	1.5052
			25g \$45.00	100g \$146.00	
	SIP6723.25 3-PHENOXYPROPYLMETHYLDICHLOROSILANE C <sub>10</sub> H <sub>14</sub> Cl <sub>2</sub> OSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	249.21	110 / 1	1.158	1.5150
			25g \$84.00		
	SIP6723.3 3-PHENOXYPROPYLTRICHLOROSILANE C <sub>9</sub> H <sub>11</sub> Cl <sub>3</sub> OSi Flashpoint: >110°C (>230°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	269.63	40 / 0.02 Flashpoint: >110°C (>230°F)	1.2574	1.5190
			25g \$36.00	100g \$117.00	

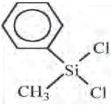
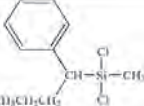
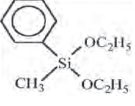
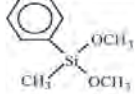
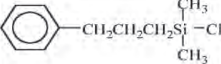
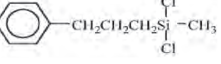
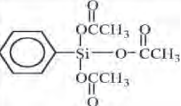
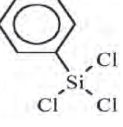
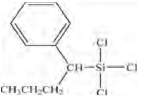
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	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIP6723.4 11-PHENOXYUNDECYLTRICHLOROSILANE C <sub>17</sub> H <sub>27</sub> Cl <sub>3</sub> OSi Forms SAMs that orient pentadecene HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	381.85	166-7 / 0.3	1.089 <sup>25</sup>	
	[526204-46-6] HMIS: 3-1-1-X		5g \$210.00		
	SIP6724.7 4-PHENYLBUTYLDIMETHYLCHLOROSILANE C <sub>12</sub> H <sub>18</sub> ClSi Flashpoint: >110°C (>230°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	226.83	85-7 / 0.6	0.964 <sup>25</sup>	1.4979 <sup>25</sup>
	[32328-67-9] HMIS: 3-1-1-X		25g \$110.00		
	SIP6724.8 4-PHENYLBUTYLMETHYLDICHLOROSILANE C <sub>11</sub> H <sub>16</sub> Cl <sub>2</sub> Si Flashpoint: >110°C (>230°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	247.24	105-9 / 1.5	1.09 <sup>25</sup>	
	[17776-69-1] HMIS: 3-1-1-X		25g \$110.00		
	SIP6724.9 4-PHENYLBUTYLTRICHLOROSILANE C <sub>10</sub> H <sub>13</sub> Cl <sub>3</sub> Si Employed as bonded phase in HPLC separation of aromatics HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	267.66	82 / 0.4	1.192	1.512
	[17886-88-3] TSCA-L HMIS: 3-1-1-X		25g \$92.00	100g \$299.00	
	SIP6726.0 PHENYLDIMETHYLACETOXSILANE C <sub>10</sub> H <sub>14</sub> O <sub>2</sub> Si Flashpoint: 72°C (162°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	194.30	127-9 / 44	1.006	1.4907
	[17887-60-4] TSCA EC 241-836-8 HMIS: 2-2-1-X		25g \$74.00		
	SIP6728.0 PHENYLDIMETHYLCHLOROSILANE C <sub>8</sub> H <sub>11</sub> ClSi Viscosity: 1.4 cSt Vapor pressure, 25°: 1 mm Forms cuprate. <sup>1</sup> 1. Fleming, I. and Terrett, N. K. <i>Tetrahedron Lett.</i> <b>1984</b> , 25, 5103. F&F: Vol. 7, p 133; Vol. 8, p 196; Vol. 11, p 209; Vol. 12, p 210. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	170.71	192-3	1.032	1.5082
	[768-33-2] TSCA EC 212-193-0 HMIS: 3-2-1-X		25g \$26.00	100g \$84.00	2kg \$700.00
	SIP6728.4 PHENYLDIMETHYLETHOXSILANE C <sub>10</sub> H <sub>16</sub> OSi Viscosity: 1.3 cSt Dipole moment: 1.34 Antiepileptic activity in petit mal syndrome HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	180.32	93 / 25	0.926	1.4799
	[1825-58-7] TSCA EC 217-366-4 HMIS: 2-2-1-X		10g \$24.00	50g \$96.00	
	SIP6729.5 12-PHENYLDODECYLDIMETHYLCHLOROSILANE C <sub>20</sub> H <sub>32</sub> ClSi HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	339.03	172-4 / 0.25	0.921	1.487
	HMIS: 3-2-1-X		5g \$318.00		
	SIP6730.0 PHENYLETHYLDICHLOROSILANE C <sub>8</sub> H <sub>10</sub> Cl <sub>2</sub> Si Vapor pressure, 100°: 13 mm HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	205.16	225-6	1.184	1.5321
	[1125-27-5] TSCA EC 214-407-8 HMIS: 3-2-1-X		25g \$124.00		
	SIP6736.4 6-PHENYLHEXYLTRICHLOROSILANE C <sub>12</sub> H <sub>17</sub> Cl <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	295.71	95 / 0.1	1.144	1.5065
	[18035-33-1] HMIS: 3-1-1-X		5g \$94.00		
	SIP6736.8 PHENYLMETHYLBIS(DIMETHYLAMINO)SILANE C <sub>11</sub> H <sub>20</sub> N <sub>2</sub> Si Flashpoint: 78°C (172°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	208.38	108-9 / 11		1.4982
	[33567-83-8] HMIS: 3-2-1-X		10g \$38.00		

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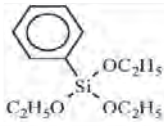
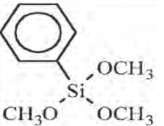
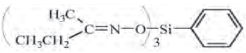
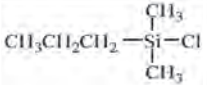
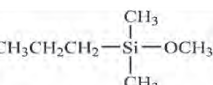
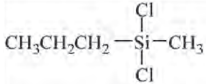
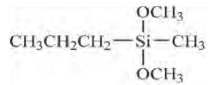
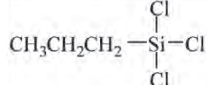
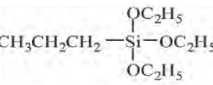
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	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIP6738.0 PHENYLMETHYLDICHLOROSILANE C <sub>7</sub> H <sub>6</sub> Cl <sub>2</sub> Si Vapor pressure, 82.5°: 13 mm ΔHvap: 11.5 kcal/mole F&F: Vol. 10, p 91; Vol. 11, p 247; Vol. 12, p 231. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	191.13	205-6 (-53)	1.187	1.5180
	[149-74-6] TSCA EC 205-746-2 HMIS: 3-2-1-X		25g \$12.00	500g \$64.00	
	SIP6738.5 1-PHENYL-1-(METHYLDICHLOROSILYL)BUTANE C <sub>11</sub> H <sub>16</sub> Cl <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	247.24	87-9 / 1	1.1	1.512
	[ ] TSCA EC 205-746-2 HMIS: 3-2-1-X		25g \$120.00		
	SIP6739.0 PHENYLMETHYLDIETHOXSILANE C <sub>11</sub> H <sub>18</sub> O <sub>2</sub> Si Dipole moment: 1.32 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	210.35	117-8 / 31	0.963	1.4690
	[775-56-4] TSCA EC 212-275-6 HMIS: 2-2-1-X		25g \$23.00	100g \$78.00	
	SIP6740.0 PHENYLMETHYLDIMETHOXSILANE C <sub>9</sub> H <sub>14</sub> O <sub>2</sub> Si Viscosity, 20°: 1.65 cSt Additive to coupling agent systems, increasing interface flexibility, UV stability HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	182.29	199-200	0.9934	1.4694
	[3027-21-2] TSCA EC 221-192-4 HMIS: 3-2-1-X		25g \$15.00	250g \$105.00	2kg \$440.00
	SIP6743.0 (3-PHENYLPROPYL)DIMETHYLCHLOROSILANE C <sub>11</sub> H <sub>17</sub> ClSi See also SIP6724.7 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	212.78	75 / 0.5	0.963	
	[17146-09-7] TSCA EC 241-208-3 HMIS: 3-1-1-X		5g \$17.00	50g \$119.00	
	SIP6744.0 (3-PHENYLPROPYL)METHYLDICHLOROSILANE C <sub>10</sub> H <sub>14</sub> Cl <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	233.21	96-8 / 4	1.086 <sup>25</sup>	1.5090 <sup>25</sup>
	[17776-66-8] TSCA EC 241-208-3 HMIS: 3-2-1-X		25g \$87.00		
	SIP6790.0 PHENYLTRIACETOXSILANE, tech-95 C <sub>12</sub> H <sub>14</sub> O <sub>5</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	282.32	144-6 / 2 (36-7)	1.1939	1.4708
	[18042-54-1] TSCA EC 241-952-9 HMIS: 3-1-1-X		25g \$64.00	100g \$208.00	
	SIP6810.0 PHENYLTRICHLOROSILANE C <sub>6</sub> H <sub>5</sub> Cl <sub>3</sub> Si Viscosity: 1.08 cSt Vapor pressure, 75°: 10 mm Dipole moment: 2.41 Surface tension: 27.9 mN/m HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	211.55	201 (-33)	1.324	1.5247
	[98-13-5] TSCA EC 202-640-8 HMIS: 3-2-1-X		25g \$11.00	2kg \$76.00	18kg \$576.00
	SIP6813.0 1-PHENYL-1-TRICHLOROSILYLBUTANE C <sub>10</sub> H <sub>13</sub> Cl <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	267.65	78-80 / 0.8	1.201	1.518
	[ ] TSCA EC 202-640-8 HMIS: 3-2-1-X		10g \$110.00		

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name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
<p>SIP6821.0</p> <p>PHENYLTRIETHOXYSILANE</p> <p>C<sub>12</sub>H<sub>20</sub>O<sub>3</sub>Si</p>  <p>Flashpoint: 96°C (205°F) TOXICITY: oral rat, LD50: 2,830 mg/kg Autoignition temperature: 265°C Coefficient of thermal expansion: 0.9 x 10<sup>-3</sup> Surface tension: 28 mN/m</p> <p>Electron donor component of polyolefin polymerization catalyst complexes Improves photoresist adhesion to silicon nitride Effective treatment for organic-grafted clays.<sup>1</sup> Phenylates allyl benzoates.<sup>2</sup> 1. Canrado, K. et al. <i>Chem. Mater.</i> <b>2001</b>, 13, 3766. 2. Correia, R. and DeShong, P. J. <i>Org. Chem.</i> <b>2001</b>, 66, 7159.</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	240.37	112-3 / 10	0.996	1.4718
[780-69-8] TSCA EC 212-305-8 HMIS: 2-1-1-X	100g \$11.00	2kg \$112.00	17kg \$510.00	
<p>SIP6822.0</p> <p>PHENYLTRIMETHOXYSILANE</p> <p>C<sub>9</sub>H<sub>14</sub>O<sub>3</sub>Si</p>  <p>Flashpoint: 86°C (187°F) TOXICITY: ivn mouse, LD50: 180 mg/kg Dielectric constant: 4.44</p> <p>Intermediate for high temperature silicone resins Hydrophobic additive to other silanes with excellent thermal stability Cross couples with aryl halides.<sup>1</sup> Phenylates heteroaromatic carboxamides.<sup>2</sup> Directly couples w/ 1° alkyl bromides and iodides.<sup>3</sup> 1. Mowery, M. E. and DeShong, P. J. <i>Org. Chem.</i> <b>1999</b>, 64, 1684. 2. Lam, P. Y. S. et al. <i>Tetrahedron Lett.</i> <b>2001</b>, 42, 2427. 3. Young, J.-Y. and Fu, G. C. <i>J. Am. Chem. Soc.</i> <b>2003</b>, 125, 5616.</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	198.29	211 (-25)	1.064	1.4734
[2996-92-1] TSCA EC 221-066-9 HMIS: 3-2-1-X	100g \$11.00	2kg \$98.00	18kg \$562.00	
<p>SIP6826.5</p> <p>PHENYLTRIS(METHYLETHYLKETOXIMINO)SILANE</p> <p>C<sub>18</sub>H<sub>28</sub>N<sub>3</sub>O<sub>3</sub>Si</p> <p>95%</p>  <p>Flashpoint: &gt;61°C (&gt;142°F)</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	363.53	60-5 / 3	0.995	
[34036-80-1] TSCA EC 221-066-9 HMIS: 3-2-1-X	50g \$17.00	250g \$68.00		
<p>SIP6910.0</p> <p>n-PROPYLDIMETHYLCHLOROSILANE</p> <p>C<sub>5</sub>H<sub>13</sub>ClSi</p>  <p>Flashpoint: 10°C (50°F)</p> <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	136.70	113-4	0.8726	1.4138
[17477-29-1] TSCA EC 241-492-9 HMIS: 3-4-1-X	25g \$49.00	100g \$159.00		
<p>SIP6911.0</p> <p>n-PROPYLDIMETHYLMETHOXYSILANE</p> <p>C<sub>8</sub>H<sub>16</sub>O<sub>2</sub>Si</p>  <p>Flashpoint: 10°C (50°F)</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	132.28	94-6	0.787	1.3927 <sup>25</sup>
[18182-14-4] TSCA EC 241-492-9 HMIS: 3-3-1-X	10g \$82.00			
<p>SIP6912.0</p> <p>n-PROPYLMETHYLDICHLOROSILANE</p> <p>C<sub>4</sub>H<sub>10</sub>Cl<sub>2</sub>Si</p>  <p>Flashpoint: 27°C (81°F)</p> <p>Viscosity, 20°: 0.8 cSt</p> <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	157.11	125	1.027	1.425
[4518-94-9] TSCA EC 224-843-0 HMIS: 3-3-1-X	25g \$41.00	100g \$134.00		
<p>SIP6914.0</p> <p>n-PROPYLMETHYLDIMETHOXYSILANE</p> <p>C<sub>8</sub>H<sub>16</sub>O<sub>2</sub>Si</p>  <p>Flashpoint: 27°C (81°F)</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	148.28	126	0.8689	1.3931
[18173-73-4] TSCA EC 241-492-9 HMIS: 3-3-1-X	25g \$86.00			
<p>SIP6915.0</p> <p>n-PROPYLTRICHLOROSILANE</p> <p>C<sub>3</sub>H<sub>7</sub>Cl<sub>3</sub>Si</p>  <p>Flashpoint: 35°C (95°F) ΔHvap: 8.7 kcal/mole</p> <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	177.53	123-4	1.185	1.4290
[141-57-1] TSCA EC 205-489-6 HMIS: 3-3-1-X	25g \$12.00	2.5kg \$210.00		
<p>SIP6917.0</p> <p>n-PROPYLTRIETHOXYSILANE</p> <p>C<sub>9</sub>H<sub>22</sub>O<sub>3</sub>Si</p>  <p>Flashpoint: 57°C (135°F)</p> <p>Architectural masonry water repellent</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	206.36	179-80	0.8916	1.3956
[2550-02-9] TSCA EC 219-842-7 HMIS: 2-2-1-X	25g \$12.00	2kg \$160.00		

