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Hydrophobicity, Hydrophilicity and Silane Surface Modification



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Pigment Dispersants

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Version 2.0

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Biomimetic Silanes
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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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Gelest 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

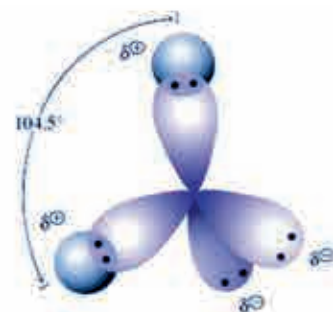
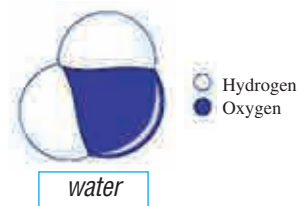
Water, Hydrophobicity and Hydrophilicity

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.

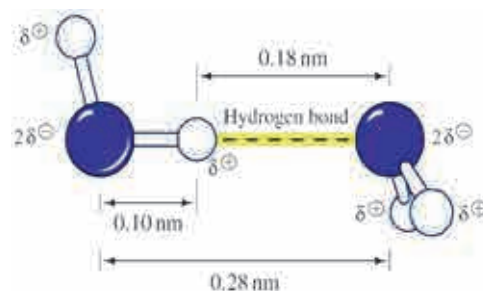
Since the interaction of water with surfaces is frequently used to define surface properties, a brief review of its structure and properties can be helpful. Although the structure of water is a subject of early discussion in the study of physical sciences, it is interesting to note that the structure 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 H₂O molecule has evolved to the currently accepted model which demonstrates a strong dipole, but no lone electron pairs associated with sp³ hybridized orbitals of oxygen. This model of isolated H₂O 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*.

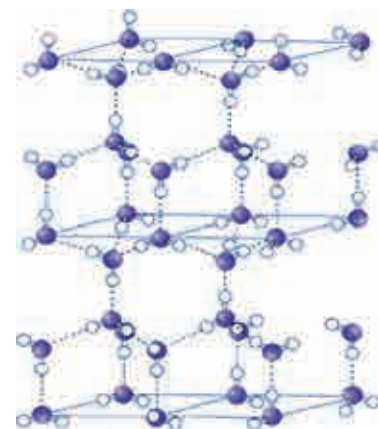
This brief description of water is provided in order to give the insight that whenever a solid surface interacts with bulk water it is interacting with a soft matter structure, not simply a collection of individual molecules. Surface interactions with water must compete with a variety of internal interactions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



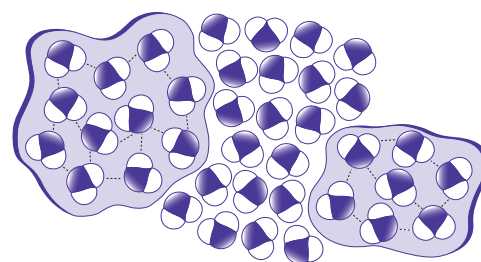
molecule of water showing dipole



2 molecules showing hydrogen bond



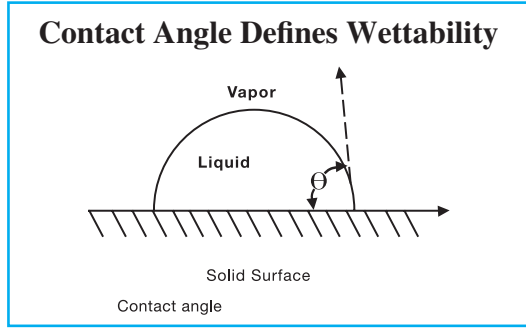
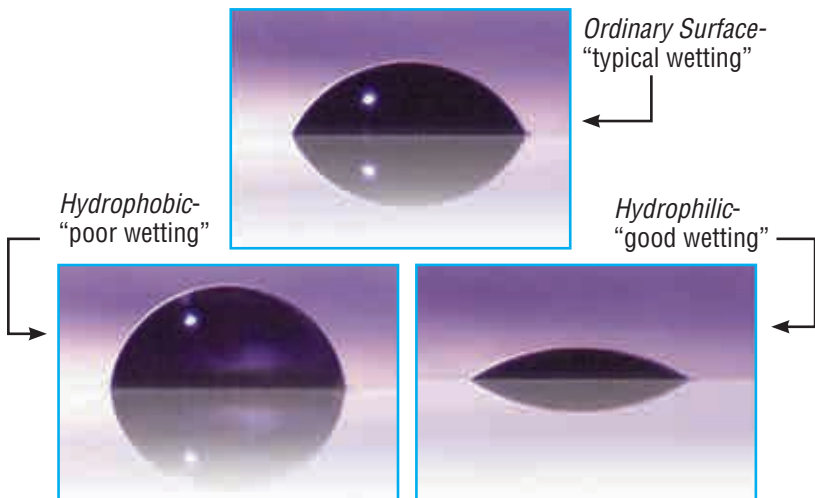
ice - molecules of water with 4 hydrogen bonds



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

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

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

Critical Surface Tension and Adhesion

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

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

where γ_{sl} = interfacial surface tension, γ_{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 (γ_c) of a substrate will wet the surface, i.e., show a contact angle of 0 ($\cos\theta_e = 1$). The critical surface tension is unique for any solid and is determined by plotting the cosine of the contact angles of liquids of different surface tensions and extrapolating to 1.

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 C₈ or greater substitution.

Critical surface tensions

	γ_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
acetoxypolypropyltrimethoxysilane	37.5
polymethylmethacrylate	39
polyvinylchloride	39
phenyltrimethoxysilane	40.0
chloropropyltrimethoxysilane	40.5
mercaptopropyltrimethoxysilane	41
glycidoxypropyltrimethoxysilane	42.5
poly(ethyleneterephthalate)	43
poly(ethylene oxide)	43-45
copper (dry)	44
aluminum (dry)	45
iron (dry)	46
nylon 6/6	45-6
glass, soda-lime (dry)	47
silica, fused	78
titanium dioxide (anatase)	91
ferric oxide	107
tin oxide	111

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

How does a Silane Modify a Surface?

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

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

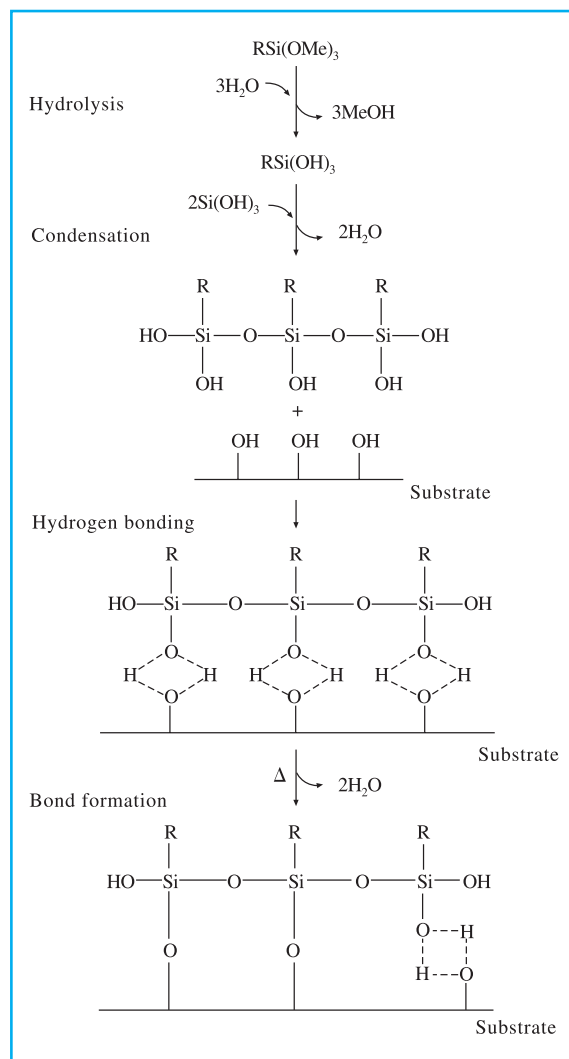
Hydrolysis Considerations

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.

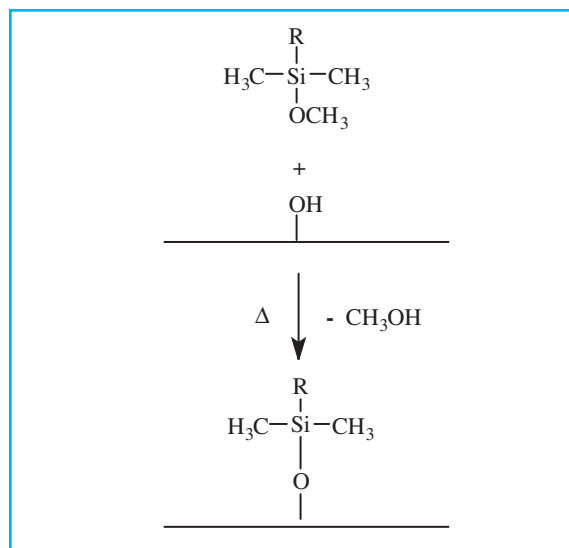
The formation of covalent bonds to the surface proceeds with a certain amount of reversibility. As water is removed, generally by heating to 120°C for 30 to 90 minutes or evacuation for 2 to 6 hours, bonds may form, break, and reform to relieve internal stress.

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:

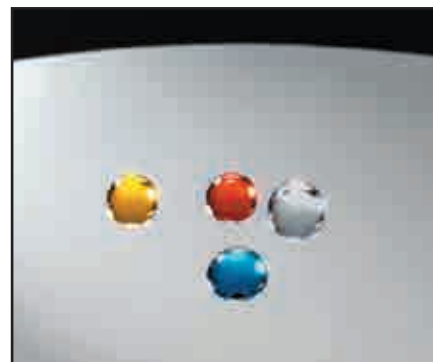
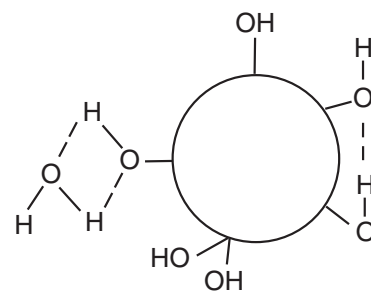
- Concentration of surface hydroxyl groups*
- Type of surface hydroxyl groups*
- Hydrolytic Stability of the bond formed*
- Physical dimensions of the substrate or substrate features*

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 10⁵x 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 ₂ O ₃ , TiO ₂ , Cr ₂ O ₃)	
GOOD	Steel, Iron	
	Asbestos	
	Nickel	
	Zinc	
	Lead	
	SLIGHT	Marble, Chalk (CaCO ₃)
		Gypsum (CaSO ₄)
		Barytes (BaSO ₄)
		Graphite
	POOR	Carbon Black

Estimates for Silane Loading on Siliceous Fillers

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

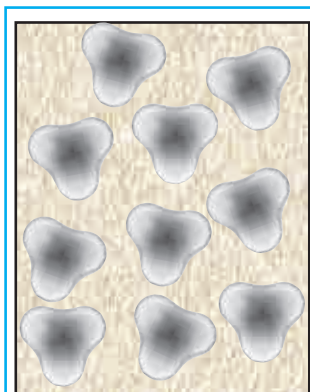
Hydrophobic Silane Surface Treatments

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

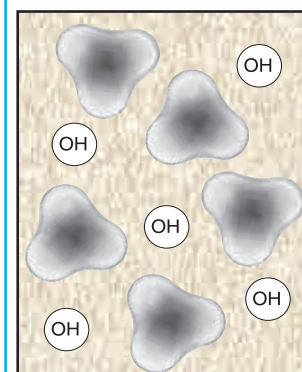
Aliphatic hydrocarbon substituents or fluorinated hydrocarbon substituents are the hydrophobic entities which enable silanes to induce surface hydrophobicity. Beyond the simple attribute that in order to generate a hydrophobic surface the organic substitution of the silane must be non-polar, more subtle distinctions can be made. The hydrophobic effect of the organic substitution can be related to the free energy of transfer of hydrocarbon molecules from an aqueous phase to a homogeneous hydrocarbon phase. For non-polar entities, van der Waals interactions are predominant factors in interactions with water and such interactions compete with hydrogen bonding in ordering of water molecules. Van der Waals interactions for solid surfaces are primarily related to the instantaneous 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.

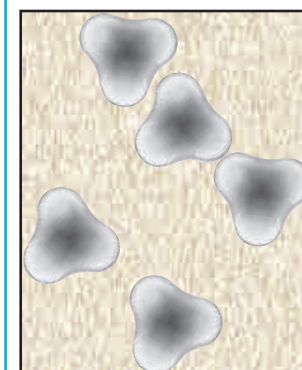
Strategies for silane surface treatment depend on the population of hydroxyl groups and their accessibility for bonding. A simple conceptual case is the reaction of organosilanes to form a monolayer. If all hydroxyl groups are capped by the silanes and the surface is effectively shielded, a hydrophobic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



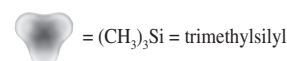
complete coverage



incomplete hydroxyl reaction



few bonding opportunities



Hypothetical Trimethylsilylated Surfaces

Pyrogenic silica has 4.4-4.6 OH/nm². 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.

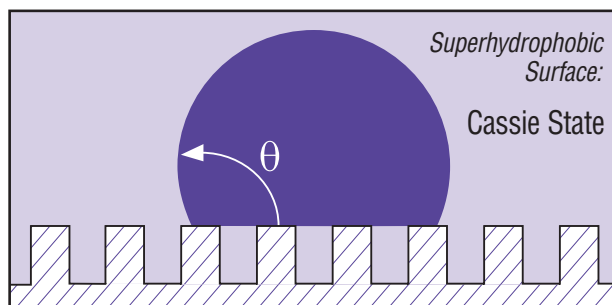
Superhydrophobic surfaces are those surfaces that present apparent contact angles that exceed the theoretical limit for smooth surfaces, i.e. $>120^\circ$. The most common examples of superhydrophobicity are associated with surfaces that are rough on a sub-micron scale and contact angle measurements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



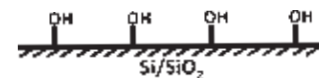
Automotive side windows are treated with fluoroalkylsilanes to provide self-cleaning properties. Water beads remove soil as they are blown over the glass substrate during acceleration.

Hydrophobicity vs Water Permeability

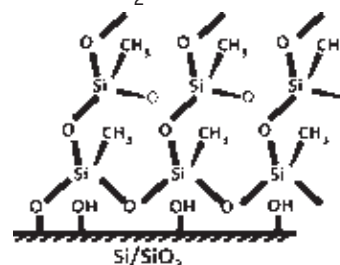
Although silane and silicone derived coatings are in general the most hydrophobic, they maintain a high degree of permeability to water vapor. This allows coatings to breathe and reduce deterioration at the coating interface associated with entrapped water. Since ions are not transported through non-polar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



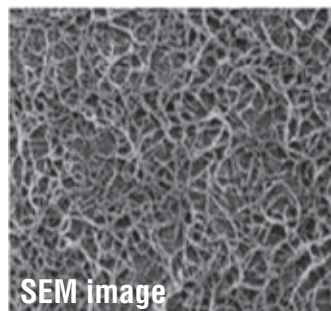
Perfect Hydrophobicity- 180°



- 1) CH_3SiCl_3
toluene
trace H_2O
- 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 ~ 20 nm. Ellipsometry indicates a film thickness of ~ 20 nm.

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

Hydrophilic Silane Surface Treatments

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

The controlled interaction of water with substrates can offer various degrees of hydrophilicity ranging from 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.



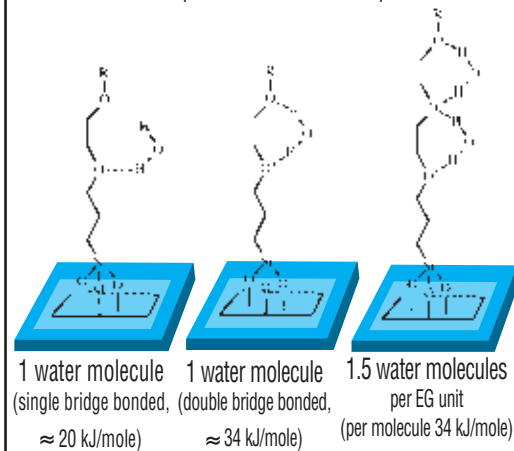
Heats of Immersion in Water, mJ/m²

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. Marciniak et al, Colloid & Polymer Science, 261, 1435, 1983 recalculated for surface area.

Water Interaction with PEGylated Silanes

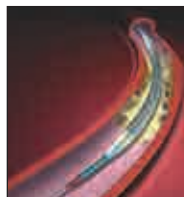
The most common strategy for non-hydroxylic polar modification of organic molecules is the incorporation of polyethylene oxide units (PEG). The interaction of water with one, two and three PEG units incorporated into a silane is depicted.



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. Anti-static coatings are usually charged or charge-inducible as are ion-conductive coatings used in the construction of thin-film batteries. A combination of hydrophilicity and hydrophobicity may be a requirement in coatings which are used as primers or in selective adsorption applications such as chromatography. Formulation limitations may require that hydrophilicity is latent and becomes unmasked after application.

Factors affecting the intrinsic hydrolytic stability of silane treated surfaces are magnified when the water is drawn directly into the interface. Even pure silicon dioxide is ultimately soluble in water (at a level of 2-6ppm), but the kinetics, low concentration for saturation and phase separation, make this a negligible consideration in most applications. The equilibrium constant for the rupture of a Si-O-Si bond by water to two Si-OH bonds is estimated at 10^{-3} . Since at minimum 3 Si-O-Si bonds must be simultaneously broken under equilibrium conditions to dissociate an organosilane from a surface, in hydrophobic environments the long-term stability is a minor consideration. Depending on the conditions of exposure to water of a hydrophilic coating, the long-term stability can be an important consideration. Selection of a dipodal, polypodal or other network forming silane as the basis for inducing hydrophilicity or as a component in the hydrophilic surface treatment is often obligatory.

Range of Water Interaction with Surfaces

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

Reacting with the Substrate

Leaving Groups

The reaction of an organofunctional silane with a surface bearing hydroxyl group results in a substitution reaction at silicon and the formation of the silylated surface where the silicon is covalently attached to the surface via an oxygen linkage. This connection may be formed directly or in the presence of water through a reactive silanol intermediate. In general the reactivity of hydroxylated surfaces with organo-functional silanes decreases in the order: Si-NR₂ > Si-Cl > Si-NH-Si > Si-O₂CCH₃ > Si-OCH₃ > Si-OCH₂CH₃. 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 -OH/nm². A high surface fumed silica has a surface area of 3.25 x 10²⁰ nm²/gram and thus 1.5 x 10²¹ hydroxyls. If this is divided by Avogadro's number, 6.02 x 10²³, 2.4 x 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)
Me ₃ Si-NMe ₂	98
Me ₃ Si-N(SiMe ₃) ₂	109
Me ₃ Si-Cl	117
Me ₃ Si-OMe	123
Me ₃ Si-OEt	122
Me ₃ Si-OSiMe ₃	136

Common Leaving Groups

Type	Advantage	Disadvantage
dimethylamine	reactive, volatile byproduct	toxic
hydrogen chloride	reactive, volatile byproduct	corrosive
silazane (NH ₃)	volatile	limited availability
methoxy	moderate reactivity, neutral byproduct	moderate toxicity
ethoxy	low toxicity	lower reactivity

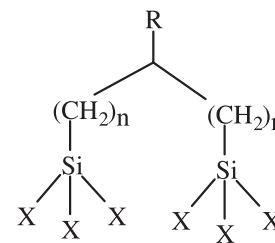
Surface Area of Common Substrates

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

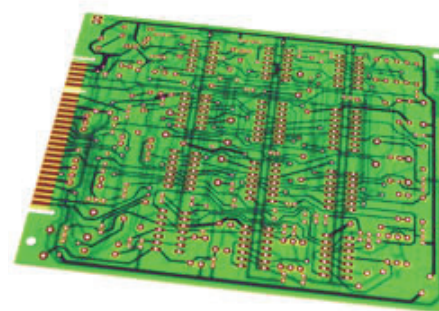
Special Topics

Dipodal Silanes

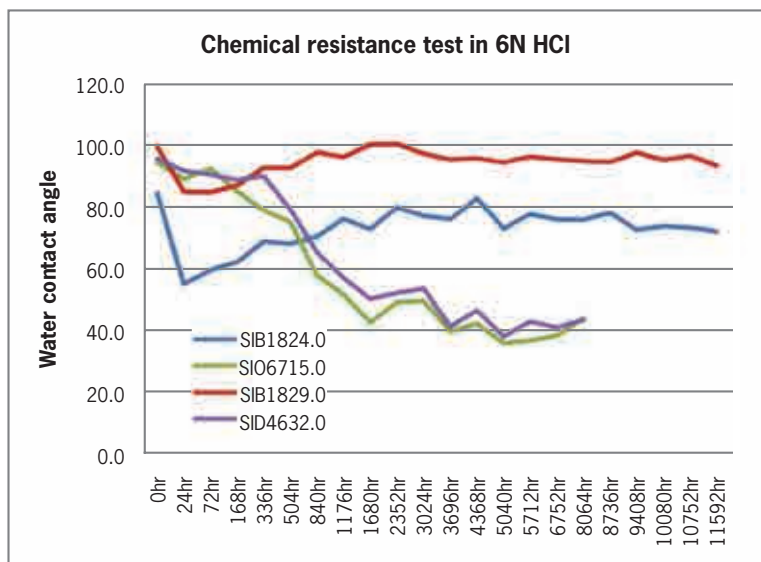
Dipodal silanes are silanes employed in surface modification that possess two silicon atoms capable of bonding to surfaces through oxane bonds. Functional dipodal silanes and combinations of non-functional dipodal silanes with functional silanes have significant impact on substrate bonding, hydrolytic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