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIP6917.2 PROPYLTRIETHOXSILANE, oligomeric hydrolysate Viscosity: 25-40 cSt Reactive hydrophobic surface treatment with reduced volatile by-products HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water			1.03	1.4243
	[314270-00-3] TSCA	HMIS: 2-2-1-X	100g \$24.00		
	SIP6918.0 n-PROPYLTRIMETHOXSILANE C <sub>6</sub> H <sub>16</sub> O <sub>3</sub> Si Flashpoint: 34°C (93°F) TOXICITY: oral rat, LD50: 7,420 mg/kg yc of treated surface: 28.5 mN/m Hydrophobic surface treatment HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	164.27	142	0.932 <sup>25</sup>	1.3880
	[1067-25-0] TSCA	EC 213-926-7 HMIS: 3-3-1-X	25g \$11.00 2kg \$102.00 16kg \$386.00		
	SIS6952.0 SILICLAD® OCTADECYL FUNCTIONAL SILANE 20% in t-AMYL ALCOHOL and DIACETONE ALCOHOL Amber liquid Flashpoint: 25°C (77°F) Coefficient of friction of treated glass surface: 0.2 - 0.3 Surface resistivity of treated surface: 1.2 x 10 <sup>13</sup> ohms yc of treated glass surface: 31 mN/m For application information see Performance Products Brochure Reduces blood protein adsorption. <sup>1</sup> Anti-stiction coating for polysilicon. <sup>2</sup> 1. Arkles, B. et al. In <i>Silanes Surfaces &amp; Interfaces</i> ; Leyden, D., Ed; Gordon & Breach: 1986; p 91. 2. Almanza-Workman, A. et al. <i>J. Electrochem. Soc.</i> <b>2002</b> , <i>149</i> , H6. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water			0.88	
	[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 CH <sub>3</sub> NaO <sub>3</sub> Si Viscosity: 10 cSt. pH: 13.0 Forms economical water-repellent coatings HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions	116.12		1.24	
	[16589-43-8] TSCA	EC 240-648-3 HMIS: 3-0-0-X	500g \$17.00 2kg \$50.00 20kg \$420.00		
	SIT7093.0 TETRADECYLTRICHLOROSILANE C <sub>14</sub> H <sub>29</sub> Cl <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	331.83	155-6 / 3	1.00	1.4575
	[18402-22-7] TSCA	HMIS: 3-1-1-X	25g \$80.00		
	SIT7095.0 1,1,3,3-TETRAETHOXY-1,3-DIMETHYLDISILOXANE, 95% C <sub>10</sub> H <sub>26</sub> O <sub>5</sub> Si <sub>2</sub> Flashpoint: 58°C (136°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	282.48	205	0.953	1.3912
	[18001-60-0]	EC 241-915-7 HMIS: 3-2-1-X	25g \$62.00		
	SIT7534.0 1,1,3,3-TETRAMETHYL-1,3-DIETHOXYDISILOXANE C <sub>8</sub> H <sub>22</sub> O <sub>2</sub> Si <sub>2</sub> Flashpoint: 43°C (109°F) Viscosity: 1.0 cSt HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	222.43	161 (-134)	0.8788	1.3880
	[18420-09-2] TSCA	EC 242-298-7 HMIS: 2-2-0-X	25g \$30.00 100g \$98.00		
	SIT7753.0 1,1,3,3-TETRAPHENYLDIMETHYLDISILAZANE C <sub>26</sub> H <sub>27</sub> NSi <sub>2</sub> Flashpoint: >110°C (>230°F) Deactivates glass capillary columns by persilylation. <sup>1</sup> 1. Grob, K. et al. <i>High Resol. Chrom. &amp; Col Chrom.</i> <b>1980</b> , <i>3</i> , 197. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	409.68	218-220 / 1.5 (91)		
	[7453-26-1] TSCA	EC 231-227-5 HMIS: 2-1-0-X	5g \$28.00 25g \$112.00		
	SIT7906.0 THEXYLDIMETHYLCHLOROSILANE t-HEXYLDIMETHYLCHLOROSILANE C <sub>8</sub> H <sub>19</sub> ClSi F&F: Vol. 13, p 74. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	178.78	55-6 / 10 (14-15)	0.911	1.4490
	[67373-56-2]	HMIS: 3-2-1-X	25g \$48.00 100g \$156.00		
	SIT7906.6 THEXYLTRICHLOROSILANE C <sub>8</sub> H <sub>13</sub> Cl <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	219.61	70-2 / 15		
	[18151-53-6]	HMIS: 3-3-1-X	10g \$110.00		
	SIT8030.0 p-TOLYLDIMETHYLCHLOROSILANE C <sub>9</sub> H <sub>13</sub> ClSi Flashpoint: 67°C (153°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	184.74	215-7	1.007 <sup>25</sup>	1.5055
	[35239-30-6] TSCA	EC 252-456-7 HMIS: 3-2-1-X	5g \$40.00		
	SIT8035.0 p-TOLYLDIMETHYLDICHLOROSILANE C <sub>8</sub> H <sub>10</sub> Cl <sub>2</sub> Si Flashpoint: 80°C (176°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	205.16	161-5 / 7	1.1609	1.5330
	[25898-37-7] TSCA	HMIS: 3-2-1-X	25g \$124.00		

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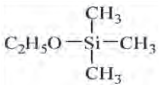
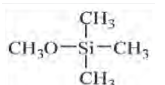
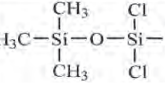
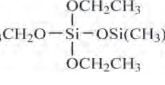
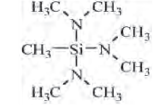
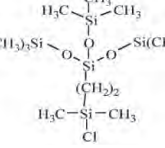
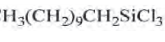
	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIT8040.0 p-TOLYLTRICHLOROSILANE C <sub>7</sub> H <sub>7</sub> Cl <sub>3</sub> Si Flashpoint: 92°C (198°F) yc of treated surface: 34 mN/m HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	225.58	218-20	1.28	1.5224 <sup>25</sup>
	[701-35-9] TSCA EC 211-854-0 HMIS: 3-2-1-X		25g \$34.00	100g \$110.00	
	SIT8042.0 p-TOLYLTRIMETHOXYSILANE C <sub>10</sub> H <sub>16</sub> O <sub>3</sub> Si Flashpoint: 94°C (201°F) yc of treated surface: 34 mN/m Charge control surface treatment for electrostatic copier particles. <sup>1</sup> 1. Yamazaki, H. Jpn. Kokai JP 06027719 A2, 1994. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	212.32	75-8 / 8	1.033	1.4726 <sup>25</sup>
	[17873-01-7] HMIS: 3-1-1-X		10g \$38.00	50g \$152.00	
	SIT8045.0 TRIACONTYLDIMETHYLCHLOROSILANE, blend C <sub>22</sub> H <sub>67</sub> ClSi Flashpoint: 80°C (176°F) 80% C <sub>30</sub> and higher, 20% C <sub>22</sub> -C <sub>28</sub> HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	515.42	(60-82)		
	[70851-52-4] TSCA EC 274-938-6 HMIS: 3-1-0-X		25g \$52.00	100g \$169.00	
	SIT8048.0 TRIACONTYLTRICHLOROSILANE, blend C <sub>30</sub> H <sub>61</sub> Cl <sub>2</sub> Si Flashpoint: 80°C (176°F) 80% C <sub>30</sub> and higher, 20% C <sub>22</sub> -C <sub>28</sub> Employed in bonded phases for HPLC of carotenes See also SIH5917.0 HEXACOSYLTRICHLOROSILANE; SIT8162.0 13-(TRICHLOROSILYLMETHYL)HEPTACOSANE HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	556.26	(60-82)		
	[70851-48-8] TSCA EC 274-933-9 HMIS: 3-1-1-X		25g \$52.00	100g \$169.00	
	SIT8162.0 13-(TRICHLOROSILYLMETHYL)HEPTACOSANE, 95% 2-DODECYLHEXADECYLTRICHLOROSILANE C <sub>28</sub> H <sub>57</sub> Cl <sub>3</sub> Si Flashpoint: 52°C (126°F) Contains isomers Forms bonded phases for HPLC applications HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	528.21	215 / 0.01 (20-35)	0.946	
	[194242-99-4] TSCA-L HMIS: 3-1-1-X		10g \$132.00		
	SIT8162.4 7-(TRICHLOROSILYLMETHYL)PENTADECANE, tech-95 2-HEXYLDECYLTRICHLOROSILANE C <sub>16</sub> H <sub>33</sub> Cl <sub>3</sub> Si Flashpoint: 52°C (126°F) Contains isomers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	359.88	146-152 / 0.2	0.985	
	HMIS: 3-2-1-X		10g \$174.00		
	SIT8170.0 (TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)- DIMETHYLCHLOROSILANE PERFLUOROOCOTYL-1H,1H,2H,2H-DIMETHYLCHLOROSILANE C <sub>10</sub> H <sub>10</sub> ClF <sub>13</sub> Si Flashpoint: 52°C (126°F) Packaged over copper powder Employed in column chromatography where low protein retentivity is required. <sup>1</sup> Employed in solid phase extraction of fluorous phases. <sup>2</sup> Modification of layered silicates yields film-forming compositions. <sup>3</sup> 1. Xindu, G. et al. <i>J. Chromatogr.</i> <b>1983</b> , 269, 96. 2. Curran, D. <i>J. Org. Chem.</i> <b>1997</b> , 62, 6714. 3. Ogawa, M. et al. <i>Chem. Mater.</i> <b>1998</b> , 10, 3787. For branched fluorinated alkylsilane see SIB1706.0 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	440.70	189-91	1.473	1.3453
	[102488-47-1] HMIS: 3-2-1-X		10g \$31.00	50g \$126.00	
	SIT8172.0 (TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)- METHYLDICHLOROSILANE C <sub>9</sub> H <sub>7</sub> Cl <sub>2</sub> F <sub>13</sub> Si Flashpoint: 51°C (124°F) Packaged over copper powder Vapor pressure, 76°: 12 mm HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	461.12	189-90	1.550 <sup>25</sup>	1.3500
	[73609-36-6] EC 277-551-0 HMIS: 3-2-1-X		10g \$41.00	50g \$164.00	
	SIT8174.0 (TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)- TRICHLOROSILANE C <sub>8</sub> H <sub>4</sub> Cl <sub>3</sub> F <sub>13</sub> Si Flashpoint: 54°C (129°F) Packaged over copper powder Lowers the coefficient of friction of silicon substrates. <sup>1</sup> 1. DePalma, V. et al. <i>Langmuir</i> <b>1989</b> , 5, 868. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	481.55	84-5 / 17	1.639	1.3521
	[78560-45-9] TSCA EC 278-947-6 HMIS: 3-2-1-X		10g \$28.00	50g \$112.00	

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIT8175.0 (TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)- TRIETHOXY-SILANE C <sub>14</sub> H <sub>19</sub> F <sub>13</sub> O <sub>3</sub> Si  Automotive side windows are treated with fluoroalkylsilanes to provide self-cleaning properties  HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [51851-37-7] TSCA EC 257-473-3 HMIS: 2-2-1-X	510.36	86 / 1.5 (<-38)	1.351	1.3436
				10g \$26.00	50g \$104.00
	SIT8176.0 (TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)- TRIMETHOXY-SILANE C <sub>11</sub> H <sub>13</sub> F <sub>13</sub> O <sub>3</sub> Si  HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [85857-16-5] TSCA-L EC 288-657-1 HMIS: 3-1-1-X	468.29	60-2 / 0.5	1.44	1.3322
				10g \$37.00	50g \$148.00
	SIT8176.3 5,5,6,6,7,7,8,8,9,9,10,10-TRIDECAFLUORO-2- (TRIDECAFLUOROHEXYL)DECYLTRICHLOROSILANE, 95% C <sub>16</sub> H <sub>7</sub> Cl <sub>3</sub> F <sub>26</sub> Si Contains ~ 5% isomers Branched structure forms low surface tension SAMs HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 3-1-1-X	827.63	110-4 / 0.8	1.709	1.338
				1.0g \$104.00	
	SIT8364.0 (3,3,3-TRIFLUOROPROPYL)DIMETHYLCHLOROSILANE C <sub>5</sub> H <sub>10</sub> ClF <sub>3</sub> Si  HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [1481-41-0] TSCA EC 216-039-3 HMIS: 3-4-1-X	190.67	118	1.113	1.3727
				5g \$32.00	25g \$128.00
	SIT8369.0 (3,3,3-TRIFLUOROPROPYL)METHYLDICHLOROSILANE C <sub>4</sub> H <sub>7</sub> Cl <sub>2</sub> F <sub>3</sub> Si ΔHcomb: 2,788 kJ/mole HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [675-62-7] TSCA EC 211-623-4 HMIS: 3-4-1-X	211.08	121-2	1.2611	1.3850
				10g \$34.00	50g \$136.00
	SIT8371.0 (3,3,3-TRIFLUOROPROPYL)TRICHLOROSILANE C <sub>3</sub> H <sub>2</sub> Cl <sub>3</sub> F <sub>3</sub> Si  HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [592-09-6] TSCA EC 209-744-2 HMIS: 3-4-1-X	231.50	113-4	1.395	1.385
				10g \$32.00	50g \$128.00
	SIT8372.0 (3,3,3-TRIFLUOROPROPYL)TRIMETHOXY-SILANE C <sub>6</sub> H <sub>13</sub> F <sub>3</sub> O <sub>3</sub> Si yc of treated surface: 33.5 mN/m Forms catalytic gels for aerobic oxidation of alcohols in combination with tetrapropylammonium perrhenate. <sup>1</sup> 1. Cirminna, R. et al. <i>Org. Biomol. Chem.</i> <b>2006</b> , <i>4</i> , 2637. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [429-60-7] TSCA EC 207-059-3 HMIS: 3-3-1-X	218.25	144	1.137	1.3546
				5g \$19.00	25g \$76.00
	SIT8510.0 TRIMETHYLCHLOROSILANE TMCS C <sub>3</sub> H <sub>9</sub> ClSi Viscosity: 0.47 cSt Vapor pressure, 20°: 190 mm Vapor pressure, 50°: 591 mm Surface tension: 17.8 mN/m Dipole moment: 2.09 Specific heat: 0.42 cal/g° Coefficient of thermal expansion: 1.2 x 10 <sup>-3</sup> Most economical and broadly used silylation reagent Enhances Claisen rearrangement. <sup>1</sup> Enhances the deprotection of tBOC-protected amino acids. <sup>2</sup> Enhances ethylene glycol ketalization reaction. <sup>3</sup> Catalyzes the formation of chlorohydrin esters from diols. <sup>4</sup> Reviewed as water scavenger in reactions of carbonyl compounds. <sup>5</sup> 1. Snider, B. B. and Hawryluk, N. A. <i>Org. Synth.</i> <b>2000</b> , <i>2</i> , 635. 2. Chen, B. C. et al. <i>J. Org. Chem.</i> <b>1999</b> , <i>64</i> , 9294. 3. Chan, T. H. et al. <i>Synthesis</i> <b>1983</b> , 203. 4. Eras, J. et al. <i>J. Org. Chem.</i> <b>2002</b> , <i>1</i> , 8631. 5. Volochnuk, D. M. et al. <i>Synthesis</i> <b>2009</b> , 3719. F&F: Vol. 1, p 1232; Vol. 2, p 435; Vol.3, p 310; Vol. 4, p 32, p 537; Vol.5, p 709; Vol. 6, p 25; Vol. 7, p 66; Vol. 8, p 107; Vol. 9, p 112; Vol. 10, p 96; Vol. 11, p 125; Vol. 12, p 126; Vol. 13, p 165; Vol. 14, p 175; Vol. 15, p 89; Vol. 16, p 85; Vol. 17, p 79; Vol. 19, p 374; Vol. 20, p 348, p 380, p 404; Vol.21, p 453. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [75-77-4] TSCA EC 200-900-5 HMIS: 3-4-2-X	108.64	57.6 (-57.7)	0.8580	1.3885
				25g \$11.00	750g \$48.00
				3kg \$180.00	

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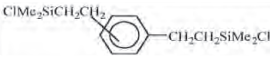
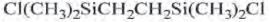

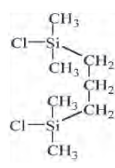
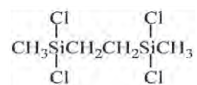
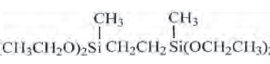
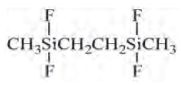

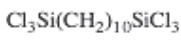
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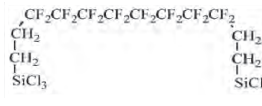
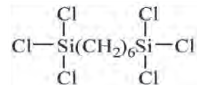
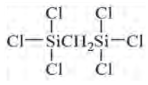