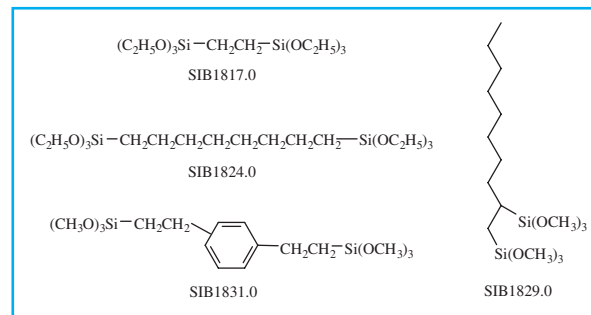


Glass surfaces treated with: bridged dipodal silane **SIB1824.0** 1,8-bis (triethoxysilyl)octane; conventional silane **SIO6715.0** n-octyltriethoxysilane; pendant dipodal silane **SIB1829.0** 1,2-bis(trimethoxysilyl)decane; conventional silane, **SID4632.0** n-decyltriethoxysilane.

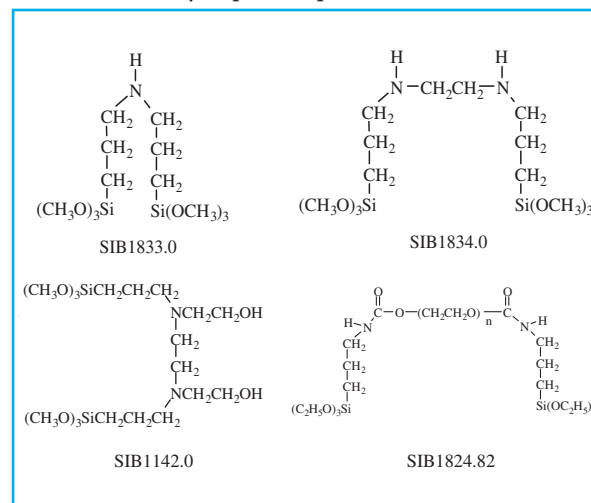


Hydrophobic coatings applied to antennas inhibit the formation of adsorbed water layers which become dielectric layers that absorb signals and cause high losses. If the water is in beads, the energy will be slightly diffracted because the water droplets have dimensions much less than a wavelength at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

Hydrophobic Dipodal Silanes

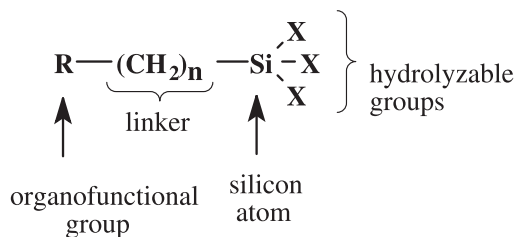


Hydrophilic Dipodal Silanes

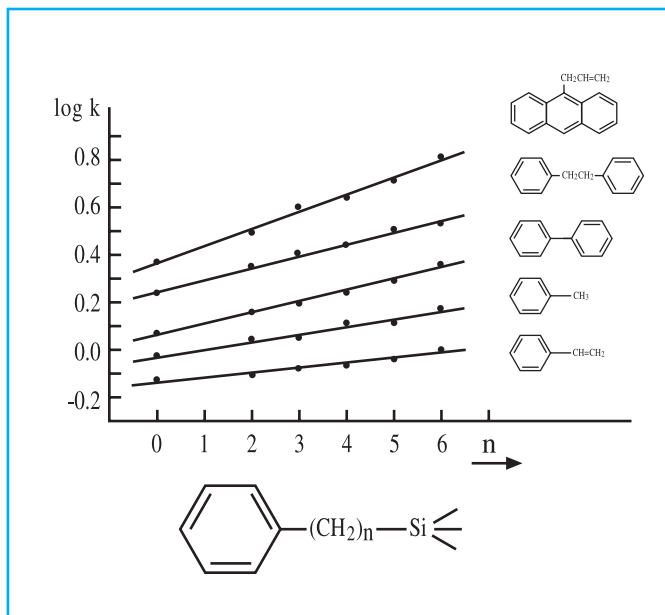


Linker Length

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.

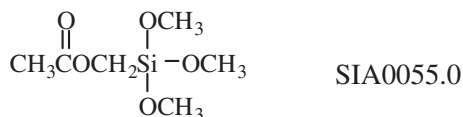
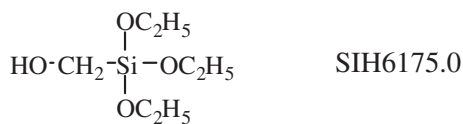
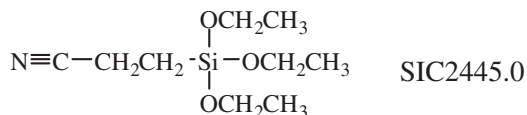
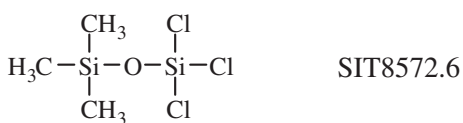


Effect of linker length on the separation of aromatic hydrocarbons

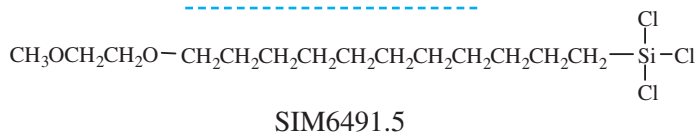
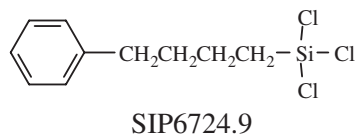
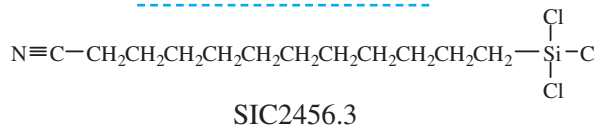
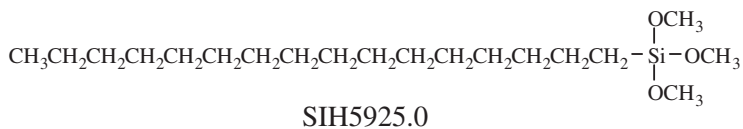


T. Den et al, in "Silanes, Surfaces, Interfaces" D. Leyden ed., 1986 p403.

Silanes with short linker length



Silanes with extended linker length



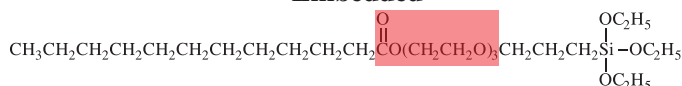
Combining Polarity and Non-Polarity in Silane Surface Treatments

It may be desirable for a surface treatment to possess both polar groups and non-polar groups. The polarity may either 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 multiphasic applications, including particle dispersion, reversed-phase HPLC and diagnostic assays can also take advantage of surfaces which combine polarity with non-polarity.

Comparative contact angle data of various silanes with polar substitution having degrees of hydrogen bonding and in which the polar groups are either embedded or are tipped along with hydrophobic and hydrophilic controls demonstrate interesting trends. Tipped polar silanes show higher contact angles with water than the embedded polar silanes, regardless of opportunities for hydrogen-bonding. The number of PEG units has relatively small impact on contact angle of the tipped silanes although an increase in number of PEG units does correlate to decreased water contact angle. PEG units embedded in silanes have a stronger effect on contact angle than PEG units in the tipped analogs. Hexadecane contact angle seems to be controlled by the number of carbon atoms in the carbon chain, although a step-change increase in contact angle is observed with C₁₈-PEG silanes.

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

Particle Dispersion Utilizing Silanes with Embedded Polarity

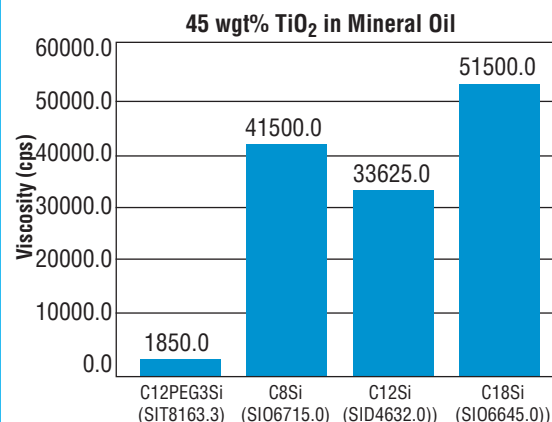
The incorporation of polar functionality into hydrocarbon substituted silanes can have dramatic effects on the dispersion of particles. Depending on the media, the appropriate mixed polarity surface treatment can improve dispersion, reduce viscosity or increase loading.

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

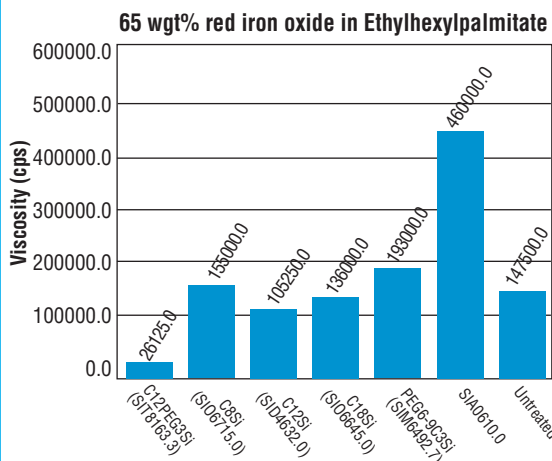
Silane	Contact angle (degrees)	
	Water	Hexadecane
Hydrophobic control Dodecyltriethoxysilane (SID4632.0)	100	21
Hydrophilic tipped silanes (Methoxytriethyleneoxy)- trimethoxysilylundecanoate (SIM6493.7)	74	7
Methoxyethoxyundecyltrichlorosilane (SIM6491.5)	73	5
Hydrophilic embedded silanes Triethoxysilylpropoxy(triethyleneoxy)-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

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

Silane Surface Treated Particles – Effect on Rheology



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



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

Partition, Orientation and Self-Assembly in Bonded Phases

Chromatography

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

Liquid Crystal Displays

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

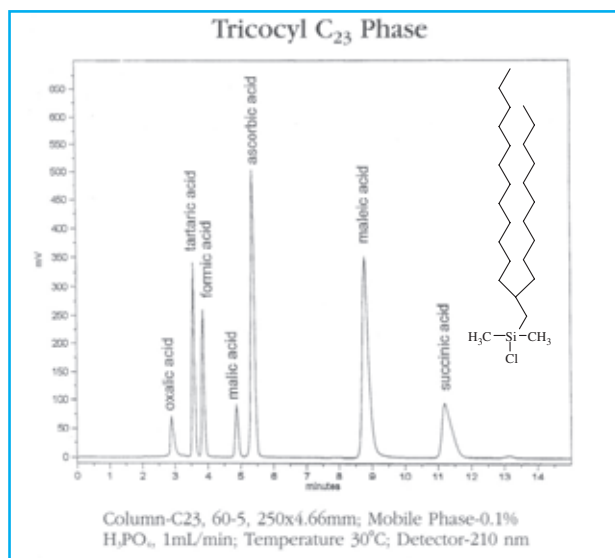
Self-Assembled Monolayers (SAMs)

A Self-Assembled Monolayer (SAM) is a one molecule thick layer of material that bonds to a surface in an ordered way as a result of physical or chemical forces during 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.

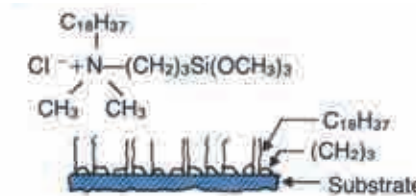
The perpendicular orientation of silanes with C₁₀ or greater length can be utilized in micro-contact printing and other soft lithography methods. Here the silane may effect a simple differential adsorption, or if functionalized have a direct sensor effect.

Normal Phase HPLC of Carboxylic Acids with a C₂₃-Silane Bonded Phase

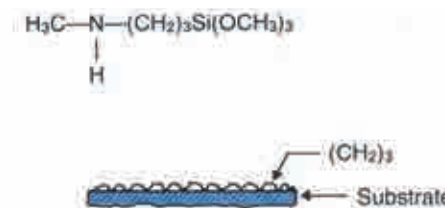


Orientation effects of silanes for passive LCDs

OCTADECYLDIMETHYL(3-TRIMETHOXYSILYL)PROPYL)AMMONIUM CHLORIDE (SIO6620.0)

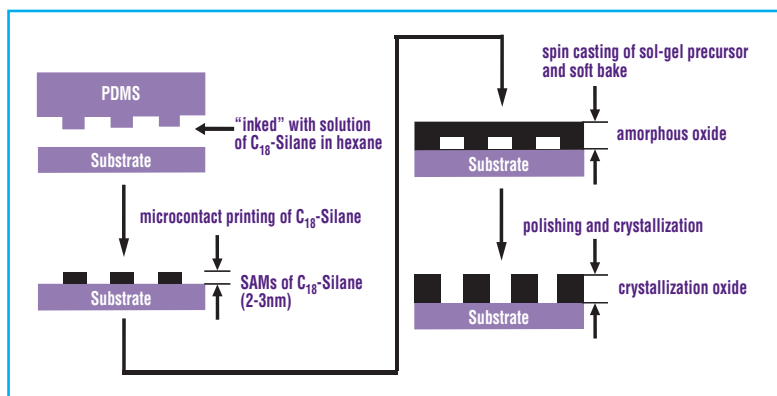


N-METHYLAMINOPROPYLTRIMETHOXYSILANE (SIM6500.0)



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

Micro-Contact Printing Using SAMs



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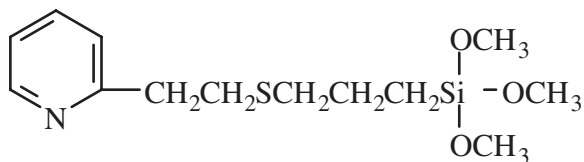
Modification of Metal Substrates

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.

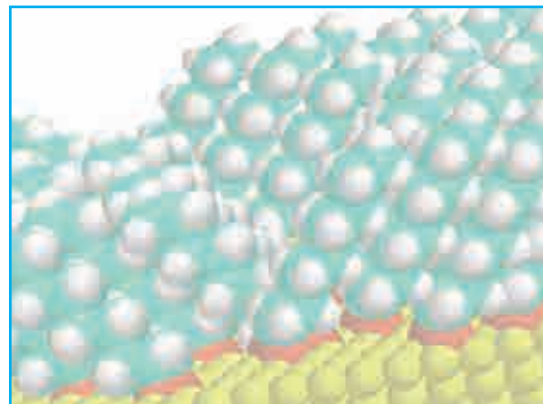
Metals that form hydrolytically stable surface oxides, e.g. aluminum, tin, titanium. These oxidized surfaces tend to have sufficient hydroxyl functionality to allow coupling under the same conditions applied to the siliceous substrates discussed earlier.

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.



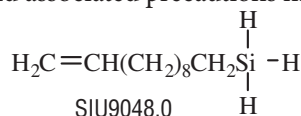
SIP6926.2



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.

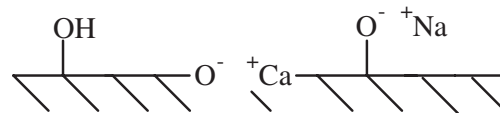
Difficult Substrates

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 recommended¹.

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 reaction¹.

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 H₂O/O₂ in high energy environments including steam at 1050° and water plasma¹.

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

Applying Silanes

Deposition from aqueous alcohol solutions is the most facile method for preparing silylated surfaces. A 95% ethanol-5% water solution is adjusted to pH 4.5-5.5 with acetic acid. Silane is added with stirring to yield a 2% final concentration. Five minutes should be allowed for hydrolysis and silanol formation. Large objects, e.g. glass plates, are dipped into the solution, agitated gently, and removed after 1-2 minutes. They are rinsed free of excess materials by dipping briefly in ethanol. Particles, e.g. fillers and supports, are silylated by stirring them in solution for 2-3 minutes and then decanting the solution. The particles are usually rinsed twice briefly with ethanol. Cure of the silane layer is for 5-10 mins at 110°C or 24 hours at room temperature (<60% relative humidity).

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.

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 preblend. The addition of the silane to non-dispersed filler is not desirable in this technique since it can lead to agglomeration. The mix is dry-blended briefly and then melt compounded. Vacuum 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 benzyldimethylamine to the silane prior to dispersal.

Anhydrous liquid phase deposition of chlorosilanes, methoxysilanes, aminosilanes and cyclic azasilanes is preferred for small particles and nano-featured substrates. Toluene, tetrahydrofuran or hydrocarbon solutions are prepared containing 5% silane. The mixture is refluxed for 12-24 hours with the substrate to be treated. It is washed with the solvent. The solvent is then removed by air or explosion-proof oven drying. No further cure is necessary. This reaction involves a direct nucleophilic displacement of the silane chlorines by the surface silanol. If monolayer deposition is desired, substrates should be predried at 150°C for 4 hours. Bulk deposition results if adsorbed water is present on the substrate. This method is cumbersome for large scale preparations and rigorous controls must be established to ensure reproducible results. More reproducible coverage is obtained with monochlorosilanes.

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



Fig. 2 Vacuum tumble dryers can be used for slurry treatment of powders.



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°C have achieved the greatest number of commercial applications. In closed chamber designs, substrates are supported above or adjacent to a silane reservoir and the reservoir is heated to sufficient temperature to achieve 5mm vapor pressure. Alternatively, vacuum can be applied until silane evaporation is observed. In still another variation the silane can be prepared as a solution in toluene, and the toluene brought to reflux allowing sufficient silane to enter the vapor phase through partial pressure contribution. In general, substrate temperature should be maintained above 50° and below 120° to promote reaction. Cyclic azasilanes deposit the quickest- usually less than 5 minutes. Amine functional silanes usually deposit rapidly (within 30 minutes) without a catalyst. The reaction of other silanes requires extended reaction times, usually 4-24 hours. The reaction can be promoted by addition of catalytic amounts of amines.

Spin-On

Spin-On applications can be made under hydrolytic conditions which favor maximum functionalization and polylayer deposition or dry conditions which favor monolayer deposition. For hydrolytic deposition 2-5% solutions are prepared (see deposition from aqueous alcohol). Spin speed is low, typically 500 rpm. Following spin-deposition a hold period of 3-15 minutes is required before rinse solvent. Dry deposition employs solvent solutions such as methoxypropanol or ethyleneglycol monoacetate (EGMA). Aprotic systems utilize toluene or THF. Silane solutions are applied at low speed under a nitrogen purge. If strict monolayer deposition is preferred, the substrate should be heated to 50° . In some protocols, limited polylayer formation is induced by spinning under an atmospheric ambient with 55% relative humidity.

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.

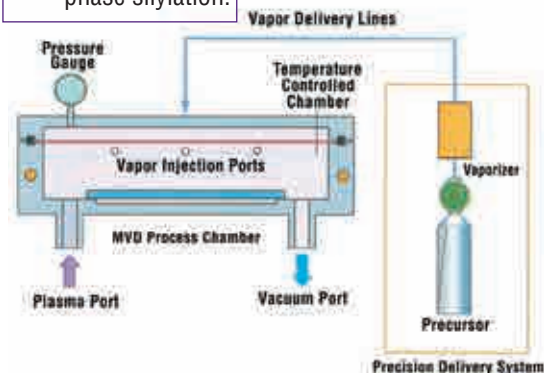


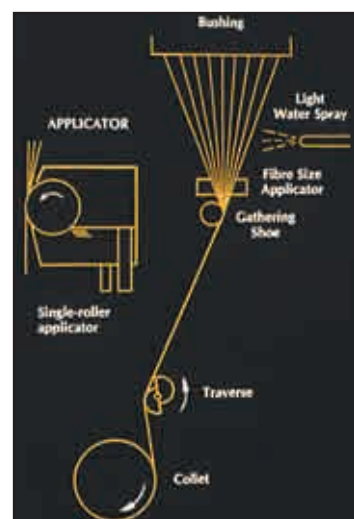
Figure 5.
Spin-coater for deposition on wafers.



Figure 6.
Spray application of silanes on large structures.