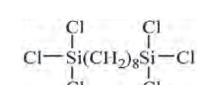
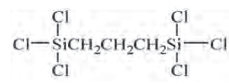
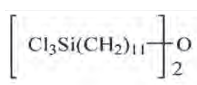
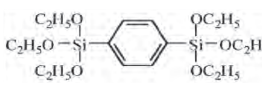
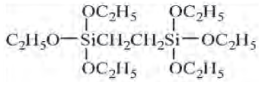
	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIT8515.0 TRIMETHYLETHOXSILANE <i>ETHOXYTRIMETHYLSILANE</i> C <sub>5</sub> H <sub>14</sub> OSi Vapor pressure, 25°: 111 mm Dipole moment: 1.2 Anti-structuring additive for silicone rubber HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	118.25	75-6 (-83)	0.7573	1.3742
	[1825-62-3] TSCA EC 217-370-6 HMIS: 2-4-1-X	25g \$10.00	1.5kg \$138.00	14kg \$672.00	
	SIT8566.0 TRIMETHYLMETHOXSILANE C <sub>4</sub> H <sub>12</sub> OSi Dipole moment: 1.18 debye ΔHcomb: 908 kcal/mole Undergoes α-lithiation w/ tert-butyllithium. <sup>1</sup> 1. Bates, T.F. et al. <i>J. Organometal. Chem.</i> <b>2000</b> , 595, 87. F&F: Vol. 14, p 119. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	104.22	57-8	0.7560	1.3678
	[1825-61-2] TSCA EC 217-369-0 HMIS: 3-4-1-X	25g \$19.00	100g \$62.00	1.5kg \$195.00	
	SIT8572.6 TRIMETHYLSILOXYTRICHLOROSILANE C <sub>3</sub> H <sub>9</sub> Cl <sub>3</sub> OSi <sub>2</sub> Flashpoint: 16°C (61°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	223.63	128	1.1405	1.4032
	[2750-45-0] HMIS: 3-4-1-X	25g \$72.00			
	SIT8582.7 TRIMETHYLSILOXYTRIETHOXSILANE C <sub>9</sub> H <sub>24</sub> O <sub>4</sub> Si <sub>2</sub> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	252.46	62 / 9	0.897	1.3866 <sup>25</sup>
	[17861-35-7] HMIS: 2-2-1-X	25g \$72.00			
	SIT8712.0 TRIS(DIMETHYLAMINO)METHYLSILANE C <sub>7</sub> H <sub>21</sub> N <sub>3</sub> Si Flashpoint: 30°C (86°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	175.35	55-6 / 17 (-11)	0.850 <sup>22</sup>	1.432 <sup>22</sup>
	[3768-57-8] TSCA EC 223-199-8 HMIS: 3-3-1-X	10g \$45.00	50g \$180.00		
	SIT8719.5 [TRIS(TRIMETHYLSILOXY)SILYLETHYL]DIMETHYL- CHLOROSILANE C <sub>13</sub> H <sub>37</sub> ClO <sub>3</sub> Si <sub>5</sub> Forms highly hydrophobic monolayers Candidate for self-cleaning surfaces Water contact angle: advancing = receding = 104°. <sup>1</sup> 1. McCarthy, T. et al. <i>Langmuir</i> <b>1999</b> , 15, 7328. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	417.32	85 / 0.6	0.9056	1.4135
	[225794-57-0] HMIS: 3-2-1-X	10g \$84.00			
	SIU9050.0 UNDECYLTRICHLOROSILANE C <sub>11</sub> H <sub>23</sub> Cl <sub>3</sub> Si Employed in SAMS as a spacer molecule for functionally tipped silanes HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	289.75	155-60 / 15	1.02	
	[18052-07-8] HMIS: 3-1-1-X	25g \$104.00			

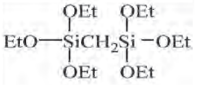
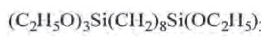

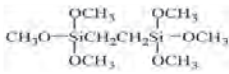
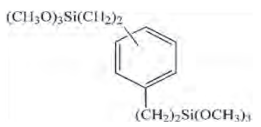
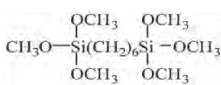
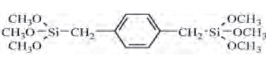
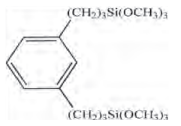

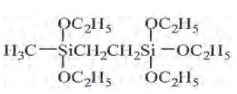
# Hydrophobic Dipodal Silanes

## Dipodal Surface Bonding

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIB1030.0 BIS[2-(CHLORODIMETHYLSILYL)ETHYL]BENZENE C <sub>14</sub> H <sub>24</sub> Cl <sub>2</sub> Si <sub>2</sub> Mixed isomers Intermediate for silahydrocarbon polymers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [74129-20-7] TSCA HMIS: 3-1-1-X	319.42	116-7 / 0.2 Flashpoint: 187°C (369°F)	1.02	
	SIB1042.0 1,2-BIS(CHLORODIMETHYLSILYL)ETHANE TETRAMETHYLDICHLORODISILETHYLENE C <sub>6</sub> H <sub>16</sub> Cl <sub>2</sub> Si <sub>2</sub> Reagent for protection of primary amines, including amino acids. <sup>1</sup> 1. Djuric, S. et al. <i>Tetrahedron Lett.</i> <b>1981</b> , 22, 1787. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [13528-93-3] TSCA EC 236-871-0 HMIS: 3-2-1-X	215.27	198-9 (36-9) Flashpoint: 40°C (104°F)		
	SIB1046.0 1,6-BIS(CHLORODIMETHYLSILYL)HEXANE, 95% C <sub>10</sub> H <sub>24</sub> Cl <sub>2</sub> Si <sub>2</sub> HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [14799-66-7] HMIS: 3-1-1-X	271.38	113-6 / 3 Flashpoint: 150°C (302°F)	0.961	1.4538
	SIB1048.0 1,8-BIS(CHLORODIMETHYLSILYL)OCTANE, 95% C <sub>12</sub> H <sub>28</sub> Cl <sub>2</sub> Si <sub>2</sub> Intermediate for silahydrocarbon polymers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [5089-28-1] EC 225-804-0 HMIS: 3-1-1-X	299.43	106-7 / 0.4 Flashpoint: 180°C (356°F)	0.946	1.4540
	SIB1048.2 1,3-BIS(CHLORODIMETHYLSILYL)PROPANE C <sub>7</sub> H <sub>16</sub> Cl <sub>2</sub> Si <sub>2</sub> Forms cyclic derivatives of polyalkyleneoxides suitable for anionic copolymerization. <sup>1</sup> 1. Zundel, T. et al. <i>Macromol.</i> <b>1998</b> , 31, 2724. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [2295-06-9] HMIS: 3-2-1-X	229.30	94/19	1.0244	1.4647
	SIB1614.0 1,2-BIS(METHYLDICHLOROSILYL)ETHANE 2,2,5,5-TETRACHLORO-2,5-DISILAHEXANE C <sub>4</sub> H <sub>10</sub> Cl <sub>4</sub> Si <sub>2</sub> Dipodal coupling agent HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [3353-69-3] TSCA EC 222-123-0 HMIS: 3-2-1-X	256.11	208-210 (31-3) Flashpoint: 94°C (201°F)	1.2628	1.4760
	SIB1615.0 1,2-BIS(METHYLDIETHOXSILYL)ETHANE C <sub>12</sub> H <sub>30</sub> O <sub>4</sub> Si <sub>2</sub> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [18043-74-8] EC 241-953-4 HMIS: 2-2-1-X	294.54	80 / 1.5 Flashpoint: >65°C (>150°F)	0.92	1.4170
	SIB1630.0 1,2-BIS(METHYLDIFLUOROSILYL)ETHANE C <sub>4</sub> H <sub>10</sub> F <sub>4</sub> Si <sub>2</sub> HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [170381-99-4] HMIS: 3-3-1-X	190.29	114	1.118	
	SIB1808.0 1,2-BIS(TRICHLOROSILYL)DECANE C <sub>10</sub> H <sub>20</sub> Cl <sub>6</sub> Si <sub>2</sub> Bonded phase for HPLC stable over wide range of pH HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [620987-03-3] TSCA-L HMIS: 3-2-1-X	409.16	114 / 1	1.2496	1.4754
	SIB1809.0 1,10-BIS(TRICHLOROSILYL)DECANE, tech-95 C <sub>10</sub> H <sub>20</sub> Cl <sub>6</sub> Si <sub>2</sub> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [52217-62-6] HMIS: 3-2-1-X	409.16	156-9 / 1		

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name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
 <p>SIB1811.5 1,8-BIS(TRICHLOROSILYLETHYL)HEXADECAFLUORO-OCTANE C<sub>12</sub>H<sub>8</sub>Cl<sub>6</sub>F<sub>16</sub>Si<sub>2</sub> Forms hydrolysis-resistant oleophobic coatings HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [445303-83-3] HMIS: 3-1-1-X 1.0g \$140.00</p>	725.06	142-4 / 0.6 (69-70)		
 <p>SIB1812.0 1,6-BIS(TRICHLOROSILYL)HEXANE C<sub>6</sub>H<sub>12</sub>Cl<sub>6</sub>Si<sub>2</sub> Forms mesoporous sol-gel structures HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [13083-94-8] TSCA EC 235-994-7 HMIS: 3-2-1-X 10g \$41.00 50g \$164.00</p>	353.05	148-50 / 10 Flashpoint: 75°C (167°F)	1.327	1.4759
 <p>SIB1813.0 BIS(TRICHLOROSILYL)METHANE CH<sub>2</sub>Cl<sub>6</sub>Si<sub>2</sub> Nucleus for star polymers and dendrimers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [4142-85-2] TSCA-L HMIS: 3-2-1-X 5g \$40.00 25g \$160.00</p>	282.90	183	1.5567	1.4740
 <p>SIB1813.7 1,2-BIS(TRICHLOROSILYL)OCTADECANE C<sub>18</sub>H<sub>36</sub>Cl<sub>6</sub>Si<sub>2</sub> Hydrolysis resistant dipodal bonded phase for high acidity aqueous HPLC HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [4142-85-2] TSCA-L HMIS: 3-1-1-X 10g \$124.00</p>	520.36	186-9 / 0.2	1.103	
 <p>SIB1814.0 1,8-BIS(TRICHLOROSILYL)OCTANE C<sub>8</sub>H<sub>16</sub>Cl<sub>6</sub>Si<sub>2</sub> Forms mesoporous sol-gel structures HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [52217-53-5] EC 257-748-8 HMIS: 3-1-1-X 25g \$36.00 100g \$116.00</p>	381.10	140 / 1 Flashpoint: 115°C (239°F)	1.22	1.4757
 <p>SIB1815.0 1,3-BIS(TRICHLOROSILYL)PROPANE C<sub>3</sub>H<sub>6</sub>Cl<sub>6</sub>Si<sub>2</sub> 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</p>	310.97	115-7 / 4 (29-30)	1.4394	1.4732
 <p>SIB1815.4 BIS(TRICHLOROSILYLUNDECYL) ETHER C<sub>22</sub>H<sub>44</sub>Cl<sub>6</sub>O<sub>2</sub>Si<sub>2</sub> HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [52217-53-5] EC 257-748-8 HMIS: 3-1-1-X 5g \$242.00</p>	593.48			
 <p>SIB1816.6 1,4-BIS(TRIETHOXSILYL)BENZENE C<sub>18</sub>H<sub>34</sub>O<sub>6</sub>Si<sub>2</sub> Forms phenylene-bridged silica with ordered pore walls.<sup>1,2</sup> 1. Inagaki, S. et al. <i>Nature</i> <b>2002</b>, 416, 304. 2. Wang, W. et al. <i>Chem. Mater.</i> <b>2003</b>, 15, 4886. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [2615-18-1] HMIS: 2-2-1-X 5g \$60.00 25g \$240.00</p>	402.64	130-2 / 0.4	1.015	1.4549
 <p>SIB1817.0 BIS(TRIETHOXSILYL)ETHANE HEXAETHOXYDISILETHYLENE, BSE C<sub>14</sub>H<sub>34</sub>O<sub>6</sub>Si<sub>2</sub> Vapor pressure, 150°: 10mm Additive to silane coupling agents formulations that enhances hydrolytic stability Employed in corrosion resistant coatings/primers for steel and aluminum.<sup>1,2</sup> Sol-gels of α,ω-bis(trimethoxysilyl)alkanes reported.<sup>3</sup> Component in evaporation-induced self-assembly of mesoporous structures.<sup>4</sup> Forms mesoporous, derivatizable molecular sieves.<sup>5,6</sup> 1. Van Ooij, W. et al. <i>J. Adhes. Sci. Tech.</i> <b>1997</b>, 11, 29. 2. Van Ooij, W. et al. <i>Chemtech</i> <b>1999</b>, 28, 3302. 3. Loy, D. A. et al. <i>J. Am. Chem. Soc.</i> <b>1999</b>, 121, 5413. 4. Lu, Y. et al. <i>J. Am. Chem. Soc.</i> <b>2000</b>, 122, 5258. 5. Molde, B. et al. <i>Chem. Mater.</i> <b>1999</b>, 11, 3302. 6. Cho, E. et al. <i>Chem Mater.</i> <b>2004</b>, 16, 270. See also SIB1821.0, SIT8185.8 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [16068-37-4] TSCA EC 240-212-2 HMIS: 3-1-1-X 25g \$15.00 100g \$49.00 2kg \$420.00</p>	354.59	96 / 0.3 (-33) Flashpoint: 107°C (225°F) TOXICITY: oral rat, LD50: 161 mg/kg ΔHvap: 101.5 kJ/mole	0.957	1.4052

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIB1821.0 BIS(TRIETHOXYSILYL)METHANE 4,4,6,6-TETRAETHOXY-3,7-DIOXA-4,6-DISILANONANE C <sub>13</sub> H <sub>32</sub> O <sub>6</sub> Si <sub>2</sub> Intermediate for sol-gel coatings, hybrid inorganic-organic polymers Forms methylene-bridged mesoporous structures. <sup>1</sup> 1. Zhang, W. et al. <i>Chem. Mater.</i> <b>2005</b> , <i>17</i> , 6407. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	340.56	114-5 / 3.5	0.9741	1.4098
	[18418-72-9] TSCA-L HMIS: 3-2-1-X		5g \$24.00	25g \$96.00	
	SIB1824.0 1,8-BIS(TRIETHOXYSILYL)OCTANE C <sub>20</sub> H <sub>46</sub> O <sub>6</sub> Si <sub>2</sub> Employed in sol-gel synthesis of mesoporous structures Sol-gels of α,ω-bis(trialkoxysilyl)alkanes reported. <sup>1</sup> 1. Loy, D.A. et al. <i>J. Am. Chem. Soc.</i> <b>1999</b> , <i>121</i> , 5413. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	438.76	172-5 / 0.75	0.926	1.4240
	[52217-60-4] TSCA HMIS: 2-1-1-X		25g \$30.00	100g \$98.00	
	SIB1829.0 1,2-BIS(TRIMETHOXYSILYL)DECANE C <sub>16</sub> H <sub>36</sub> O <sub>6</sub> Si <sub>2</sub> Pendant dipodal silane; employed in high pH HPLC HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	382.65	130-2 / 0.4	0.984	1.4303
	[832079-33-1] TSCA-L HMIS: 3-2-1-X		25g \$48.00	100g \$156.00	
	SIB1830.0 1,2-BIS(TRIMETHOXYSILYL)ETHANE C <sub>8</sub> H <sub>22</sub> O <sub>6</sub> Si <sub>2</sub> <b>CAUTION: INHALATION HAZARD</b> <b>AIR TRANSPORT FORBIDDEN</b> Employed in fabrication of multilayer printed circuit boards. <sup>1</sup> 1. Palladino, J. U.S. Patent 5,073,456, 1991. See also SIB1817.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	270.43	103-4 / 5	1.068	1.4091
	[18406-41-2] TSCA EC 242-285-6 HMIS: 4-2-1-X		25g \$69.00	100g \$224.00	
	SIB1831.0 BIS(TRIMETHOXYSILYLETHYL)BENZENE C <sub>16</sub> H <sub>30</sub> O <sub>6</sub> Si <sub>2</sub> Mixed isomers Forms high refractive index coatings HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	374.58	148-50 / 0.1	1.08	1.4734
	[58298-01-4] TSCA HMIS: 2-1-0-X		10g \$33.00	50g \$132.00	
	SIB1832.0 1,6-BIS(TRIMETHOXYSILYL)HEXANE C <sub>12</sub> H <sub>30</sub> O <sub>6</sub> Si <sub>2</sub> Sol-Gels of α,ω-bis(trimethoxysilyl)alkanes reported. <sup>1</sup> 1. Loy, D.A. et al. <i>J. Am. Chem. Soc.</i> <b>1999</b> , <i>121</i> , 5413. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	326.54	161 / 2	1.014	1.4213
	[87135-01-1] HMIS: 3-2-1-X		10g \$38.00	50g \$152.00	
	SIB1832.2 1,4-BIS(TRIMETHOXYSILYLMETHYL)BENZENE C <sub>14</sub> H <sub>26</sub> O <sub>6</sub> Si <sub>2</sub> Forms adherent films on metal substrates HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	346.53	124-5 / 0.05	1.097	1.47 <sup>25</sup>
	[193358-40-6] HMIS: 3-1-1-X		10g \$180.00		
	SIB1833.4 1,3-BIS(TRIMETHOXYSILYLPROPYL)BENZENE C <sub>18</sub> H <sub>34</sub> O <sub>6</sub> Si <sub>2</sub> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	402.64			
	HMIS: 3-2-1-X		5g \$145.00		
	SIC2265.5 (CHLORODIMETHYLSILYL)-6-[2-(CHLORODIMETHYLSILYL)ETHYL]BICYCLOHEPTANE C <sub>13</sub> H <sub>26</sub> Cl <sub>2</sub> Si <sub>2</sub> Mixture of 1 and 2 regio isomers, exo and endo Forms polymers HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	309.43		1.03	1.4863
	[220527-24-2] HMIS: 3-2-1-X		25g \$45.00		
	SIT8185.8 1-(TRIETHOXYSILYL)-2-(DIETHOXYMETHYLSILYL)-ETHANE C <sub>13</sub> H <sub>32</sub> O <sub>5</sub> Si Dipodal silane; forms abrasion-resistant sol-gel coatings Improves hydrolytic stability of silane adhesion promotion systems HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	324.56	100 / 0.5	0.946	1.4112
	[18418-54-7] TSCA HMIS: 3-1-1-X		25g \$40.00	100g \$130.00	2kg \$840.00