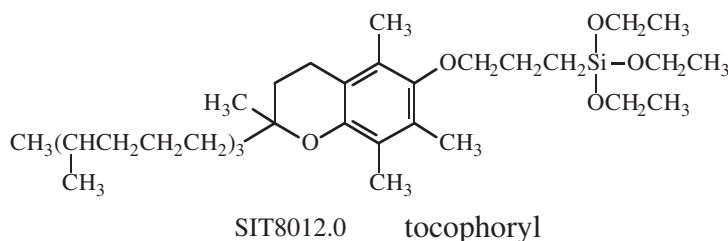
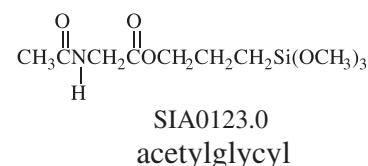
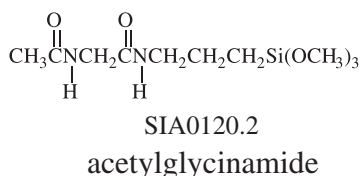
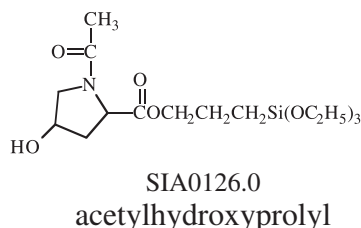


Figure 7.
Spray & contact roller application of silanes on fiberglass.



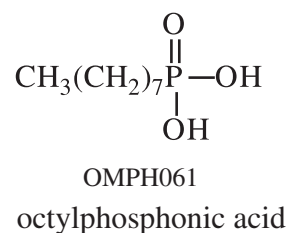
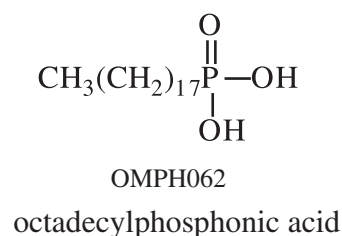
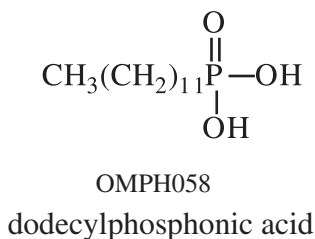
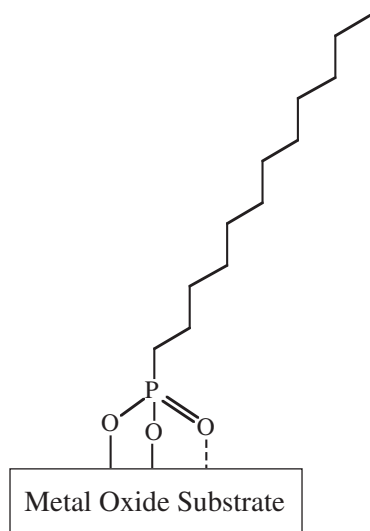
Biomimetic Silane Surface Treatments

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.



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.



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
acetoxo	SIM6519.0	methyltriacetoxysilane
dimethylamine	SIT8712.0	tris(dimethylamino)methylsilane
other amine	SIT8710.0	tris(cyclohexylamino)methylsilane
silazane (NH)		
oxime	SIM6590.0	methyltris(methylethylketoximino)silane

Methyl-SiloxanylSilanes

3 or more Hydrolyzable Groups

Hydrolyzable Groups	Product Code	Product Name
2 silicon atom compounds		
chloro	SIT8572.6	trimethylsiloxytrichlorosilane
ethoxy	SIT7095.0	tetraethoxy-1,3-dimethyldisiloxane
acetoxo		
3 silicon atom compounds		
chloro		
methoxy		
ethoxy		
chloro		
oligomeric polysiloxanes		
chloro	SIM6560.2	methyltrimethoxysilane, oligomeric hydrolysate
methoxy		
ethoxy		
amine/silazane		
silanol		
selected specialties		
	SID4236.0	dimethyltetramethoxydisiloxane



Fumed silica treated with hexamethyldisilazane floats on water.



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

2 Hydrolyzable Groups

1 Hydrolyzable Group

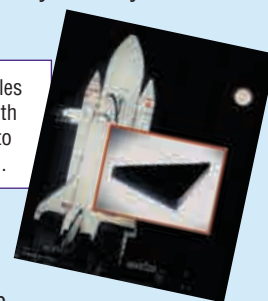
Product Code	Product Name	Product Code	Product Name
SID4120.0	dimethyldichlorosilane	SIT8510.0	trimethylchlorosilane
SID4123.0	dimethyldimethoxysilane	SIT8566.0	trimethylmethoxysilane
SID4121.0	dimethyldiethoxysilane	SIT8515.0	trimethylethoxysilane
		SIT8568.0	trimethyl-n-propoxysilane
SID4076.0	dimethyldiacetoxysilane	SIM6492.8	methoxypropoxytrimethylsilane
SIB1072.0	bis(dimethylamino)dimethylsilane	SIA0110.0	acetoxymethyltrimethylsilane
SIB1068.0	bis(diethylamino)dimethylsilane	SID3605.0	dimethylaminotrimethylsilane
SIH6102.0	hexamethylcyclotrisilazane	SID3398.0	diethylaminotrimethylsilane
		SIH6110.0	hexamethyldisilazane

2 Hydrolyzable Groups

1 Hydrolyzable Group

Product Code	Product Name	Product Code	Product Name
SID3372.0	dichlorotetramethyldisiloxane		
SIT7534.0	tetramethyldiethoxydisiloxane	SIP6717.0	pentamethylacetoxymethylsiloxane
SID3360.0	dichlorohexamethyltrisiloxane	SIB1843.0	bis(trimethylsiloxy)methylmethoxysilane
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	SID4125.0	dimethylethoxysilane

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



Hydrophobic Silane Selection Guide

Linear Alkyl-Silanes

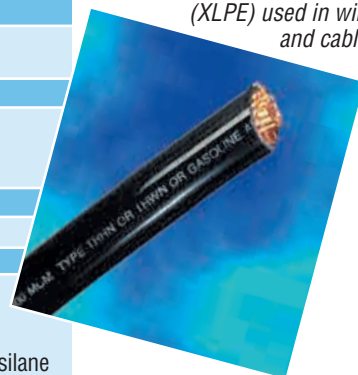
3 Hydrolyzable Groups

	Hydrolyzable Groups	Product Code	Product Name	
C₂	hydrophobic, treatment for microporous mineral powders used as fillers for plastics			
	chloro	SIE4901.0	ethyltrichlorosilane	
	methoxy	SIE4901.4	ethyltrimethoxysilane	
	ethoxy	SIE4901.2	ethyltriethoxysilane	
C₃	hydrophobic, treatment for microporous mineral powders used as fillers for plastics			
	chloro	SIP6915.0	propyltrichlorosilane	
	methoxy	SIP6918.0	propyltrimethoxysilane	
	ethoxy	SIP6917.0	propyltriethoxysilane	
C₄	moderate hydrophobicity, penetrates microporous structures, minimal organic compatibility			
	chloro	SIB1982.0	n-butyltrichlorosilane	
	methoxy	SIB1988.0	n-butyltrimethoxysilane	
	ethoxy	SIB1986.0	n-butyltriethoxysilane	
C₅	moderate hydrophobicity with minimal organic compatibility			
	chloro	SIP6720.0	pentyltrichlorosilane	
C₆	moderate hydrophobicity with moderate organic compatibility			
	ethoxy	SIP6720.2	pentyltriethoxysilane	
C₆	moderate hydrophobicity with moderate organic compatibility	chloro	SIH6167.0	hexyltrichlorosilane
		methoxy	SIH6168.5	hexyltrimethoxysilane
		ethoxy	SIH6167.5	hexyltriethoxysilane
C₇	moderate hydrophobicity with moderate organic compatibility			
	chloro	SIH5846.0	heptyltrichlorosilane	
C₈	hydrophobic with moderate organic compatibility - generally most economical			
	chloro	SIO6713.0	octyltrichlorosilane	
	methoxy	SIO6715.5	octyltrimethoxysilane	
	ethoxy	SIO6715.0	octyltriethoxysilane	
	amine			
C₁₀	hydrophobic, concentrates on surface of microporous structures			
	chloro	SID2663.0	decyltrichlorosilane	
	methoxy	SID2670.0	decyltrimethoxysilane	
C₁₁	hydrophobic, concentrates on surface of microporous structures, forms SAMs			
	ethoxy	SID2665.0	decyltriethoxysilane	
C₁₁	hydrophobic, concentrates on surface of microporous structures, forms SAMs	chloro	SIU9050.0	undecyltrichlorosilane
C₁₂	hydrophobic, concentrates on surface of microporous structures, forms SAMs			
	chloro	SID4630.0	dodecyltrichlorosilane	
	methoxy	SID4635.0	dodecyltrimethoxysilane	
C₁₄	hydrophobic, concentrates on surface of microporous structures, forms SAMs			
	ethoxy	SID4632.0	dodecyltriethoxysilane	
C₁₄	hydrophobic, concentrates on surface of microporous structures, forms SAMs	chloro	SIT7093.0	tetradecyltrichlorosilane
C₁₆	forms hydrophobic and oleophilic coatings, liquid at room temperature, forms SAMs			
	chloro	SIH5920.0	hexadecyltrichlorosilane	
	methoxy	SIH5925.0	hexadecyltrimethoxysilane	
	ethoxy	SIH5922.0	hexadecyltriethoxysilane	
C₁₈	forms hydrophobic and oleophilic coatings allowing full miscibility with paraffinic materials, forms SAMs			
	chloro	SIO6640.0	octadecyltrichlorosilane	
	methoxy	SIO6645.0	octadecyltrimethoxysilane	
	ethoxy	SIO6642.0	octadecyltriethoxysilane	
	amine	SIO6648.0	octadecyltris(dimethylamino)silane	
	proprietary	SIS6952.0/PPI-GC18	Siliclad®/Glassclad® 18	
C₂₀	forms hydrophobic and oleophilic coatings, solid at room temperature			
	chloro	SIE4661.0	eicosyltrichlorosilane	
C₂₀₋₂₄	forms hydrophobic and oleophilic coatings, solid at room temperature			
	chloro	SID4621.0	docosyltrichlorosilane blend	
C₂₀₋₂₄	forms hydrophobic and oleophilic coatings, solid at room temperature	ethoxy	SID4622.09	docosyltriethoxysilane blend
C_{26-C₃₄}	forms hydrophobic and oleophilic coatings, solid at room temperature			
	chloro	SIT8048.0	triacontyltrichlorosilane blend	