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# Polymeric Hydrophobic Silanes

## Polymeric Surface Bonding

POLYMERIC HYDROPHOBIC

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	<b>Polybutadiene</b> SSP-055 TRIETHOXSILYL MODIFIED POLY-1,2-BUTADIENE, 50% in toluene Viscosity: 100-200 cSt Coupling agent for EPDM resins	3,500-4,500			0.90
	[72905-90-9] TSCA HMIS: 2-4-1-X store <5° 100g \$60.00 2kg \$780.00				
	SSP-056 TRIETHOXSILYL MODIFIED POLY-1,2-BUTADIENE, 50% in volatile silicone Viscosity: 100-200 cSt Primer coating for silicone rubbers	3,500-4,500			0.93
	[72905-90-9] TSCA HMIS: 2-3-1-X store <5° 100g \$68.00				
	SSP-058 DIETHOXYMETHYLSILYL MODIFIED POLY-1,2-BUTA- DIENE, 50% in toluene Viscosity: 75-150 cSt Water tree resistant additive for crosslinkable HDPE cable cladding	3,500-4,500			0.90
	HMIS: 2-4-1-X store <5° 100g \$86.00				
	SSP-255 (30-35% TRIETHOXSILYLETHYL)ETHYLENE- (35-40% 1,4-BUTADIENE)-(25-30% STYRENE) terpolymer, 50% in toluene Viscosity: 20-30 cSt	4,500-5,500			
	HMIS: 2-3-1-X 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

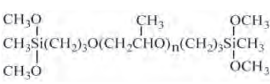
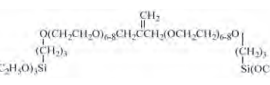
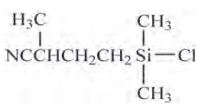
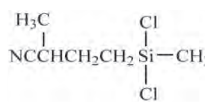
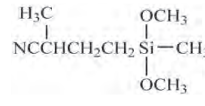
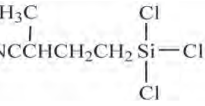
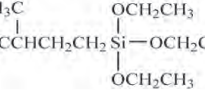
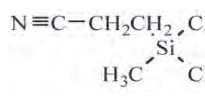
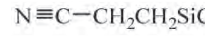
### Silanol Terminated PolyDimethylsiloxanes

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 <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIB1660.0 BIS[(3-METHYLDIMETHOXSILYL)PROPYL]- POLYPROPYLENE OXIDE Hydrophilic dipodal silane W/tin catalyst forms moisture-cross-linkable resins HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	600-800		1.00	1.452 <sup>25</sup>
	[75009-88-0] TSCA HMIS: 3-1-1-X		100g \$19.00	2kg \$228.00	
	SIB1824.9 1,3-BIS(3-TRIETHOXSILYL)POLYETHYLENE- OXY-2-METHYLENEPROPANE C <sub>50</sub> H <sub>104</sub> O <sub>20</sub> Si <sub>2</sub> (av) Vinyl functional hydrophilic dipodal coupling agent for protein immobilization HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	1113.50			
	HMIS: 2-2-1-X		1.0g \$292.00		
	SIC2436.0 (3-CYANOBTYL)DIMETHYLCHLOROSILANE C <sub>7</sub> H <sub>14</sub> ClNSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	175.73	80-4 / 1	0.993	
	HMIS: 3-2-1-X		25g \$40.00	100g \$130.00	
	SIC2437.0 (3-CYANOBTYL)METHYLDICHLOROSILANE C <sub>8</sub> H <sub>11</sub> Cl <sub>2</sub> NSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	196.17	63 / 0.3	1.104	
	[71550-62-4] TSCA EC 275-613-1 HMIS: 3-2-1-X		25g \$40.00	100g \$130.00	
	SIC2437.5 (3-CYANOBTYL)METHYLDIMETHOXSILANE C <sub>8</sub> H <sub>17</sub> NO <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	187.32	77 / 1.5	0.947	1.4213 <sup>25</sup>
	[793681-94-4] TSCA HMIS: 3-2-1-X		25g \$88.00		
	SIC2438.0 (3-CYANOBTYL)TRICHLOROSILANE C <sub>9</sub> H <sub>9</sub> Cl <sub>3</sub> NSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	216.57	61-3 / 2	1.22	1.469 <sup>25</sup>
	[163155-56-4] HMIS: 3-2-1-X		25g \$39.00	100g \$127.00	
	SIC2439.0 3-CYANOBTYLTRIEETHOXSILANE C <sub>11</sub> H <sub>23</sub> NO <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	245.39			
	HMIS: 2-2-1-X		25g \$32.00		
	SIC2440.0 2-CYANOETHYLMETHYLDICHLOROSILANE C <sub>4</sub> H <sub>7</sub> Cl <sub>2</sub> NSi Vapor pressure, 60°: 4 mm Monomer for polar silicones used in GC phases HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	168.10	60-4 / 4	1.2015	1.4550 <sup>25</sup>
	[1071-21-2] TSCA EC 213-985-9 HMIS: 3-2-1-X		25g \$132.00		
	SIC2442.0 2-CYANOETHYLTRICHLOROSILANE C <sub>3</sub> H <sub>4</sub> Cl <sub>3</sub> NSi Vapor pressure, 85°: 12 mm ΔHvap: 11.2 kcal/mole HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	188.52	84-6 / 10 (32-3)	1.356	1.4615
	[1071-22-3] TSCA EC 213-986-4 HMIS: 3-2-1-X		10g \$29.00	50g \$116.00	

COMMERCIAL

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	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
$N\equiv C-CH_2CH_2Si(OC_2H_5)_3$	SIC2445.0 2-CYANOETHYLTRIETHOXYSILANE C <sub>9</sub> H <sub>19</sub> NO <sub>3</sub> Si Flashpoint: 86°C (187°F) TOXICITY: oral rat, LD50: 5,630 mg/kg Crosslinker for moisture-cure silicone RTVs - improves fuel resistance HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	217.34	224-5	0.9792	1.4140
	[919-31-3] TSCA EC 213-050-5 HMIS: 2-2-0-X		25g \$15.00	100g \$49.00	2kg \$360.00
$N\equiv C-CH_2CH_2Si(OCH_3)_3$	SIC2446.0 2-CYANOETHYLTRIMETHOXYSILANE C <sub>6</sub> H <sub>13</sub> NO <sub>3</sub> Si Flashpoint: 79°C (174°F) yc of treated surfaces: 34 mN/m Crosslinker for moisture-cure silicones - improves solvent resistance HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	175.26	112 / 15	1.079	1.4126
	[2526-62-7] TSCA EC 219-764-3 HMIS: 3-2-1-X		25g \$42.00	100g \$138.00	
$N\equiv C-CH_2CH_2CH_2Si(CH_3)_2-N(CH_3)_2$	SIC2451.0 3-CYANOPROPYLDIISOPROPYL(DIMETHYLAMINO)- SILANE 4-[DIMETHYLAMINOBIS(1-METHYLETHYL)SILYL]BUTANENITRILE C <sub>12</sub> H <sub>26</sub> N <sub>2</sub> Si Stable cyanofunctional bonded phase HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	226.44	96-8 / 0.2	0.89	
	[163794-91-0] TSCA HMIS: 3-2-1-X		10g \$132.00		
$N\equiv C-CH_2CH_2CH_2Si(CH_3)_2-Cl$	SIC2452.0 3-CYANOPROPYLDIMETHYLCHLOROSILANE 4-(CHLORODIMETHYLSILYL)BUTYRONITRILE C <sub>6</sub> H <sub>12</sub> ClNSi Coupling agent for antibodies. <sup>1</sup> Allows formation of electrostatic gated nanopore electrodes. <sup>2</sup> 1. Falipou, S. et al. <i>Bioconjugate Chem.</i> <b>1999</b> , <i>10</i> , 36. 2. Wang, G. et al. <i>J. Am. Chem. Soc.</i> <b>2006</b> , <i>128</i> , 7679. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	161.71	108-9 / 15	0.986	1.4460
	[18156-15-5] TSCA EC 242-039-8 HMIS: 3-2-1-X		25g \$40.00	100g \$130.00	
$N\equiv C-CH_2CH_2CH_2Si(CH_3)_2-Cl$	SIC2453.0 3-CYANOPROPYLMETHYLDICHLOROSILANE C <sub>5</sub> H <sub>9</sub> Cl <sub>2</sub> NSi Monomer for silicone films for microelectrodes permeable to polar molecules HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	182.12	79-82 / 1	1.145 <sup>25</sup>	1.4551 <sup>25</sup>
	[1190-16-5] TSCA EC 214-717-3 HMIS: 3-2-1-X		25g \$39.00	100g \$127.00	
$N\equiv C-CH_2CH_2CH_2Si(OCH_3)_2-CH_3$	SIC2453.5 3-CYANOPROPYLMETHYLDIMETHOXYSILANE C <sub>7</sub> H <sub>15</sub> NO <sub>2</sub> Si See also SIC2437.5 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	173.29	82-3 / 3	0.9970	1.4235
	[153723-40-1] HMIS: 3-2-1-X		5g \$29.00	25g \$114.00	
$N\equiv C-CH_2CH_2CH_2Si(CH_3)_2-Cl$	SIC2454.0 3-CYANOPROPYLTRICHLOROSILANE 4-(TRICHLOROSILYL)BUTYRONITRILE C <sub>4</sub> H <sub>6</sub> Cl <sub>3</sub> NSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	202.54	93-4 / 8	1.302	1.465
	[1071-27-8] TSCA EC 213-990-6 HMIS: 3-2-1-X		25g \$24.00	100g \$78.00	
$N\equiv C-CH_2CH_2CH_2Si(OC_2H_5)_3$	SIC2455.0 3-CYANOPROPYLTRIETHOXYSILANE C <sub>10</sub> H <sub>21</sub> NO <sub>3</sub> Si Flashpoint: 74°C (165°F) TOXICITY: oral rat, LD50: 2,460 mg/kg Viscosity: 2.3 cSt HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	231.37	79-80 / 0.6	0.961	1.4174
	[1067-47-6] TSCA EC 213-931-4 HMIS: 3-2-1-X		25g \$32.00	100g \$104.00	
$N\equiv C-CH_2CH_2CH_2Si(OCH_3)_2-CH_3$	SIC2456.0 3-CYANOPROPYLTRIMETHOXYSILANE C <sub>7</sub> H <sub>15</sub> NO <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	189.29	90-2 / 7	1.027	1.4416
	[55453-24-2] TSCA EC 259-646-9 HMIS: 3-2-1-X		10g \$30.00	50g \$140.00	
$NC(CH_2)_{11}SiCl_3$	SIC2456.3 11-CYANOUNDECYLTRICHLOROSILANE C <sub>12</sub> H <sub>22</sub> Cl <sub>3</sub> NSi Long chain organofunctional silane HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	314.76	162-4 / 1	1.075	
	[724460-16-6] HMIS: 3-2-1-X		5g \$153.00		

# Hydrophilic Silane Properties

## Polar - Hydrogen Bonding

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIA0006.0 ACETAMIDOPROPYLTRIMETHOXSILANE C <sub>8</sub> H <sub>18</sub> NO <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	221.33	162-5 / 2-3		1.441
	[57757-66-1] HMIS: 3-2-1-X		10g \$152.00		
	SIA0010.0 ACETOXYETHYLDIMETHYLCHLOROSILANE C <sub>6</sub> H <sub>13</sub> ClO <sub>2</sub> Si Flashpoint: 63°C (145°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	180.71	108-9 / 50	1.031 <sup>25</sup>	1.4301 <sup>25</sup>
	[18306-45-1] HMIS: 3-2-1-X		25g \$66.00		
	SIA0015.0 ACETOXYETHYLMETHYLDICHLOROSILANE C <sub>5</sub> H <sub>10</sub> Cl <sub>2</sub> O <sub>2</sub> Si Flashpoint: 65°C (149°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	201.12	117 / 62	1.177 <sup>25</sup>	1.4390 <sup>25</sup>
	[18163-34-3] TSCA EC 242-045-0 HMIS: 3-2-1-X		25g \$59.00		
	SIA0020.0 ACETOXYETHYLTRICHLOROSILANE C <sub>4</sub> H <sub>7</sub> Cl <sub>3</sub> O <sub>2</sub> Si Flashpoint: 82°C (180°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	221.54	143 / 70	1.272 <sup>25</sup>	1.4427 <sup>25</sup>
	[18204-80-3] TSCA EC 242-092-7 HMIS: 3-2-1-X		25g \$58.00	100g \$192.00	
	SIA0025.0 ACETOXYETHYLTRIETHOXSILANE C <sub>10</sub> H <sub>22</sub> O <sub>5</sub> Si >280° rearranges to acetoxytriethoxysilane w/ extrusion of ethylene. <sup>1</sup> 1. Ezbiansky, K. A. et al. <i>Chemical Processing of Dielectrics, Insulators &amp; Electronic Ceramics</i> , MRS Proc. <b>2000</b> ; 606, 251. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	250.37	60 / 0.2	0.983	1.410
	[22538-45-0] HMIS: 2-2-1-X		25g \$54.00		
	SIA0030.0 ACETOXYETHYLTRIMETHOXSILANE, 95% C <sub>7</sub> H <sub>16</sub> O <sub>5</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	208.29	108-9 / 27	1.061	
	[72878-29-6] TSCA HMIS: 3-3-1-X		25g \$52.00		
	SIA0040.0 ACETOXYMETHYLDIMETHYLACETOXSILANE C <sub>7</sub> H <sub>14</sub> O <sub>4</sub> Si Flashpoint: 63°C (145°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	190.27	66-9 / 7	1.0420	1.4388
	[5833-57-8] HMIS: 3-2-1-X		25g \$78.00		
	SIA0050.0 ACETOXYMETHYLTRIETHOXSILANE C <sub>9</sub> H <sub>20</sub> O <sub>5</sub> Si Hydrolyzes to form stable silanol solutions in neutral water HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	236.34	106 / 15	1.042 <sup>25</sup>	1.4092
	[5630-83-1] HMIS: 2-2-1-X		25g \$62.00	100g \$202.00	
	SIA0055.0 ACETOXYMETHYLTRIMETHOXSILANE, 95% C <sub>6</sub> H <sub>14</sub> O <sub>5</sub> Si Flashpoint: 56°C (133°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	194.26	190-1	1.085	1.4031
	[65625-39-0] TSCA-L HMIS: 3-2-1-X		10g \$45.00	50g \$180.00	
	SIA0078.0 2-[(ACETOXY(POLYETHYLENEOXY)PROPYL)- TRIETHOXSILANE, 95% Viscosity: 50 cSt HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	500 - 700		1.071	1.4527
	HMIS: 2-1-1-X		25g \$78.00		