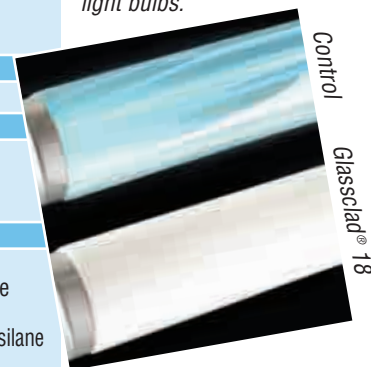
PLEASE INQUIRE ABOUT BULK QUANTITIES

2 Hydrolyzable Groups		1 Hydrolyzable Group	
Product Code	Product Name	Product Code	Product Name
SIE4896.0	ethylmethyldichlorosilane	SIE4892.0	ethyldimethylchlorosilane
SIP6912.0 SIP6914.0	propylmethyldichlorosilane propylmethyldimethoxysilane	SIP6910.0 SIP6911.0 SID4591.0	propyldimethylchlorosilane propyldimethylmethoxysilane dipropyltetramethyldisilazane
SIB1972.0	butylmethyldichlorosilane	SIB1934.0 SIB1937.0	n-butyldimethylchlorosilane n-butyldimethyl(dimethylamino)silane
SIP6719.9	pentylmethyldichlorosilane		
SIH6165.6	hexylmethyldichlorosilane		
SIH5845.0	heptylmethyldichlorosilane		
SIO6712.0 SIO6712.2	octylmethyldichlorosilane octylmethyldiethoxysilane	SIO6711.0 SIO6711.1 SIO6711.3 SID4404.0	octyldimethylchlorosilane octyldimethylmethoxysilane octyldimethyl(dimethylamino)silane dioctyltetramethyldisilazane
SID2662.0	decylmethyldichlorosilane	SID2660.0	decyldimethylchlorosilane
SID4628.0 SID4629.0	dodecylmethyldichlorosilane dodecylmethyldiethoxysilane	SID4627.0	dodecyldimethylchlorosilane
SIO6625.0 SIO6629.0 SIO6627.0	octadecylmethyldichlorosilane octadecylmethyldimethoxysilane octadecylmethyldiethoxysilane	SIO6615.0 SIO6618.0 SIO6617.0	octadecyldimethylchlorosilane octadecyldimethylmethoxysilane octadecyldimethyl(dimethylamino)silane
SID4620.0	docosylmethyldichlorosilane blend		
		SIT8045.0	triacontyldimethylchlorosilane blend

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



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



Hydrophobic Silane Selection Guide

Branched and Cyclic Alkyl-Silanes

3 Hydrolyzable Groups

	Hydrolyzable Groups	Product Code	Product Name
C₃	chloro		
C₄	chloro methoxy ethoxy chloro	SII6453.0 SII6453.7 SII6453.5 SIB1985.0	isobutyltrichlorosilane isobutyltrimethoxysilane isobutyltriethoxysilane t-butyltrichlorosilane
C₅	chloro methoxy	SIC2555.0 SIC2557.0	cyclopentyltrichlorosilane cyclopentyltrimethoxysilane
C₆	chloro ethoxy chloro chloro methoxy	SID4069.0 SID4068.4 SIT7906.6 SIC2480.0 SIC2482.0	(3,3-dimethylbutyl)trichlorosilane (3,3-dimethylbutyl)triethoxysilane thexyltrichlorosilane cyclohexyltrichlorosilane cyclohexyltrimethoxysilane
C₇	norbornene chloro chloro	SIB0997.0 SIC2470.0	bicycloheptyltrichlorosilane (cyclohexylmethyl)trichlorosilane
C₈	chloro methoxy ethoxy chloro	SII6457.0 SII6458.0 SII6453.5 SIC2490.0	isooctyltrichlorosilane isooctyltrimethoxysilane isooctyltriethoxysilane cyclooctyltrichlorosilane
C₁₀			
C₁₂		SIA0325.0	adamantylethyltrichlorosilane
C₁₆		SIT8162.4	7-(trichlorosilylmethyl)pentadecane
C₁₈	silahydrocarbon chloro	SID4401.5	(di-n-octylmethylsilyl)ethyltrichlorosilane
C₂₄	chloro		
C₂₈	chloro	SIT8162.0	13-(trichlorosilylmethyl)heptacosane

<i>2 Hydrolyzable Groups</i>		<i>1 Hydrolyzable Group</i>	
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 hexyl dimethylchlorosilane cyclohexyl dimethylchlorosilane
		SIB0994.0	bicycloheptyl dimethylchlorosilane
		SII6456.6	isooctyl dimethylchlorosilane
		SID4074.0	(dimethylchlorosilyl)methylpinane
		SID4401.0	(di-n-octylmethylsilyl)ethyl dimethylchlorosilane
		SIC2266.5	11-(chlorodimethylsilylmethyl)tricosane
		SIC2266.0	13-(chlorodimethylsilylmethyl)heptacosane

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



Hydrophobic Silane Selection Guide

Phenyl- and Phenylalkyl-Silanes

3 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
	methoxy	SIP6724.92	4-phenylbutyltrimethoxysilane
	chloro	SIP6723.3	phenoxypropyltrichlorosilane
spacer atoms > 4			
	chloro	SIP6736.4	phenoxyundecyltrichlorosilane
	chloro	SIP6723.4	phenylhexyltrichlorosilane
	chloro		

Substituted Phenyl- and Phenylalkyl-Silanes

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

Naphthyl-Silanes

Forms 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		

<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		
SIP6739.0	phenylmethyldiethoxysilane	SIP6728.4	phenyldimethylethoxysilane
SIP6736.8	phenylmethylbis(dimethylamino)silane		
SIP6738.5	1-phenyl-1-methyldichlorosilylbutane	SIB0962.0	benzyl dimethylchlorosilane
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-phenylbutyl dimethylchlorosilane
SIP6723.25	phenoxypropylmethyldichlorosilane	SIP6723.2	phenoxypropyl dimethylchlorosilane
		SIP6736.3	(6-phenylhexyl)dimethylchlorosilane
		SIP6729.5	(12-phenyldodecyl)dimethylchlorosilane
SIT8035.0	p-tolylmethyldichlorosilane	SIT8030.0	p-tolyldimethylchlorosilane
SIT8035.6	p-tolylmethyldimethoxysilane		
SIM6511.0	(p-methylphenethyl)methyldichlorosilane	SIE4897.2	m,p-ethylphenethyl dimethylchlorosilane
		SIB1972.5	p-(t-butyl)phenethyl dimethylchlorosilane
SIM6492.4	3-(p-methoxyphenyl)propylmethyldichlorosilane		
		SIP6723.0	m-phenoxyphenyl dimethylchlorosilane
		SIN6598.0	p-nonylphenoxypropyl dimethylchlorosilane

Hydrophobic Silane Selection Guide

Fluorinated Alkyl-Silanes - linear

3 Hydrolyzable Groups				
	Hydrolyzable Groups	Product Code	Product Name	
C₃	Moderately polar hydrophobic coating			
	chloro	SIT8371.0	(3,3,3-trifluoropropyl)trichlorosilane	
	methoxy	SIT8372.0	(3,3,3-trifluoropropyl)trimethoxysilane	
	amine/silazane			
C₆	Hydrophobic films			
	chloro	SIN6597.6	nonafluorohexyltrichlorosilane	
	methoxy	SIN6597.7	nonafluorohexyltrimethoxysilane	
	ethoxy	SIN6597.65	nonafluorohexyltriethoxysilane	
	amino/silazane	SIN6597.4	nonafluorohexyltris(dimethylamino)silane	
C₈	Hydrophobic, oleophobic films			
	chloro	SIT8174.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)trichlorosilane	
	methoxy	SIT8176.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)trimethoxysilane	
	ethoxy	SIT8175.0	(tridecafluoro-1,1,2,2-tetrahydrooctyl)triethoxysilane	
C₁₀	Forms oleophobic films with extremely low surface energy			
	chloro	SIH5841.0	(heptadecafluoro-1,1,2,2-tetrahydrodecyl)trichlorosilane	
	methoxy	SIH5841.5	(heptadecafluoro-1,1,2,2-tetrahydrodecyl)trimethoxysilane	
	ethoxy	SIH5841.2	(heptadecafluoro-1,1,2,2-tetrahydrodecyl)triethoxysilane	
C₁₂	chloro	SIH5840.25	heneicocyl-1,1,2,2-tetrahydrodecyltrichlorosilane	

Fluorinated Alkyl-Silanes - branched

1 x 3 fluorinated carbons	chloro	SIH5842.0	heptafluoroisopropoxypropyltrichlorosilane	
	methoxy	SIH5842.2	heptafluoroisopropoxypropyltrimethoxysilane	
2 x 4 fluorinated carbons	chloro	SIB1706.0	bis(nonafluorohexyldimethylsiloxy)methylsilylethyldimethylchlorosilane	
2 x 6 fluorinated carbons	chloro	SIT8176.3	tridecafluoro-2-(tridecafluoroethyl)decyltrichlorosilane	

DiAlkyl Silanes

2 Hydrolyzable Groups				
Highest Carbon #	Next Carbon #	Hydrolyzable Groups	Product Code	Product Name
C₂	C₂	chloro	SID3402.0	diethyldichlorosilane
		ethoxy	SID3404.0	diethyldiethoxysilane
C₃	C₃	chloro	SID3537.0	diisopropyldichlorosilane
		methoxy	SID3538.0	diisopropyldimethoxysilane
C₄	C₄	chloro	SID3203.0	di-n-butylchlorosilane
		methoxy	SID3214.0	di-n-butyltrimethoxysilane
		methoxy	SID3530.0	diisobutyldimethoxysilane
		ethoxy	SID3528.0	diisobutyldiethoxysilane
		methoxy	SIH6452.6	isobutylisopropyldimethoxysilane
C₅	C₅	chloro	SID3390.0	dicyclopentylchlorosilane
		methoxy	SID3391.0	dicyclopentyltrimethoxysilane
C₆	C₆	chloro	SID3510.0	di-n-hexyldichlorosilane
		chloro	SID3382.0	dicyclohexyldichlorosilane
C₈	C₈	chloro	SID4400.0	di-n-octyldichlorosilane
		methoxy	SID4400.4	di-n-octyltrimethoxysilane

PLEASE INQUIRE ABOUT BULK QUANTITIES

<i>2 Hydrolyzable Groups</i>		<i>1 Hydrolyzable Group</i>	
Product Code	Product Name	Product Code	Product Name
SIT8369.0	(3,3,3-trifluoropropyl)methyldichlorosilane	SIT8364.0	(3,3,3-trifluoropropyl)dimethylchlorosilane
SIT8370.0	(3,3,3-trifluoropropyl)methylmethoxysilane	SIB1828.4	bis(trifluoropropyl)tetramethyldisilazane
SIN6597.5	nonafluorohexylmethyldichlorosilane	SIN6597.3	nonafluorohexyldimethylchlorosilane
		SIN6597.4	
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

Non-Functional Dipodal Silane Selection Guide

aliphatic

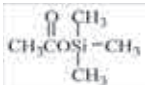

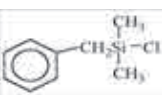

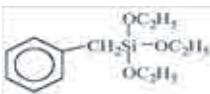

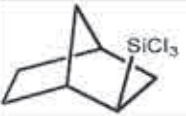

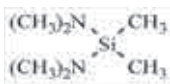
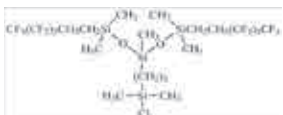
	<i>4 Hydrolyzeable Groups</i>	<i>5 Hydrolyzeable Groups</i>	<i>6 Hydrolyzeable Groups</i>
Spacer atoms	Product Code/Name	Product Code/Name	Product Code/Name
1	SIB1635.0 bis(methylmethoxysilyl)methane		SIB1821.0 bis(triethoxysilyl)methane
2	SIB1615.0 bis(methyldiethoxysilyl)ethane	SIT8185.8 1-(triethoxysilyl)-2-(diethoxymethylsilyl)ethane	SIB1817.0 bis(triethoxysilyl)ethane
2	SIB1632.0 bis(methylmethoxysilyl)ethane		SIB1830.0 bis(trimethoxysilyl)ethane
2			SIB1829.0 1,2-bis(trimethoxysilyl)decane
6			SIB1832.0 1,6-bis(trimethoxysilyl)hexane
6			SIB1829.7 1,6-bis(trimethoxysilyl)-2,5-dimethylhexane
8			SIB1824.0 1,8-bis(triethoxysilyl)octane
8			SIB1832.7 1,8-bis(trimethoxysilyl)octane

aromatic/heteroatom


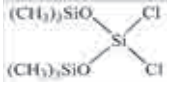
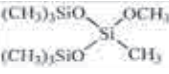
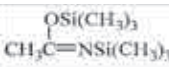
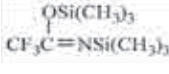


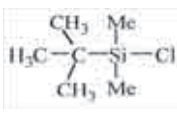
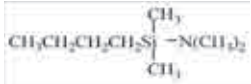
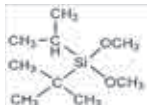
aromatic		SIB1831.0 bis(trimethoxysilyl)ethyl)benzene
aromatic		SIB1816.6 bis(triethoxysilyl)benzene
aromatic		SIB1832.2 bis(trimethoxysilylmethyl)benzene
ethylene oxide		SIB1824.84 bis(triethoxysilylpropyl)poly(ethyleneoxide)
siloxane		SIB1820.2 bis(triethoxysilyl)ethyl)tetramethyldisiloxane

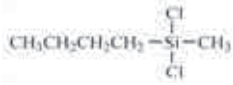
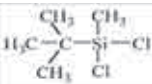
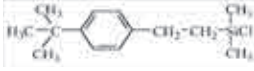
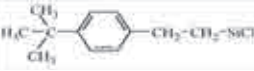
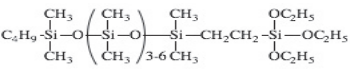

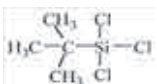
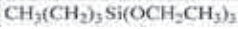
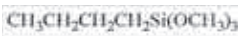
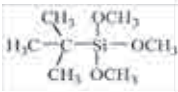

Hydrophobic Silane Properties Conventional Surface Bonding

COMMERCIAL


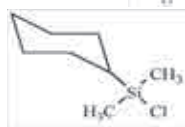
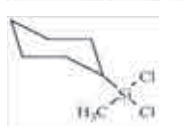
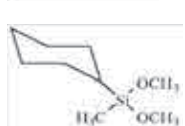


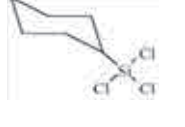

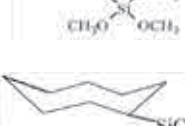
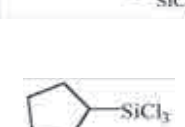
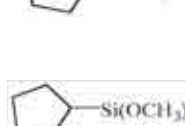
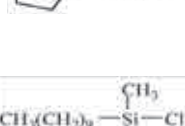
name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIA0110.0 ACETOXYTRIMETHYLSILANE O-TRIMETHYLSILOXY ACETATE C₅H₁₂O₂Si Vapor pressure, 30°: 35 mm HYDROLYTIC SENSITIVITY: 4: no reaction with water under neutral conditions</p>	132.23	103-4 (-32)	0.891	1.3890
[2754-27-0]	TSCA	EC 220-404-2	HMIS: 3-4-1-X	25g 100g 2kg
 <p>SIA0325.0 ADAMANTYLETHYLTRICHLOROSILANE C₁₂H₁₉Cl₃Si Contains approximately 25% α-isomer Flashpoint: 155°C (310°F) Forms silica bonded phases for reverse phase chromatography.¹ 1. Yang, S. S. and Gilpin, R. K. <i>Anal. Chem.</i> 1988, 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 25g
 <p>SIB0962.0 BENZYLDIMETHYLCHLOROSILANE C₉H₁₃ClSi Flashpoint: 73°C (163°F) 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 50g
 <p>SIB0970.0 BENZYLTRICHLOROSILANE C₇H₇Cl₃Si Flashpoint: 87°C (189°F) Dipole moment: 1.78 TOXICITY: oral rat, LD50: 2,830 mg/kg 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 100g
 <p>SIB0971.0 BENZYLTRIETHOXSILANE C₁₃H₂₂O₃Si Flashpoint: 127°C (261°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	254.40	148 / 26	0.986	1.4628 ²⁵
[2549-99-7]	TSCA	EC 219-841-1	HMIS: 2-1-0-X	10g 50g
 <p>SIB0994.0 2-(BICYCLOHEPTYL)DIMETHYLCHLOROSILANE C₉H₁₇ClSi Flashpoint: 87°C (189°F) 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 100g
 <p>SIB0997.0 2-(BICYCLOHEPTYL)TRICHLOROSILANE C₇H₁₁Cl₃Si Flashpoint: 83°C (181°F) 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 50g
 <p>SIB1068.0 BIS(DIETHYLAMINO)DIMETHYLSILANE C₁₀H₂₀N₂Si Flashpoint: 35°C (95°F) Silylates diamines to cyclic diaminosilanes.¹ 1. Schwartz, E. et al. <i>J. Org. Chem.</i> 1981, 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
 <p>SIB1072.0 BIS(DIMETHYLAMINO)DIMETHYLSILANE C₆H₁₈N₂Si Flashpoint: -3°C (27°F) 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 ²²
[3768-58-9]	TSCA	EC 223-200-1	HMIS: 3-4-1-X	25g 100g
 <p>SIB1706.0 [BIS(NONAFLUOROHEXYLDIMETHYLSILOXY)METHYL]- SILYLETHYLDIMETHYLCHLOROSILANE, 95% C₂₇H₃₃ClF₁₈O₂Si₄ Forms self-cleaning surfaces HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	807.26	128 / 0.2	1.244 ²⁵	1.3705 ²⁵
			HMIS: 3-1-1-X	5g


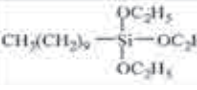
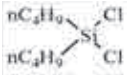
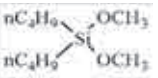
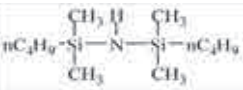
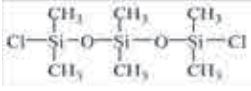
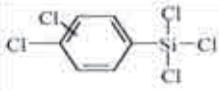
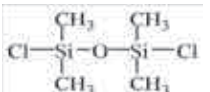

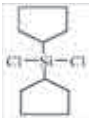

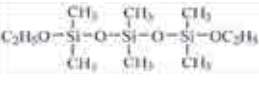
PLEASE INQUIRE ABOUT BULK QUANTITIES

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIB1828.4 1,3-BIS(TRIFLUOROPROPYL)TETRAMETHYL-DISILAZANE, 95% C₁₀H₂₁F₉NSi₂ Fluorinated blocking agent HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [39482-87-6] TSCA EC 254-470-9 HMIS: 2-2-1-X 50g</p>	325.45	76-9 / 10 Flashpoint: 78°C (172°F)	1.11	1.386
 <p>SIB1837.0 BIS(TRIMETHYLSILOXY)DICHLOROSILANE 3,3-DICHLOROHEXAMETHYLTRISILOXANE C₆H₁₈Cl₂O₂Si₃ Sterically hindered protecting group for diols HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [2750-44-9] HMIS: 3-2-1-X 25g</p>	277.37	173 (-53) Vapor pressure, 57°: 12 mm	1.0017	1.3983
 <p>SIB1843.0 BIS(TRIMETHYLSILOXY)METHYLMETHOXY-SILANE METHOXYHEPTAMETHYLTRISILOXANE C₈H₂₄O₃Si₃ HYDROLYTIC SENSITIVITY: 1: no significant reaction with aqueous systems [7671-19-4] HMIS: 3-2-1-X 25g</p>	252.53	82 / 47	0.862	1.3883 ²⁵
 <p>SIB1846.0 N,O-BIS(TRIMETHYLSILYL)ACETAMIDE BSA C₈H₂₁NOSi₂ 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 [10416-59-8] TSCA EC 233-892-7 HMIS: 3-2-1-X 25g 100g 2kg</p>	203.43	71-3 / 35 (-24) Flashpoint: 42°C (108°F) TOXICITY: oral rat, LD50: 1,580 mg/kg	0.832	1.418
 <p>SIB1876.0 BIS(TRIMETHYLSILYL)TRIFLUOROACETAMIDE BSTFA C₈H₁₈F₃NOSi₂ Silylation reagent for preparing derivatives of amino acids.¹ 1. Stalling, D. et al. <i>Biochem. Biophys., Res. Comm.</i> 1968, 31, 616. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [25561-30-2] TSCA EC 247-103-9 HMIS: 3-3-1-X 25g 100g 2kg</p>	257.40	45-50 / 15 (-10) Flashpoint: 24°C (75°F)	0.969	1.3840
 <p>SIB1932.5 1-BUTYLDECAMETHYLPENTASILOXANYLETHYL-TRIETHOXY-SILANE Contains isomers C₂₂H₅₈O₇Si₆ Phase collapse resistant bonded phase HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 2-2-1-X 10g</p>	603.21	140-2 / 1	0.921	
 <p>SIB1934.0 n-BUTYLDIMETHYLCHLOROSILANE C₆H₁₅ClSi Forms bonded phases for HPLC HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [1000-50-6] TSCA HMIS: 3-2-1-X 25g 100g</p>	150.72	138 Flashpoint: 39°C (102°F)	0.8751	1.4205
 <p>SIB1935.0 t-BUTYLDIMETHYLCHLOROSILANE C₆H₁₅ClSi 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 [18162-48-6] TSCA EC 242-042-4 HMIS: 3-4-1-X 25g 100g 2kg</p>	150.72	124-6 (87-90) Flashpoint: 22°C (72°F) Autoignition temperature: 405°C Vapor pressure, 100°: 476 mm	0.830	
 <p>SIB1937.0 n-BUTYLDIMETHYL(DIMETHYLAMINO)SILANE C₈H₂₁NSi Highly reactive reagent for bonded phases without acidic byproduct HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [181231-67-4] TSCA HMIS: 3-3-1-X 10g 50g</p>	159.35	47-9 / 12 Flashpoint: 26°C (79°F)	0.772	1.422
 <p>SIB1971.0 t-BUTYLISOPROPYLDIMETHOXY-SILANE C₉H₂₂O₂Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [109144-59-4] HMIS: 3-2-1-X 1.0g</p>	190.36	75 / 20	0.871	1.4189