PLEASE INQUIRE ABOUT BULK QUANTITIES

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIA0090.0 ACETOXYPROPYLEMETHYLDICHLOROSILANE C <sub>6</sub> H <sub>12</sub> Cl <sub>2</sub> O <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [5290-24-4] TSCA EC 226-126-8 HMIS: 3-2-1-X	215.15 Flashpoint: 85°C (185°F)	142 / 73	1.151 <sup>25</sup>	1.4434 <sup>25</sup>
	SIA0100.0 ACETOXYPROPYLTRIMETHOXSILANE C <sub>6</sub> H <sub>16</sub> O <sub>5</sub> Si γc of treated surfaces: 37.5 mN/m HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [59004-18-1] EC 261-552-8 HMIS: 3-1-1-X	222.31 Flashpoint: 93°C (199°F)	92 / 2	1.062	1.4146
	SIA0114.0 11-ACETOXYUNDECYLTRICHLOROSILANE C <sub>13</sub> H <sub>25</sub> Cl <sub>3</sub> O <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [53605-77-9] HMIS: 3-1-1-X	347.78 Flashpoint: >110°C (>230°F)	147-9 / 1	1.084	
	SIA0115.0 11-ACETOXYUNDECYLTRIETHOXSILANE C <sub>19</sub> H <sub>40</sub> O <sub>5</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [959053-85-1] HMIS: 2-2-1-X	376.61		1.0g	\$116.00
	SIA0120.2 (N-ACETYLGLYCYL)-3-AMINOPROPYLTRIMETHOXY-SILANE, 5% in methanol C <sub>10</sub> H <sub>22</sub> N <sub>2</sub> O <sub>5</sub> Si Amino acid-tipped silane HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 3-4-1-X	278.38 Flashpoint: 15°C (59°F)	(171-3)	0.80	25g \$40.00
	SIA0599.4 N-3-[(AMINO(POLYPROPYLENOXY))AMINOPROPYL-TRIMETHOXSILANE, 60 - 65% 3-4 propylenoxy units Contains amine-terminated polypropylene oxide Coupling agent with film-forming capability. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 2-2-1-X	337-435		0.984	1.4508
	SIB0959.0 BENZOYLOXYPROPYLTRIMETHOXSILANE C <sub>13</sub> H <sub>20</sub> O <sub>5</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [76241-02-6] TSCA HMIS: 3-2-1-X	284.38	145 / 0.2	1.104	1.4806
	SIB1815.1 1,3-BIS-(3-TRICHLOROSILYLPROPOXY)-2-DECYLOXY-PROPANE C <sub>19</sub> H <sub>38</sub> Cl <sub>3</sub> O <sub>5</sub> Si <sub>2</sub> Dipodal C <sub>18</sub> analog with embedded hydrophilicity HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [862912-02-5] HMIS: 3-1-1-X	583.40	190-200 / 0.4	1.158	10g \$124.00
	SIB1815.3 3,3-BIS-(TRICHLOROSILYLPROPOXYMETHYL)-5-OXA-TRIDECAENE, 95% C <sub>20</sub> H <sub>40</sub> Cl <sub>3</sub> O <sub>5</sub> Si <sub>2</sub> Dipodal hydrophobic surface treatment with embedded hydrophobicity for chromatography HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [862911-99-7] HMIS: 3-1-1-X	597.42	220-2 / 0.9	1.135	10g \$84.00
	SIB1824.82 N,N'-BIS-[(3-TRITHOXSILYLPROPYL)AMINO-CARBONYL]POLYETHYLENE OXIDE (10-15 EO) UREASIL Dipodal hydrophilic silane Viscosity: 300-350 cSt In combination with sulfolane forms gel electrolyte for solar cells. <sup>1</sup> Forms proton conducting hybrid organic-inorganic polymer electrode membranes. <sup>2</sup> 1. Stathatos, E. et al. <i>Adv. Funct. Mater.</i> <b>2004</b> , <i>14</i> , 45. 2. Honma, I. et al. <i>J. Membr. Sci.</i> <b>2001</b> , <i>185</i> , 83. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [178884-91-8] TSCA HMIS: 1-1-1-X	1,000 - 1,200		1.088	1.4583 <sup>25</sup>

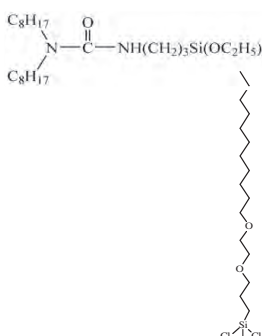

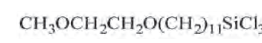
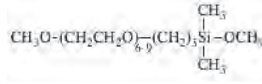
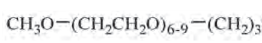
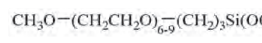
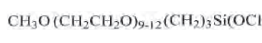
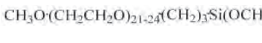
Antifog coatings can be formed from combinations of polyalkylene oxide functional silanes and film-forming hydrophilic silanes

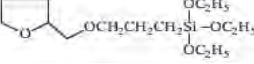

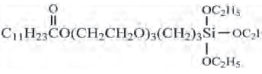
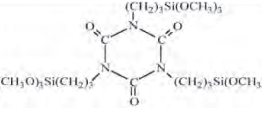


	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIB1824.84 BIS[3-(TRIETHOXSILYL)PROPYL]POLYETHYLENE- OXIDE (25-30 EO) Hydrolytically stable hydrophilic silane See also SIB1860.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	1,400 - 1,600	(38-42)		
		HMIS: 2-1-1-X	25g \$84.00		
	SIB1827.0 BIS[3-(TRIETHOXSILYL)PROPYL]THIOUREA, 90% C <sub>19</sub> H <sub>44</sub> N <sub>2</sub> O <sub>6</sub> SSi <sub>2</sub> Viscous yellow liquid Forms films on electrodes for determination of mercury. <sup>1</sup> 1. Guo, Y. et al. <i>J. Pharm. Biol. Anal.</i> <b>1999</b> , 19 175. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	484.73	Flashpoint: >110°C (>230°F)	1.047	1.4696
		HMIS: 2-1-1-X	25g \$134.00		
	SIB1828.0 BIS[3-(TRIETHOXSILYL)PROPYL]UREA, 60% in ethanol C <sub>19</sub> H <sub>44</sub> N <sub>2</sub> O <sub>7</sub> Si <sub>2</sub> See also SIB1835.5, SIU9055.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	468.73	Flashpoint: 24°C (75°F)	0.923	
		HMIS: 2-1-1-X	25g \$34.00	100g \$110.00	
	SIB1835.5 BIS(TRIMETHOXSILYL)PROPYL]UREA, 95% C <sub>13</sub> H <sub>32</sub> N <sub>2</sub> O <sub>7</sub> Si <sub>2</sub> Amber liquid Viscosity: 100 - 250 cSt Adhesion promoter for 2-part condensation cure silicone RTVs HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	384.58	Flashpoint: >110°C (>230°F)	1.10	1.449
		HMIS: 3-2-1-X	25g \$20.00	100g \$65.00	2kg \$368.00
	SIC2065.0 10-(CARBOMETHOXY)DECYLDIMETHYLCHLORO- SILANE C <sub>14</sub> H <sub>28</sub> ClO <sub>2</sub> Si Long chain organofunctional silane HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	292.92	133 / 0.3 Flashpoint: 105°C (221°F)	0.950	1.4483 <sup>25</sup>
		HMIS: 3-1-1-X	10g \$42.00	50g \$168.00	
	SIC2067.0 10-(CARBOMETHOXY)DECYLDIMETHYLMETHOXY- SILANE C <sub>15</sub> H <sub>32</sub> O <sub>3</sub> Si Long chain organofunctional silane HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	288.50	130 / 0.3	0.903	1.4399
		HMIS: 2-1-1-X	10g \$51.00	50g \$204.00	
	SIC2067.6 10-(CARBOMETHOXY)DECYLTRICHLOROSILANE C <sub>12</sub> H <sub>23</sub> Cl <sub>3</sub> O <sub>2</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	333.75	133-6 / 0.3	1.10	
		HMIS: 3-2-1-X	10g \$82.00		
	SIC2068.0 2-(CARBOMETHOXY)ETHYLMETHYLDICHLORO- SILANE, tech-96 C <sub>5</sub> H <sub>10</sub> Cl <sub>2</sub> O <sub>2</sub> Si Contains ~ 20% 1-(carbomethoxy)ethylmethylchlorosilane isomer HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	201.12	98-9 / 25 Flashpoint: 52°C (126°F)	1.187 <sup>25</sup>	1.4439 <sup>25</sup>
		HMIS: 3-2-1-X	25g \$80.00		
	SIC2070.0 2-(CARBOMETHOXY)ETHYLTRICHLOROSILANE METHYL (3-TRICHLOROSILYL)PROPIONATE C <sub>4</sub> H <sub>7</sub> Cl <sub>3</sub> O <sub>2</sub> Si tech-95 Contains ~ 20% 1-(carbomethoxy)ethyltrichlorosilane isomer HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	221.54	90-2 / 25 Flashpoint: >43°C (>110°F)	1.325	1.448
		HMIS: 3-3-1-X	25g \$39.00	100g \$126.00	
	SIC2072.0 2-(CARBOMETHOXY)ETHYLTRIMETHOXSILANE METHYL (3-TRIMETHOXSILYL)PROPIONATE C <sub>7</sub> H <sub>16</sub> O <sub>5</sub> Si tech-95 Contains ~ 20% 1-(carbomethoxy)ethyltrimethoxysilane isomer HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	208.29	75 / 1.5 Flashpoint: >43°C (>110°F)	1.069	1.410
		HMIS: 3-3-1-X	10g \$88.00		

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	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SID4465.0 N,N-DIOCTYL-N'-TRIETHOXSILYLPROPYLUREA C <sub>26</sub> H <sub>56</sub> N <sub>2</sub> O <sub>4</sub> Si	488.83		0.924 <sup>25</sup>	1.4521 <sup>25</sup>
	Forms hydrophobic phases with embedded hydrophilicity Forms organic-inorganic vesicles (cerasomers). <sup>1</sup> 1. Hashizume, M. et al. <i>J. Thin Solid Films</i> <b>2003</b> , 438, 20. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [259727-10-1] HMIS: 2-2-1-X 25g \$88.00				
	SID4472.0 4,7-DIOXAOCYTADECYLTRICHLOROSILANE, 95% C <sub>16</sub> H <sub>33</sub> Cl <sub>3</sub> O <sub>2</sub> Si	391.88	165 / 0.7	1.028	
	Forms C <sub>18</sub> bonded phases with embedded hydrophilicity HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 3-1-1-X 10g \$185.00				
	SIM6491.5 METHOXYETHOXYUNDECYLTRICHLOROSILANE C <sub>14</sub> H <sub>29</sub> Cl <sub>3</sub> O <sub>2</sub> Si	363.83	145-9 / 1.25	1.07	
	Forms self-assembled monolayers with "hydrophilic tips" HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [943349-49-3] HMIS: 3-2-1-X 5g \$82.00				
	SIM6492.58 2-[METHOXPOLY(ETHYLENEOXY) <sub>6-9</sub> PROPYL]- DIMETHYLMETHOXSILANE CH <sub>3</sub> O(C <sub>2</sub> H <sub>4</sub> O) <sub>6-9</sub> (CH <sub>2</sub> ) <sub>3</sub> (CH <sub>3</sub> ) <sub>2</sub> Si(OCH <sub>3</sub> ) <sub>2</sub>	427-559			
	HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 2-2-1-X 5g \$110.00				
	SIM6492.66 2-[METHOXY(POLYETHYLENEOXY)PROPYL]- TRICHLOROSILANE, tech-90 CH <sub>3</sub> O(C <sub>2</sub> H <sub>4</sub> O) <sub>6-9</sub> (CH <sub>2</sub> ) <sub>3</sub> Cl <sub>3</sub> Si	472-604		1.13	
	Forms hydrophilic surfaces Provides protein antifouling surface. <sup>1</sup> 1. Cecchet, F. et al. <i>Langmuir</i> <b>2006</b> , 22, 1173 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [36493-41-1] TSCA HMIS: 3-2-1-X 10g \$76.00				
	SIM6492.7 2-[METHOXY(POLYETHYLENEOXY)PROPYL]- TRIMETHOXSILANE, tech-90 CH <sub>3</sub> (C <sub>2</sub> H <sub>4</sub> O) <sub>6-9</sub> (CH <sub>2</sub> ) <sub>3</sub> OSi(OCH <sub>3</sub> ) <sub>3</sub>	459-591	(-8)	1.076	1.403
	Flashpoint: 88°C (190°F) Viscosity: 29 cSt Reduces non-specific binding of proteins Forms charge neutral coatings on CdSe quantum dots which conjugate DNA. <sup>1</sup> 1. Parak, W. et al. <i>Chem. Mater.</i> <b>2002</b> , 14, 2113. See also SIB1824.84, SIH6188.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [65994-07-2] TSCA HMIS: 2-2-1-X 25g \$76.00 100g \$247.00				
	SIM6492.72 2-[METHOXY(POLYETHYLENEOXY)PROPYL]- TRIMETHOXSILANE, tech-90 CH <sub>3</sub> (C <sub>2</sub> H <sub>4</sub> O) <sub>9-12</sub> (CH <sub>2</sub> ) <sub>3</sub> OSi(OCH <sub>3</sub> ) <sub>3</sub>	591-719		1.071	1.451 <sup>25</sup>
	Flashpoint: 88°C (190°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [65994-07-2] TSCA HMIS: 2-2-1-X 25g \$76.00 100g \$247.00				
	SIM6492.73 2-[METHOXY(POLYETHYLENEOXY)PROPYL]- TRIMETHOXSILANE, tech-90 CH <sub>3</sub> O(CH <sub>2</sub> CH <sub>2</sub> O) <sub>21-4</sub> (CH <sub>2</sub> ) <sub>3</sub> Si(OCH <sub>3</sub> ) <sub>3</sub>	900-1,200			
	HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [65994-07-2] HMIS: 2-2-1-X 1.0g \$84.00				

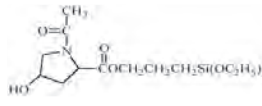
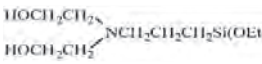
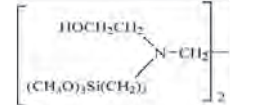

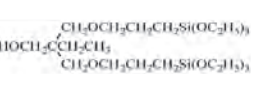

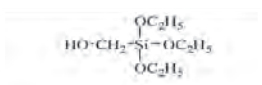
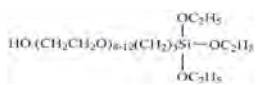
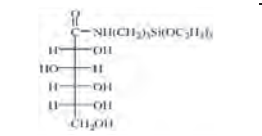

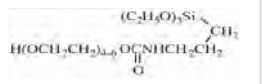
	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
CH <sub>3</sub> OCH <sub>2</sub> CH <sub>2</sub> CH <sub>2</sub> Si(OCH <sub>3</sub> ) <sub>3</sub>	SIM6493.0 3-METHOXYPROPYLTRIMETHOXSILANE C <sub>7</sub> H <sub>18</sub> O <sub>4</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	194.30	98-9 / 40 Flashpoint: 53°C (127°F)	0.995	
	[33580-59-5] HMIS: 3-2-1-X		25g \$38.00	100g \$124.00	
CH <sub>3</sub> O(CH <sub>2</sub> CH <sub>2</sub> O) <sub>3</sub> (CH <sub>2</sub> ) <sub>3</sub> SiCl <sub>3</sub>	SIM6493.2 METHOXYTRIETHYLENEOXYPROPYLTRICHLORO-SILANE C <sub>10</sub> H <sub>21</sub> Cl <sub>3</sub> O <sub>4</sub> Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	339.71	148 / 0.3	1.034	
	[228700-87-6] TSCA-L HMIS: 3-2-1-X		10g \$122.00		
CH <sub>3</sub> O(CH <sub>2</sub> CH <sub>2</sub> O) <sub>3</sub> (CH <sub>2</sub> ) <sub>3</sub> Si(OCH <sub>3</sub> ) <sub>3</sub>	SIM6493.4 METHOXYTRIETHYLENEOXYPROPYLTRIMETHOXY-SILANE C <sub>13</sub> H <sub>30</sub> O <sub>7</sub> Si Forms polymeric proton-conducting electrolytes. <sup>1</sup> 1. Ritchie, J. et al. <i>Chem. Mater.</i> <b>2006</b> , 18,504. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	326.46	140 / 0.2	1.163	1.4321
	[132388-45-5] HMIS: 3-2-1-X		10g \$128.00		
CH <sub>3</sub> O-(CH <sub>2</sub> CH <sub>2</sub> O) <sub>3</sub> -(CH <sub>2</sub> ) <sub>11</sub> Si(OCH <sub>3</sub> ) <sub>3</sub>	SIM6493.7 METHOXYTRIETHYLENEOXYUNDECYLTRIMETHOXY-SILANE PEG3C11 Silane C <sub>21</sub> H <sub>46</sub> O <sub>7</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	438.68			
	HMIS: 3-2-1-X		1.0g \$84.00		
	SIT7122.6 TETRAHYDROFURFURYLPROPYLTRIETHOXSILANE C <sub>14</sub> H <sub>30</sub> O <sub>9</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	306.47	130 / 0.3	0.990	
	HMIS: 1-2-1-X		10g \$96.00		
	SIT8186.0 (2-TRIETHOXSILYLPROPOXY)ETHOXSULFOLANE C <sub>15</sub> H <sub>32</sub> O <sub>7</sub> SSi 95% Forms hydrophilic surfaces HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	384.56	190-4 / 0.4	1.122	
	[502925-40-8] HMIS: 2-2-1-X		10g \$64.00		
	SIT8186.3 TRIETHOXSILYLPROPOXY(POLYETHYLENEOXY)-DODECANOATE (3 EO units) C <sub>27</sub> H <sub>56</sub> O <sub>8</sub> Si Contact angle (treated surface), water: 61-2° Contact angle (treated surface), 2-ethylhexyl palmitate: <15° Provides embedded hydrophilicity with oleophilic compatibility Surface treatments stabilize particle dispersions. <sup>1</sup> 1. Arkles, B. et al. in <i>Silanes and Other Coupling Agents</i> ; Mittal, K., Ed.; VSP (Brill), 2009, Vol. 5, p. 51. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	536.82		0.977	1.4479 <sup>25</sup>
	[1041420-54-5] HMIS: 2-1-1-X		10g \$88.00		
	SIT8717.0 TRIS(3-TRIMETHOXSILYLPROPYL)ISOCYANURATE C <sub>21</sub> H <sub>45</sub> N <sub>3</sub> O <sub>12</sub> Si <sub>3</sub> tech-95 Flashpoint: 102°C (216°F) Viscosity: 325-350 cSt. Adhesion promoter for hotmelt adhesives Coupling agent for polyimides to silicon metal Forms periodic mesoporous silicas. <sup>1</sup> 1. Zhang, W. et al. <i>Chem. Mater.</i> <b>2007</b> , 19, 2663. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	615.86		1.170	1.4610
	[26115-70-8] TSCA EC 247-465-8 HMIS: 2-1-1-X		25g \$12.00	100g \$39.00	2kg \$380.00

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# Hydrophilic Silane Properties

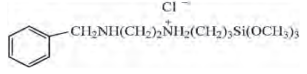
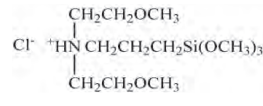
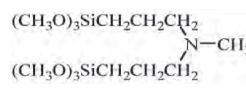
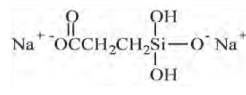
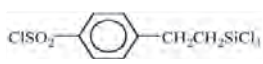


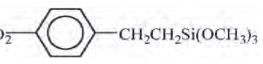
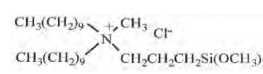
## Hydroxylic

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>	
	SIA0126.0 3-(N-ACETYL-4-HYDROXYPROPYL)PROPYL- TRIETHOXSILANE, 25% in ethanol C <sub>18</sub> H <sub>31</sub> NO <sub>5</sub> Si Hydrophilic reagent for biomimetic surface modification HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	377.51		0.872		
			HMIS: 2-3-0-X	5g \$180.00		
	SIB1140.0 BIS(2-HYDROXYETHYL)-3-AMINOPROPYLTRIETHOXY- SILANE, 62% in ethanol C <sub>13</sub> H <sub>31</sub> NO <sub>5</sub> Si Contains 2-3% hydroxyethylaminopropyltriethoxysilane Urethane polymer coupling agent Employed in surface modification for preparation of oligonucleotide arrays. <sup>1</sup> 1. McCall, G. et al. <i>Proc. Natl. Acad. Sci.</i> <b>1996</b> , 93, 1355. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	309.48	Flashpoint: 24°C (75°F) Specific wetting surface: 252 m <sup>2</sup> /g	0.92	1.4090 <sup>25</sup>	
			[7538-44-5] TSCA EC 231-408-9 HMIS: 3-4-0-X	25g \$30.00	100g \$98.00	
	SIB1142.0 N,N'-BIS(HYDROXYETHYL)-N,N'-BIS(TRIMETHOXY- SILYLPROPYL)ETHYLENEDIAMINE, 66-68% in methanol C <sub>18</sub> H <sub>44</sub> N <sub>2</sub> O <sub>6</sub> Si <sub>2</sub> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	472.73	Flashpoint: 11°C (52°F)	0.98		
			[214362-07-9] HMIS: 3-4-1-X	25g \$66.00		
	SIB1824.2 BIS-(3-(TRIETHOXSILYLPROPOXY)-2-HYDROXY- PROPOXY)POLYETHYLENE OXIDE, 65% in ethanol C <sub>24</sub> H <sub>54</sub> O <sub>11</sub> Si <sub>2</sub> (C <sub>2</sub> H <sub>4</sub> O) <sub>5-8</sub> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	800 - 900	Flashpoint: 24°C (75°F)	0.959	1.421	
			HMIS: 2-4-1-X	25g \$74.00		
	SIB1824.4 2,2-BIS(3-(TRIETHOXSILYLPROPOXYMETHYL)- BUTANOL, 50% in ethanol C <sub>24</sub> H <sub>52</sub> O <sub>9</sub> Si <sub>2</sub> For solid-state synthesis of oligonucleotides	542.86		0.899		
			[862911-98-6] HMIS: 2-4-1-X	10g \$146.00		
	SIH6172.0 N-(HYDROXYETHYL)-N-METHYLAMINOPROPYL- TRIMETHOXSILANE, 75% in methanol C <sub>9</sub> H <sub>23</sub> NO <sub>3</sub> Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	237.37	Flashpoint: 16°C (61°F)	0.99	1.417	
			[330457-46-0] HMIS: 3-4-1-X	25g \$55.00	100g \$179.00	
	SIH6175.0 HYDROXYMETHYLTRIETHOXSILANE, 50% in ethanol TRIETHOXSILYLMETHANOL C <sub>7</sub> H <sub>18</sub> O <sub>3</sub> Si Contains equilibrium condensation oligomers Hydrolysis yields analogs of silica-hydroxymethylsilanetriol polymers. <sup>1</sup> 1. Arkles, B. US Patent 5,371,262, 1994. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	194.31		0.866		
			[162781-73-9] HMIS: 2-4-0-X	25g \$96.00		
	SIH6188.0 [HYDROXY(POLYETHYLENEOXY)PROPYL]- TRIETHOXSILANE, (8-12 EO), 50% in ethanol HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	575-750		0.889	1.401	
			HMIS: 2-4-1-X	25g \$88.00		
	SIT8189.0 N-(3-(TRIETHOXSILYLPROPYL)GLUCONAMIDE C <sub>15</sub> H <sub>33</sub> NO <sub>9</sub> Si 50% in ethanol Water soluble, hydrophilic silane HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	399.51	Flashpoint: 8°C (46°F)	0.951		
			[104275-58-3] HMIS: 2-4-1-X	25g \$28.00	100g \$91.00	
	SIT8189.5 N-(3-(TRIETHOXSILYLPROPYL)-4-HYDROXY- BUTYRAMIDE C <sub>13</sub> H <sub>29</sub> NO <sub>5</sub> Si Anchoring reagent for light directed synthesis of DNA on glass. <sup>1</sup> 1. McCall, G. et al. <i>J. Am. Chem. Soc.</i> <b>1997</b> , 119, 5081. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	307.47		1.02	1.4533	
			[156214-80-1] HMIS: 2-2-1-X	10g \$31.00	50g \$124.00	
	SIT8192.0 N-(TRIETHOXSILYLPROPYL)-O-POLYETHYLENE - OXIDE URETHANE, 95% C <sub>10</sub> H <sub>22</sub> N <sub>4</sub> O <sub>4</sub> Si(CH <sub>2</sub> CH <sub>2</sub> O) <sub>4-6</sub> H Hydrophilic surface modifier Forms PEGylated glass surfaces suitable for capillary electrophoresis. <sup>1</sup> 1. Razunguzwa, T. et al. <i>Anal. Chem.</i> <b>2006</b> , 78, 4326. See also SIB1824.82 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	400-500	Contains some bis(urethane) analog Viscosity: 75-125 cSt	1.09	1.4540 <sup>25</sup>	
			[74695-91-3] TSCA HMIS: 2-1-1-X	25g \$16.00	100g \$52.00	2kg \$728.00

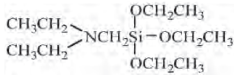
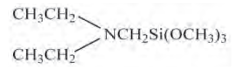
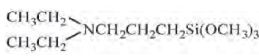
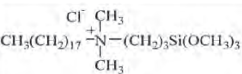

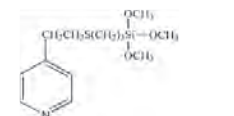
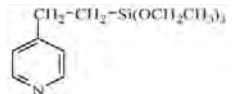
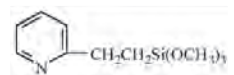
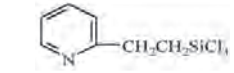
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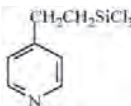
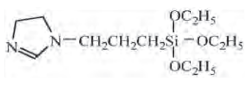
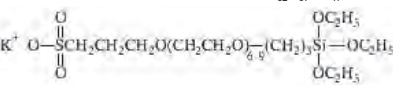
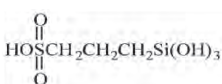
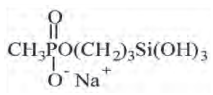
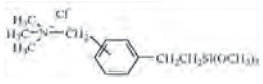
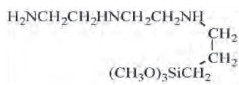
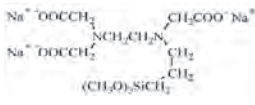
# Hydrophilic Silane Properties

## Ionic-Charge Inducible

name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
 <p>(2-N-BENZYLAMINOETHYL)-3-AMINOPROPYL-TRIMETHOXSILANE hydrochloride, 90% C<sub>15</sub>H<sub>28</sub>N<sub>2</sub>O<sub>3</sub>Si·HCl 50% in methanol Amber liquid HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [623938-90-9] TSCA HMIS: 3-3-1-X</p>	348.95	Flashpoint: 9°C (48°F)	0.942	1.4104
 <p>BIS(METHOXYETHYL)-3-TRIMETHOXSILYLPROPYL-AMMONIUM CHLORIDE, 60% in methanol C<sub>12</sub>H<sub>29</sub>NO<sub>6</sub>Si·HCl Hydrophilic ammonium salt; forms anti-fog surface films HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 3-4-1-X</p>	331.91	Flashpoint: 11°C (52°F)		
 <p>BIS(3-TRIMETHOXSILYLPROPYL)-N-METHYLAMINE C<sub>13</sub>H<sub>33</sub>NO<sub>6</sub>Si<sub>2</sub> See also SIB1828.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [31024-70-1] HMIS: 2-1-0-X</p>	355.58	175 / 10 Flashpoint: 106°C (223°F)	1.023	1.430
 <p>CARBOXYETHYLSILANETRIOL, SODIUM SALT C<sub>5</sub>H<sub>8</sub>Na<sub>2</sub>O<sub>5</sub>Si 25% in water pH: 12 - 12.5 In combination w/ aminofunctional silanes forms amphoteric silicas.<sup>1</sup> 1. Han, L. et al. <i>Chem. Mater.</i> <b>2007</b>, <i>19</i>, 2860. HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions [18191-40-7] HMIS: 2-0-0-X</p>	196.14		1.170 <sup>25</sup>	
 <p>2-(4-CHLOROSULFONYLPHENYL)ETHYLTRICHLORO-SILANE, 50% in methylene chloride C<sub>8</sub>H<sub>8</sub>Cl<sub>4</sub>O<sub>2</sub>SSi Contains 30% free sulfonic acid and small amounts of silylsulfonic acid condensation products Employed in preparation of solid phase extraction columns HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [79793-00-3] TSCA EC 279-267-2 HMIS: 4-2-2-X</p>	338.11		1.37	
<p><b>Solid Phase Extraction (SPE) columns with benzenesulfonic acid functionalized silica are utilized to analyze urine samples for amino acids and drugs of abuse.</b></p> 				
 <p>2-(4-CHLOROSULFONYLPHENYL)ETHYLTRICHLORO-SILANE, 50% in toluene C<sub>8</sub>H<sub>8</sub>Cl<sub>4</sub>O<sub>2</sub>SSi Contains 30% free sulfonic acid and small amounts of silylsulfonic acid condensation products See also SIB1811.7 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [79793-00-3] TSCA EC 279-267-2 HMIS: 4-4-2-X</p>	338.11		1.08	
 <p>2-(4-CHLOROSULFONYLPHENYL)ETHYLTRIMETHOXY-SILANE, 50% in methylene chloride C<sub>11</sub>H<sub>17</sub>ClO<sub>5</sub>Si Amber color Contains free sulfonic acid Treated silica acts as etherification catalyst.<sup>1</sup> Reagent for surface initiated ATRP.<sup>2</sup> Employed in mesostructured fuel-cell membranes.<sup>3</sup> 1. Sow, B. et al. <i>Microporous and Mesoporous Mat'ls.</i> <b>2005</b>, <i>79</i>, 129. 2. Fukuda, J. et al. <i>Macromolecules</i> <b>2000</b>, <i>33</i>, 2870. 3. Pereira, F. et al. <i>Chem. Mater.</i> <b>2008</b>, <i>20</i>, 1710. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [126519-89-9] HMIS: 3-2-1-X</p>	324.85		1.30 <sup>25</sup>	
 <p>N,N-DIDECYL-N-METHYL-N-(3-TRIMETHOXSILYL-PROPYL)AMMONIUM CHLORIDE, 40-42% in methanol C<sub>27</sub>H<sub>60</sub>ClNO<sub>3</sub>Si Contains 3-5% Cl(CH<sub>2</sub>)<sub>3</sub>Si(OMe)<sub>3</sub> In combination with TEOS forms high pore volume xerogels w/ adsorptive capacity.<sup>1</sup> 1. Markovitz, M. et al. <i>Langmuir</i> <b>2001</b>, <i>17</i>, 7085. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [68959-20-6] TSCA EC 273-403-4 HMIS: 3-4-0-X</p>	510.32	Flashpoint: 13°C (55°F)	0.863	1.4085

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	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SID3395.4 (DIETHYLAMINOMETHYL)TRIETHOXSILANE C <sub>11</sub> H <sub>27</sub> NO <sub>3</sub> Si Catalyst for neutral cure 1-part RTVs HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	249.43	74-6 / 3	0.9336 <sup>25</sup>	1.4142 <sup>25</sup>
	[15180-47-9] TSCA-L HMIS: 2-2-1-X		25g \$49.00		
	SID3395.6 (N,N-DIETHYLAMINOMETHYL)TRIMETHOXSILANE C <sub>8</sub> H <sub>21</sub> NO <sub>3</sub> Si Charge control agent for toner particles Crosslinker for moisture-cure silicone RTVs HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	207.40			
	[67475-66-5] TSCA-L HMIS: 3-2-1-X		25g \$48.00		
	SID3396.0 (N,N-DIETHYL-3-AMINOPROPYL)TRIMETHOXSILANE C <sub>10</sub> H <sub>25</sub> NO <sub>3</sub> Si Provides silica-supported catalyst for 1,4-addition reactions. <sup>1</sup> 1. Mutukura, K. et al. <i>Chem.-Eur. J.</i> <b>2009</b> , <i>15</i> , 10871. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	235.40	120 / 20 Flashpoint: 100°C (212°F)	0.934	1.425
	[41051-80-3] TSCA EC 255-192-0 HMIS: 2-1-1-X		25g \$62.00 100g \$202.00		
	SIO6620.0 OCTADECYLDIMETHYL(3-TRIMETHOXSILYL- PROPYL)AMMONIUM CHLORIDE, 60% in methanol C <sub>26</sub> H <sub>58</sub> ClNO <sub>3</sub> Si Contains 3-5% Cl(CH <sub>2</sub> ) <sub>3</sub> Si(OMe) <sub>3</sub> Orients liquid crystals Employed as a glass lubricant Provides an antistatic surface coating Dispersion/coupling agent for high density magnetic recording media. <sup>1</sup> Application as immobilizable antimicrobial reported. <sup>2</sup> 1. Vincent, H. In <i>Chemically Modified Oxide Surfaces</i> ; D. Leyden, D., Ed.; Gordon & Breach: 1990; p.305. 2. White, W. et al. In <i>Silanes, Surfaces &amp; Interfaces</i> ; Leyden, D., Ed.; Gordon & Breach: 1986; p.107. See also SID3392.0, SIO6606.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	496.29		0.89	
	[27668-52-6] TSCA EC 248-595-8 HMIS: 3-4-0-X		25g \$18.00 2kg \$280.00		
	SIP6926.2 2-(2-PYRIDYLETHYL)THIOPROPYLTRIMETHOXY- SILANE C <sub>13</sub> H <sub>23</sub> NO <sub>3</sub> SSi HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	301.48	156-7 / 0.25	1.089	1.498
	[29098-72-4] HMIS: 3-2-1-X		10g \$118.00		
	SIP6926.4 2-(4-PYRIDYLETHYL)THIOPROPYLTRIMETHOXY- SILANE C <sub>13</sub> H <sub>23</sub> NO <sub>3</sub> SSi pKa: 4.8 Immobilizable ligand for immunoglobulin IgG separation using hydrophobic charge induction chromatography (HCIC) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	301.48	160-2 / 0.2	1.09	1.5037
	[198567-47-4] HMIS: 3-2-1-X		10g \$124.00		
	SIP6928.0 2-(4-PYRIDYLETHYL)TRIETHOXSILANE C <sub>13</sub> H <sub>23</sub> NO <sub>3</sub> Si Amber liquid Forms self-assembled layers which can be "nano-shaved" by scanning AFM. <sup>1</sup> 1. Rosa, L. et al. <i>Mater. Lett.</i> <b>2009</b> , <i>63</i> , 961. See also SIP6930.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	269.43	105 / 0.9	1.00	1.4624 <sup>24</sup>
	[98299-74-2] HMIS: 3-2-1-X		10g \$119.00		
	SIP6930.0 2-(2-PYRIDYLETHYL)TRIMETHOXSILANE 2-(TRIMETHOXSILYLETHYL)PYRIDINE C <sub>10</sub> H <sub>17</sub> NO <sub>3</sub> Si See also SIP6928.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	227.33	105 / 0.3 Flashpoint: >110°C (>230°F)	1.06	1.4755
	[27326-65-4] HMIS: 3-1-1-X		10g \$41.00 50g \$164.00		
	SIT8157.0 2-[2-(TRICHLOROSILYL)ETHYL]PYRIDINE C <sub>7</sub> H <sub>8</sub> Cl <sub>3</sub> NSi Fuming solid, moisture sensitive See also SIP6930.0 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	240.59	280-decomposes (207)		
	[17082-69-8] TSCA EC 241-137-8 HMIS: 3-2-1-X		25g \$54.00		

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIT8158.0 4-[2-(TRICHLOROSILYL)ETHYL]PYRIDINE C <sub>7</sub> H <sub>6</sub> Cl <sub>3</sub> NSi 15-20% in toluene Flashpoint: 4°C (39°F) Hazy liquid; extremely moisture sensitive Employed in polypyridine self-assembled monolayers. <sup>1</sup> 1. Paulson, S. et al. <i>J. Chem. Soc., Chem. Commun.</i> <b>1992</b> , 21, 1615. See also SIP6930.0.0 2-(TRIMETHOXYSILYLETHYL)PYRIDINE HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	240.59		0.93	
	[17082-70-1] TSCA EC 241-138-3 HMIS: 3-4-1-X		25g \$32.00	100g \$104.00	
	SIT8187.5 N-(3-TRIETHOXYSILYLPROPYL)-4,5-DIHYDRO- IMIDAZOLE 3-(2-IMIDAZOLIN-1-YL)PROPYLTRIETHOXYSILANE, IMEO C <sub>12</sub> H <sub>26</sub> N <sub>2</sub> O <sub>3</sub> Si Viscosity: 5 cSt Coupling agent for elevated temperature-cure epoxies Utilized in HPLC of metal chelates. <sup>1</sup> Forms proton vacancy conducting polymers w/sulfonamides by sol-gel. <sup>2</sup> Ligand for molecular imprinting of silica with chymotrypsin transition state analog. <sup>3</sup> 1. Suzuki, T. et al. <i>Chem. Lett.</i> <b>1994</b> , 881. 2. De Zea Bermudez, V. et al. <i>Sol-Gel Optics II, SPIE Proc.</i> <b>1992</b> , 1728, 180. 3. Markowitz, M. et al. <i>Langmuir</i> <b>2000</b> , 16, 1759. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	274.43	134 / 2 Flashpoint: >110°C (>230°F)	1.005	1.452
	[58068-97-6] TSCA EC 261-093-3 HMIS: 2-1-1-X		25g \$18.00	100g \$62.00	2kg \$680.00
	SIT8192.2 TRIETHOXYSILYLPROPYL(POLYETHYLENE- OXY)PROPYLPOTASSIUM SULFATE, 50% in ethanol C <sub>28</sub> H <sub>67</sub> KO <sub>17</sub> SSi HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	823.01			
	[58068-97-6] TSCA EC 261-093-3 HMIS: 2-2-1-X		2.5g \$240.00		
	SIT8378.3 3-(TRIHYDROXYSILYL)-1-PROPANESULFONIC ACID C <sub>3</sub> H <sub>10</sub> O <sub>6</sub> SSi 30-35% in water pH: <1 Employed in preparation of nanoscale ionic silicas. <sup>1</sup> 1. Giannelis, E. et al. <i>Appl. Organomet. Chem.</i> <b>2010</b> , 24, 581. HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions	202.26		1.12	
	[70942-24-4] TSCA EC 284-799-3 HMIS: 3-0-0-X		25g \$51.00	100g \$166.00	
	SIT8378.5 3-TRIHYDROXYSILYLPROPYLMETHYLPHOSPHATE, - SODIUM SALT, 42% in water C <sub>4</sub> H <sub>12</sub> NaO <sub>6</sub> PSi Contains 4-5% methanol, sodium methylphosphonate HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions	238.18	Flashpoint: 79°C (174°F)	1.25	
	[84962-98-1] TSCA EC 284-799-3 HMIS: 1-2-0-X		100g \$16.00	500g \$64.00	
	SIT8395.0 N-(TRIMETHOXYSILYLETHYL)BENZYL-N,N,N- TRIMETHYLAMMONIUM CHLORIDE, 60% in methanol C <sub>15</sub> H <sub>26</sub> ClNO <sub>3</sub> Si Candidate for exchange resins and extraction phases HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	333.93	Flashpoint: 25°C (77°F)	0.966	
	[58068-97-6] TSCA EC 261-093-3 HMIS: 3-3-1-X		25g \$86.00		
	SIT8398.0 (3-TRIMETHOXYSILYLPROPYL)DIETHYLENE- TRIAMINE, 95% C <sub>10</sub> H <sub>27</sub> N <sub>3</sub> O <sub>3</sub> Si yc of treated surface: 37.5 mN/m Hardener, coupling agent for epoxies HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	265.43	114-8 / 2 Flashpoint: 137°C (279°F) TOXICITY: oral rat, LD50: >2,000 mg/kg	1.030	1.4590
	[35141-30-1] TSCA EC 252-390-9 HMIS: 3-1-1-X		100g \$20.00	2kg \$248.00	
	SIT8402.0 N-(TRIMETHOXYSILYLPROPYL)ETHYLENEDIAMINE, - TRIACETIC ACID, TRISODIUM SALT, 35% in water C <sub>14</sub> H <sub>25</sub> N <sub>2</sub> Na <sub>3</sub> O <sub>9</sub> Si Essentially silanetriol, contains NaCl Chelates metal ions HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions	462.42		1.26	
	[128850-89-5] TSCA EC 252-390-9 HMIS: 2-0-0-X		25g \$42.00	100g \$137.00	

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	<p>SIT8405.0 N-(TRIMETHOXYSILYLPROPYL)ISOTHIOURONIUM - CHLORIDE, 50% in water TRIHYDROXYPROPYLCARBAMIDOTHIOIC ACID HYDROCHLORIDE C<sub>7</sub>H<sub>19</sub>ClN<sub>2</sub>O<sub>3</sub>Si Antimicrobial activity reported Essentially silanetriol HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions</p>	<p>274.84 pH: 6 [84682-36-0] TSCA EC 283-599-3 HMIS: 2-0-0-X 25g \$48.00</p>	<p>1.190 1.441</p>
	<p>SIT8412.0 N-TRIMETHOXYSILYLPROPYL-N,N,N-TRI-n-BUTYL- AMMONIUM BROMIDE, 50% in methanol C<sub>18</sub>H<sub>42</sub>BrNO<sub>3</sub>Si Immobilizable phase transfer catalyst HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	<p>428.52 Flashpoint: 11°C (52°F) HMIS: 3-4-1-X 25g \$89.00</p>	<p>0.92</p>
	<p>SIT8414.0 N-TRIMETHOXYSILYLPROPYL-N,N,N-TRI-n-BUTYL- AMMONIUM CHLORIDE, 50% in methanol C<sub>18</sub>H<sub>42</sub>ClNO<sub>3</sub>Si Contains 3-5% chloropropyltrimethoxysilane and Bu<sub>3</sub>NH<sup>+</sup>Cl<sup>-</sup> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	<p>384.08 Flashpoint: 11°C (52°F) HMIS: 3-4-1-X 25g \$81.00</p>	<p>0.88</p>
	<p>SIT8415.0 N-TRIMETHOXYSILYLPROPYL-N,N,N-TRIMETHYL- AMMONIUM CHLORIDE, 50% in methanol N,N,N-TRIMETHYL-3-(TRIMETHOXYSILYL)-1-PROPANAMINIUM CHLORIDE C<sub>9</sub>H<sub>24</sub>ClNO<sub>3</sub>Si Employed for bonded chromatographic phases Anti-static agent Used to treat glass substrates employed in electroblotting Prevents contact electrification.<sup>1</sup> 1. Thomas, S. et al. <i>J. Am. Chem. Soc.</i> <b>2009</b>, <i>131</i>, 8746. See also SIT8395.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	<p>257.83 Flashpoint: 16°C (61°F) [35141-36-7] TSCA EC 252-393-5 HMIS: 2-4-1-X 25g \$18.00 2kg \$390.00</p>	<p>0.927 1.3966</p>
	<p>SIT8422.0 N-TRIMETHOXYSILYLUNDECYL-N,N,N-TRI-n-BUTYL- AMMONIUM BROMIDE, 25% in dimethylformamide C<sub>26</sub>H<sub>58</sub>BrNO<sub>3</sub>Si Immobilizable phase transfer catalyst HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	<p>540.74 Flashpoint: 59°C (138°F) HMIS: 3-4-1-X 25g \$84.00</p>	<p>0.965<sup>25</sup> 1.443</p>

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### Polymeric Hydrophilic Silanes

#### Polymeric Amine

Name	MW	bp °C/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
<p>SSP-060 TRIMETHOXYSILYLPROPYL MODIFIED - (POLYETHYLENIMINE), 50% in isopropanol Viscosity: 125-175 cSt Employed as a coupling agent for polyamides.<sup>1</sup> In combination with glutaraldehyde immobilizes enzymes.<sup>2</sup> 1. Arkles, B. et al. SPI 42nd Composite Inst. Proc., 21-C, 1987 2. Cramer, S. et al. <i>Biotechnol. Bioeng.</i> <b>1989</b>, <i>33</i>(3), 344.</p>	<p>1,500-1,800 ~20% of nitrogens substituted</p>	<p>0.92 [136856-91-2] TSCA HMIS: 2-4-1-X 100g \$28.00 2kg \$364.00</p>		
<p>SSP-065 DIMETHOXYSILYLMETHYLPROPYL MODIFIED - (POLYETHYLENIMINE), 50% in isopropanol Viscosity: 100-200 cSt Primer for brass</p>	<p>1,500-1,800 ~20% of nitrogens substituted</p>	<p>0.92 [125441-88-5] TSCA HMIS: 2-4-1-X 100g \$38.00 2kg \$494.00</p>		

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### Water-borne Aminoalkyl Silsesquioxane Oligomers

TSCA


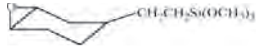
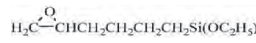
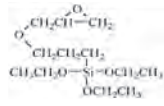
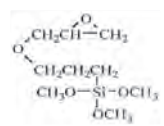

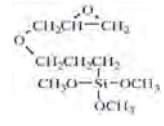
Code	Functional Group	Mole %	Molecular Weight	Weight % in solution	Specific Gravity	Viscosity	pH	Price/100g	3kg
WSA-7011	Aminopropyl	65-75	250-500	25-28	1.10	5-15	10-10.5	\$29.00	\$435.00
WSA-9911*	Aminopropyl	100	270-550	22-25	1.06	5-15	10-10.5	\$24.00	\$360.00
WSA-7021	Aminoethylaminopropyl	65-75	370-650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

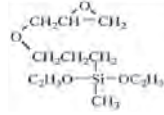
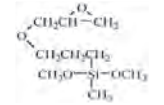
Aqueous exposure of treated surfaces  
converts Epoxy-Silanes to Hydrophilic-Diols

# Epoxy Functional Silanes

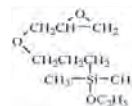
## Epoxy Functional Silanes - Trialkoxy

name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
 <p>SIE4668.0 2-(3,4-EPOXYCyclohexyl)ethyltriethoxysilane C<sub>14</sub>H<sub>26</sub>O<sub>3</sub>Si Flashpoint: 104°C (219°F) Adhesion promoter for water-borne coatings on alkaline substrates HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	288.46	114-7 / 0.4	1.015	1.4455
[10217-34-2] TSCA HMIS: 2-1-1-X		25g \$14.00	100g \$46.00	2kg \$320.00
 <p>SIE4670.0 2-(3,4-EPOXYCyclohexyl)ethyltrimethoxy-silane C<sub>11</sub>H<sub>22</sub>O<sub>3</sub>Si Flashpoint: 146°C (295°F) TOXICITY: oral rat, LD50: 12,300 mg/kg yc of treated surfaces: 39.5 mN/m Specific wetting surface: 317 m<sup>2</sup>/g Viscosity: 5.2 cSt Coefficient of thermal expansion: 0.8 x 10<sup>-3</sup> Vapor pressure, 152°: 10 mm Ring epoxide more reactive than glycidoxypropyl systems UV initiated polymerization of epoxy group with weak acid donors Forms UV-curable coating resins by controlled hydrolysis.<sup>1</sup> Used to make epoxy-organosilica particles w/ high positive Zeta potential.<sup>2</sup> 1. Just, O. et al. <i>Mater. Res. Soc. Symp. Proc.</i> <b>1996</b>, 415, 111. 2. Nakamura, M. and Ishimura, K. <i>Langmuir</i> <b>2008</b>, 24, 12228. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	246.38	95-7 / 0.25	1.065	1.4490
[3388-04-3] TSCA EC 222-217-1 HMIS: 3-1-1-X		100g \$24.00	2kg \$270.00	18kg \$1,044.00
 <p>SIE4675.0 5,6-EPOXYhexyltriethoxysilane C<sub>12</sub>H<sub>26</sub>O<sub>3</sub>Si Flashpoint: 99°C (210°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	262.42	115-9 / 1.5	0.960 <sup>25</sup>	1.4254 <sup>25</sup>
[86138-01-4] HMIS: 3-2-1-X		10g \$96.00		
 <p>SIG5839.0 (3-Glycidoxypropyl)triethoxysilane C<sub>12</sub>H<sub>26</sub>O<sub>5</sub>Si Flashpoint: 144°C (291°F) Coupling agent for latex polymers HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	278.42	124 / 3	1.00	1.425
[2602-34-8] TSCA EC 220-011-6 HMIS: 3-1-1-X		25g \$34.00	100g \$110.00	2kg \$580.00
 <p>SIG5840.0 3-(2,3-EPOXYpropoxy)propyltrimethoxysilane GLYMO, GPTMS, A-187 C<sub>9</sub>H<sub>20</sub>O<sub>5</sub>Si Flashpoint: 135°C (276°F) TOXICITY: oral rat, LD50: 8,400 mg/kg Surface tension: 38.5 mN/m Specific wetting surface: 331 m<sup>2</sup>/g Viscosity: 3.2 cSt Component in abrasion resistant coatings for plastic optics Coupling agent for epoxy composites employed in electronic "chip" encapsulation Component in aluminum metal bonding adhesives Used to prepare epoxy-containing hybrid organic-inorganic materials.<sup>1</sup> 1. Innocenzi, P. et al. <i>Chem. Mater.</i> <b>1999</b>, 11, 1672. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p> 	236.34	120 / 2 (-70)	1.070	1.4290
[2530-83-8] TSCA EC 219-784-2 HMIS: 3-1-1-X		100g \$16.00	2kg \$138.00	18kg \$693.00
 <p>SIG5840.1 (3-Glycidoxypropyl)trimethoxysilane 99+% C<sub>9</sub>H<sub>20</sub>O<sub>5</sub>Si Flashpoint: 135°C (276°F) Low fluorescence grade for high-throughput screening HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	236.34	120 / 2 (-70)	1.070	1.4290
[2530-83-8] TSCA EC 219-784-2 HMIS: 3-1-1-X		25g \$180.00	in fluoropolymer bottle	

## Epoxy Functional Silanes - Dialkoxy

 <p>SIG5832.0 (3-Glycidoxypropyl)methyldiethoxysilane C<sub>11</sub>H<sub>24</sub>O<sub>4</sub>Si Flashpoint: 122°C (252°F) TOXICITY: oral rat, LD50: &gt;2,000 mg/kg Viscosity: 3.0 cSt Employed in scratch resistant coatings for eye glasses Coupling agent for latex systems with reduced tendency to gel compared to SIG5840.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	248.39	122-6 / 5	0.978 <sup>25</sup>	1.431
[2897-60-1] TSCA EC 220-780-8 HMIS: 2-1-1-X		25g \$38.00	100g \$124.00	2kg \$580.00
 <p>SIG5836.0 (3-Glycidoxypropyl)methyldimethoxysilane C<sub>9</sub>H<sub>20</sub>O<sub>3</sub>Si Flashpoint: 105°C (221°F) Relative hydrolysis rate vs. SIG5840.0: 7.5:1 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	220.34	100 / 4	1.02	1.431 <sup>25</sup>
[65799-47-5] TSCA EC 265-929-8 HMIS: 3-1-1-X		25g \$50.00	100g \$162.00	

## Epoxy Functional Silanes - Monoalkoxy

 <p>SIG5825.0 (3-Glycidoxypropyl)dimethylethoxysilane C<sub>10</sub>H<sub>22</sub>O<sub>3</sub>Si Flashpoint: 87°C (189°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	218.37	100 / 3	0.950	1.4337 <sup>25</sup>
[17963-04-1] TSCA EC 241-889-7 HMIS: 3-2-1-X		10g \$40.00	50g \$160.00	

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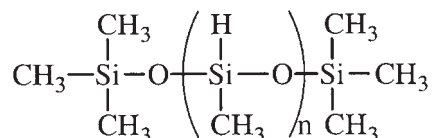
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## Silyl Hydrides

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 with appropriate caution.

name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
$\text{CH}_3(\text{CH}_2)_{10}\text{CH}_2\text{SiH}_3$ SID4629.6 DODECYLSILANE C <sub>12</sub> H <sub>26</sub> Si Forms SAMs on gold and titanium surfaces HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions [872-19-5] HMIS: 2-2-1-X 10g \$78.00	200.44	80 / 7	0.7753	1.4380 <sup>25</sup>
$\text{CH}_3(\text{CH}_2)_{16}\text{CH}_2\text{SiH}_3$ SIO6635.0 n-OCTADECYLSILANE C <sub>18</sub> H <sub>40</sub> Si Contains 4-6% C <sub>18</sub> isomers Forms self-assembled monolayers on titanium. <sup>1</sup> Reacts onto a gold surface to form monolayers of long alkyl chains. <sup>2</sup> 1. Fadea, A. et al. <i>J. Am. Chem. Soc.</i> <b>1989</b> , 121, 12184. 2. Owens, T. M. et al. <i>J. Am. Chem. Soc.</i> <b>2002</b> , 124, 6800. HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base [18623-11-5] TSCA EC 242-453-9 HMIS: 2-1-1-X 25g \$46.00 100g \$150.00	284.60	195 / 15 (29) Flashpoint: >110°C (>230°F)	0.794	
$\text{CF}_3(\text{CF}_2)_5\text{CH}_2\text{CH}_2\text{SiH}_3$ SIT8173.0 TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)SILANE C <sub>8</sub> H <sub>7</sub> F <sub>13</sub> Si Provides vapor-phase hydrophobic surfaces on titanium, gold, silicon HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base [469904-32-3] HMIS: 3-3-1-X 10g \$190.00	378.21	75 / 25	1.446	1.318
$\text{H}_2\text{C}=\text{CH}(\text{CH}_2)_8\text{CH}_2\text{SiH}_3$ SIU9048.0 10-UNDECENYLSILANE C <sub>11</sub> H <sub>24</sub> Si Forms self-assembled monolayers on gold HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base HMIS: 2-3-1-X 2.5g \$134.00	184.40		0.768 <sup>25</sup>	1.4415 <sup>25</sup>

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



### polyMethylHydrosiloxanes, Trimethylsiloxy terminated

T<sub>g</sub>: -119° V.T.C: 0.50 CAS: [63148-57-2] TSCA

Code	Viscosity	Molecular Weight	Mole % (MeHSiO)	Equivalent Weight	Specific Gravity	Refractive Index	Price/100g	Price/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

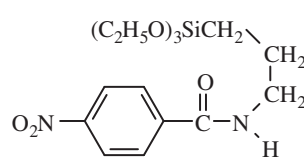
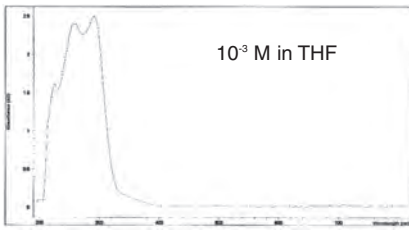
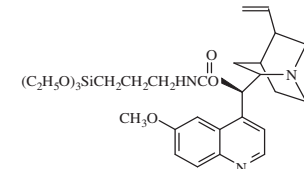
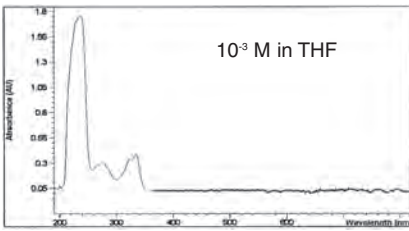
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## UV Active and Fluorescent Silanes

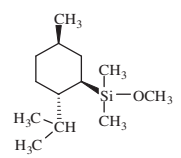
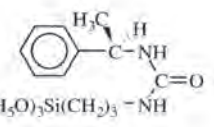
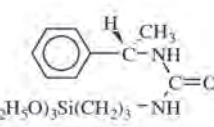
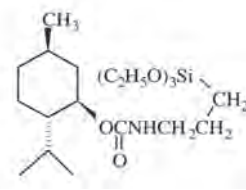
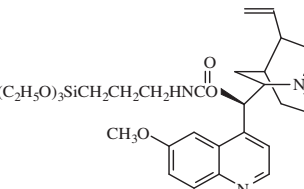
	name	MW	bp/mm (mp)	$n_D^{20}$	
	SIB1824.8 BIS(4-TRIETHOXYSILYLPROPYL-3-METHOXY-PHENYL)-1,6-HEPTANE-3,5-DIONE tech-90 $C_{39}H_{60}O_{12}Si_2$ UV: 220, 232(max), 354(broad) metal chelating chromophore HMIS: 2-1-1-X	777.07			
	SID4352.0 3-(2,4-DINITROPHENYLAMINO)PROPYL-TRIETHOXYSILANE, 95% $C_{15}H_{25}N_3O_7Si$ viscous liquid or solid UV: 222, 258, 350(max), 410 forms $\chi^2$ non-linear optical sol-gel materials by corona poling <sup>1,2</sup> . 1. E. Toussaere et al, Non-Linear Optics, 2, 37, 1992 2. B. Lebeau et al, J. Mater. Chem., 4, 1855, 1994 [71783-41-0] HMIS: 2-1-0-X	387.46	(27-30°)mp flashpoint: >110°C (230°F)	1.5665	
	SIH6198.0 2-HYDROXY-4-(3-METHYLDIETHOXYSILYL-PROPOXY)DIPHENYLKETONE, 95% $C_{21}H_{28}O_5Si$ monomer for UV opaque fluids HMIS: 2-1-1-X	388.54	viscosity, 25°: 100-125 cSt.		
	SIH6200.0 2-HYDROXY-4-(3-TRIETHOXYSILYLPROPOXY)-DIPHENYLKETONE, 95% $C_{22}H_{30}O_6Si$ density: 1.12 strong UV blocking agent for optically clear coatings, absorbs from 210-420nm UV blocking agent <sup>1</sup> . B. Anthony, US Pat. 4,495,360, 1985 [79876-59-8] TSCA HMIS: 2-1-1-X	418.56	viscosity, 25°: 125-150 cSt. UV: 230, 248, 296(max), 336	1.545 <sup>25</sup>	
	SIM6502.0 O-4-METHYLCUMARINYL-N-[3-(TRIETHOXY-SILYL)PROPYL]CARBAMATE $C_{20}H_{29}NO_7Si$ immobilizeable fluorescent compound <sup>1</sup> . 1. B. Arkles, US Pat. 4,918,200, 1990 [129119-78-4] HMIS: 2-2-1-X	423.54	(88-90°)mp UV: 223, 281, 319.5(max) soluble: THF		
	SIT8186.2 7-TRIETHOXYSILYLPROPOXY-5-HYDROXY-FLAVONE $C_{24}H_{30}O_7Si$ HMIS: 2-1-1-X	458.58	UV: 350nm (max)		
	SIT8187.0 N-(TRIETHOXYSILYLPROPYL)DANSYLAMIDE 5-DIMETHYLAMINO-N-(3-TRIETHOXYSILYLPROPYL)-NAPHTHALENE-1-SULFONAMIDE $C_{21}H_{34}N_2O_5SSi$ density: 1.12 viscous liquid - soluble in toluene THF UV: 222(max), 256, 354 fluorescent- employed as a tracer in UV cure composites fluorescence probe for crosslinking in silicones <sup>1</sup> . 1. P. Leezenberg et al, Chem. Mat., 7, 1784, 1995 [70880-05-6] TSCA HMIS: 2-1-1-X	454.66	115-9°/0.1	1.5421	
	SIT8188.8 2-(2-TRIETHOXYSILYLPROPOXY-5-METHYL-PHENYL)BENZOTRIAZOLE $C_{22}H_{31}N_3O_4Si$ UV blocking agent/stabilizer HMIS: 2-1-1-X	429.59	UV: 300, 330(max)		

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	name	MW	bp/mm (mp)	$n_D^{20}$
	SIT8191.0 3-(TRIETHOXSILYLPROPYL)-p-NITRO-BENZAMIDE C <sub>16</sub> H <sub>26</sub> N <sub>2</sub> O <sub>6</sub> Si UV max: 224, 260, 292(s) used to prepare diazotizable supports for enzyme immobilization'. H. Weetall, US Pat., 3,652,761 [60871-86-5] TSCA HMIS: 2-1-1-X	370.48	(54-5°)mp	
	25g/\$60.00			
	SIT8192.4 N-TRIETHOXSILYLPROPYL-O-QUININE-URETHANE, 95% C <sub>30</sub> H <sub>45</sub> N <sub>3</sub> O <sub>6</sub> Si UV max: 236(s), 274, 324, 334 fluorescent, optically active silane HMIS: 2-1-1-X	571.79	(82-4°)mp soluble: warm toluene	
	5.0g/\$120.00			

## Chiral Silanes

	name	MW	bp/mm (mp)	D <sub>4</sub> <sup>20</sup>	n <sub>D</sub> <sup>20</sup>
	SIM6472.6 (-)-MENTHYLDIMETHYLMETHOXSILANE C <sub>13</sub> H <sub>28</sub> O <sub>2</sub> Si reagent for chiral separations HMIS: 3-2-1-X	228.45			
	5.0g/\$188.00				
	SIP6731.5 (R)-N-1-PHENYLETHYL-N'-TRIETHOXSILYL-PROPYLUREA C <sub>18</sub> H <sub>32</sub> N <sub>2</sub> O <sub>4</sub> Si optically active silane; treated surfaces resolve enantiomers [68959-21-7] TSCA HMIS: 2-1-0-X	368.55	flashpoint: > 110°C(>230°F)	1.05 <sup>25</sup>	
	25g/\$76.00				
	SIP6731.6 (S)-N-1-PHENYLETHYL-N'-TRIETHOXSILYL-PROPYLUREA C <sub>18</sub> H <sub>32</sub> N <sub>2</sub> O <sub>4</sub> Si optically active silane; treated surfaces resolve enantiomers [68959-21-7] TSCA HMIS: 2-1-0-X	368.55	flashpoint: > 110°C(>230°F)	1.05 <sup>25</sup>	
	25g/\$76.00				
	SIT8190.0 (S)-N-TRIETHOXSILYLPROPYL-O-MENTHO-CARBAMATE C <sub>20</sub> H <sub>41</sub> NO <sub>5</sub> Si optically active [68479-61-8] TSCA HMIS: 2-1-1-X	406.63	flashpoint: > 110°C(>230°F)	0.985 <sup>25</sup>	1.4526
	10g/\$64.00				
	SIT8192.4 N-TRIETHOXSILYLPROPYL-O-QUININE-URETHANE, 95% C <sub>30</sub> H <sub>45</sub> N <sub>3</sub> O <sub>6</sub> Si fluorescent, optically active silane HYDROLYTIC SENSITIVITY: 7 Si-OR reacts slowly with moisture/water HMIS: 2-1-1-X	571.79	(82-4°)mp soluble: warm toluene		
	5.0g/\$120.00				

**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, 2nd edition, 1990.
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<sub>2</sub> 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., 128, 9052, 2006.
16. B. Arkles, Y. Pan, Y. Kim., The Role of Polarity on the Substitution of Silanes Employed in Surface Modification, in "Silanes and Other Coupling Agents Vol 5, K. Mittal Ed. p.51 VSP (Brill) 2009.



picture courtesy of D. Teff.

# Additional Product Information on Silanes & Silicones

## For Material Science:

### Hydrophobicity, Hydrophilicity and Silane Surface Modification

Organosilanes are used extensively for modification of surface properties. This 80-page brochure describes silane surface modification with an emphasis on making surfaces hydrophobic or hydrophilic



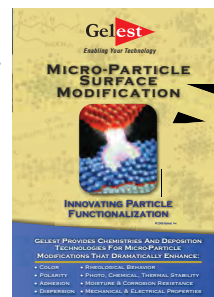
### Silane Coupling Agents

Silane coupling agents enhance adhesion, increase mechanical properties of composites, improve dispersion of pigments and fillers and immobilize catalysts and biomaterials. This 48 page brochure describes chemistry, techniques, applications and physical properties of silane coupling agents.



### Micro-Particle Surface Modification

The surface properties of micro-particles can be altered to match the requirements of various applications. Surface treatment services provided on a custom basis at Gelest are described. This brochure reviews deposition technologies and silane chemistries provided by Gelest that allow end-users to modify their micro-particles to achieve optimum surface properties for composite, separation, dispersion and other applications.



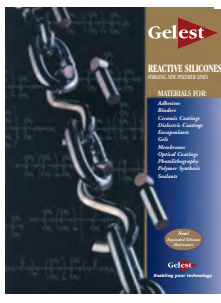
### Silicone Fluids- Stable, Inert Media

Design and Engineering properties for conventional silicone fluids as well as thermal, fluorosilicone, hydrophilic and low temperature grades are presented in a 24 page selection guide. The brochure provides data on thermal, rheological, electrical, mechanical and optical properties for silicones. Silicone fluids are available in viscosities ranging from 0.65 to 2,500,000 cSt.



### Reactive Silicones - Forging New Polymer Links

The 48 page brochure describes reactive silicones that can be formulated into coatings, membranes, cured rubbers and adhesives for mechanical, optical, electronic and ceramic applications. Information on reactions and cures of silicones as well as physical properties shortens product development time for chemists and engineers.



### Silicon Compounds: Silanes and Silicones

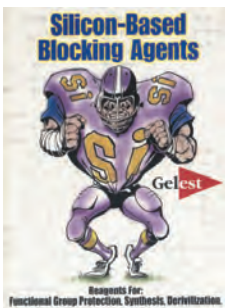
Detailed chemical properties and reference articles for over 1600 compounds. The 590 page catalog of silane and silicone chemistry includes scholarly reviews as well as detailed information on various applications.



## For Synthesis:

### Silicon-Based Blocking Agents

These silicon reagents are used for functional group protection, synthesis and derivatization. The 28 page brochure presents detailed application information on silylation reagents for pharmaceutical synthesis and analysis. Detailed descriptions are presented on selectivity for reactions, resistance to chemical transformations and selective deblocking conditions. Over 300 references are provided.



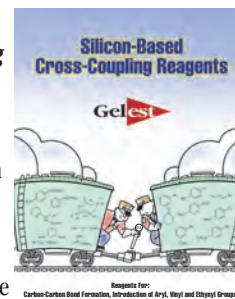
### Silicon-Based Reducing Agents

These silicon-based reagents are employed in the reduction of various organic and inorganic systems. The 24 page brochure presents information complete with literature references for a variety of reductions using organosilanes.




### Silicon-Based Cross-Coupling Reagents

A variety of organosilanes have been shown to enter into cross-coupling protocols. This 36 page brochure with 105 references reviews selected approaches and some of the key aspects of the organosilane approach to cross-coupling chemistry. An emphasis is placed on the more practical reactions.



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

A black beetle, identified as a Stenocara beetle, is shown on a multi-colored granite surface. The beetle is positioned in the center-right of the frame, facing downwards. The granite surface is a mix of red, black, and white speckles, with some white, curved, shell-like structures scattered across it. The beetle's body is dark and textured, and its legs are visible as it moves across the surface.

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

**Gelest**

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