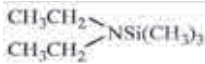
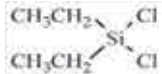
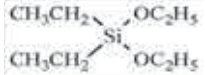
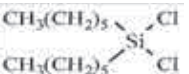

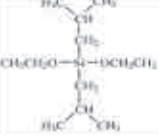
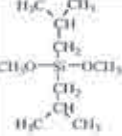
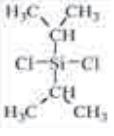
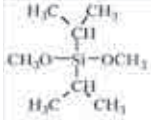

	name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
	SIB1972.0 n-BUTYLMETHYLDICHLOROSILANE C ₅ H ₁₂ Cl ₂ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18147-23-4] TSCA EC 242-035-6 HMIS: 3-3-1-X	171.14 Flashpoint: 30°C (86°F)	148	1.0424	1.4312
	SIB1972.2 t-BUTYLMETHYLDICHLOROSILANE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

PLEASE INQUIRE ABOUT BULK QUANTITIES

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIC2266.5 11-(CHLORODIMETHYLSILYL)METHYLTRICOSANE C₂₆H₅₅ClSi 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 ²²
 <p>SIC2465.0 CYCLOHEXYLDIMETHYLCHLOROSILANE C₆H₁₇ClSi 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>[71864-47-6] SIC2468.0 CYCLOHEXYLMETHYLDICHLOROSILANE C₇H₁₄Cl₂Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents HMIS: 3-2-1-X</p>	197.18	83 / 15 Flashpoint: 66°C (151°F)	1.095	1.4724
 <p>[5578-42-7] SIC2469.0 CYCLOHEXYLMETHYLDIMETHOXY-SILANE C₆H₂₀O₂Si Vapor pressure, 20°: 12 mm Donor for polyolefin polymerization HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water TSCA EC 226-956-0 HMIS: 3-2-1-X</p>	188.34	196 Flashpoint: 66°C (151°F) TOXICITY: oral rat, LD50: 3,000mg/kg	0.9472	1.4354
 <p>[17865-32-6] SIC2470.0 (CYCLOHEXYLMETHYL)TRICHLOROSILANE C₇H₁₃Cl₃Si 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>[18388-16-4] SIC2480.0 CYCLOHEXYLTRICHLOROSILANE C₆H₁₁Cl₃Si Intermediate for melt-processable silsesquioxane-siloxanes.¹ Employed in solid-phase extraction columns.² 1. Lichtenhan, J. et al. <i>Macromolecules</i> 1993, 26, 2141. 2. Tippins, B. <i>Nature</i> 1988, 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>[98-12-4] SIC2482.0 CYCLOHEXYLTRIMETHOXY-SILANE C₆H₂₀O₃Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 2-3-1-X</p>	204.34	207-9		
 <p>[17865-54-2] SIC2490.0 CYCLOOCTYLTRICHLOROSILANE, 95% C₈H₁₅Cl₃Si 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>[18290-59-0] SIC2555.0 CYCLOPENTYLTRICHLOROSILANE C₅H₉Cl₃Si 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>[14579-03-4] SIC2557.0 CYCLOPENTYLTRIMETHOXY-SILANE C₅H₁₀O₃Si 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 ²⁵	1.4240 ²⁵
 <p>[143487-47-2] SID2660.0 n-DECYLDIMETHYLCHLOROSILANE C₁₂H₂₇ClSi 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>[38051-57-9] SID2662.0 n-DECYLMETHYLDICHLOROSILANE C₁₁H₂₄Cl₂Si 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 ₄ ²⁰	n _D ²⁰
	SID2663.0 n-DECYLTRICHLOROSILANE C ₁₀ H ₂₁ Cl ₃ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	275.72	133-7 / 5 Flashpoint: >110°C (>230°F)	1.0540	1.4528
	[13829-21-5] TSCA EC 237-540-3 HMIS: 3-1-1-X		25g	100g	
	SID2665.0 n-DECYLTRIETHOXYSILANE C ₁₆ H ₃₆ O ₃ Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	304.54	150 / 8	0.8790	1.4220
	[2943-73-9] EC 220-940-7 HMIS: 2-1-0-X		25g	100g	
	SID3203.0 DI-n-BUTYLDICHLOROSILANE C ₈ H ₁₈ Cl ₂ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	213.22	212 Flashpoint: 64°C (147°F)	0.991	1.4448
	[3449-28-3] TSCA HMIS: 3-2-1-X		10g	50g	
	SID3214.0 DI-n-BUTYLDIMETHOXYSILANE C ₁₀ H ₂₄ O ₂ Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	204.39	125 / 50 Flashpoint: 103°C (217°F)	0.861	
	[18132-63-3] TSCA HMIS: 3-1-1-X		25g		
	SID3349.0 1,3-DI-n-BUTYLTETRAMETHYLDISILAZANE C ₁₂ H ₃₁ NSi ₂ HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	245.55	81 / 2 Flashpoint: 86°C (187°F)	0.80	1.4353
	[82356-80-7] HMIS: 2-2-1-X		25g	100g	
	SID3360.0 1,5-DICHLOROHEXAMETHYLTRISILOXANE, tech-95 C ₆ H ₁₈ Cl ₂ O ₂ Si ₃ ΔHvap: 11.4 kcal/mole Vapor pressure, 50°: 1 mm HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	277.37	184 (-53) Flashpoint: 76°C (169°F)	1.018	1.4071
	[3582-71-6] TSCA EC 222-707-5 HMIS: 3-2-1-X		25g	100g	
	SID3367.6 DICHLOROPHENYLTRICHLOROSILANE, 95% C ₆ H ₅ Cl ₃ Si Isomeric mixture Vapor pressure, 102°: 7 mm Monomer for high refractive index resins HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	280.44	260-1 Flashpoint: 150°C (302°F)	1.553	1.564
	[27137-85-5] TSCA EC 248-254-3 HMIS: 3-1-1-X		25g		
	SID3372.0 1,3-DICHLOROTETRAMETHYLDISILOXANE C ₄ H ₁₂ Cl ₂ O ₂ Si ₂ Vapor pressure, 25°: 8 mm Diol protection reagent HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	203.22	138 (-37) Flashpoint: 15°C (59°F)	1.039	1.4054
	[2401-73-2] TSCA EC 219-278-1 HMIS: 3-4-1-X		25g	100g	2kg
	SID3382.0 DICYCLOHEXYLDICHLOROSILANE C ₁₂ H ₂₂ Cl ₂ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	265.30	123 / 0.4 Flashpoint: 149°C (300°F)	1.103	
	[18035-74-0] HMIS: 3-1-1-X		25g		
	SID3390.0 DICYCLOPENTYLDICHLOROSILANE C ₁₀ H ₁₈ Cl ₂ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	237.24	105-7 / 10 Flashpoint: 84°C (183°F)	1.110	
	[139147-73-2] HMIS: 3-2-1-X		10g	50g	
	SID3391.0 DICYCLOPENTYLDIMETHOXYSILANE C ₁₂ H ₂₄ O ₂ Si Employed in propylene polymerization HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	228.40	120 / 6 Flashpoint: 102°C (216°F)	1.000	1.466
	[126990-35-0] TSCA HMIS: 3-1-1-X		10g	50g	
	SID3394.0 1,5-DIETHOXYHEXAMETHYLTRISILOXANE C ₁₀ H ₂₈ O ₄ Si ₃ HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	296.59	51-2 / 0.8	0.912	1.389
	[17928-13-1] HMIS: 2-2-1-X		25g		

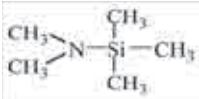
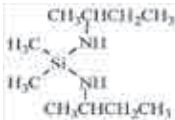
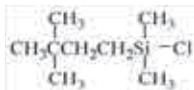

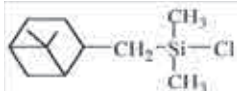

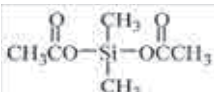
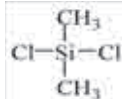
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name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SID3398.0 (DIETHYLAMINO)TRIMETHYLSILANE TMSDEA C₇H₁₉NSi Silylation reagent F&F: Vol. 3, p 317; Vol. 4, p 544; Vol. 6, p 634; Vol. 18, p 382. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	145.32	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 100g 2kg
 <p>SID3402.0 DIETHYLDICHLOROSILANE C₄H₁₀Cl₂Si 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</p>	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 100g
 <p>SID3404.0 DIETHYLDIETHOXYLSILANE C₈H₂₀O₂Si Vapor pressure, 73°: 100 mm HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	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 50g
 <p>SID3510.0 DI-n-HEXYLDICHLOROSILANE C₁₂H₂₆Cl₂Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	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 50g
 <p>SID3526.0 DIISOBUTYLCHLOROSILANE C₈H₁₈ClSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	178.78	166-7	0.995	1.4340
		Flashpoint: 42°C (108°F)		
[18279-73-7]			HMIS: 3-2-1-X	25g
 <p>SID3528.0 DIISOBUTYLDIETHOXYLSILANE C₁₂H₂₆O₂Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	232.44	221	0.845	1.418
[18297-14-8]			HMIS: 2-2-1-X	10g
 <p>SID3530.0 DIISOBUTYLDIMETHOXYLSILANE C₁₀H₂₀O₂Si Intermediate for diisobutylsilanediol, a liquid crystal Employed in polyolefin polymerization HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	204.39	120 / 6	0.87	1.4167
		Flashpoint: 102°C (216°F)		
[17980-32-4]	TSCA		HMIS: 2-1-1-X	10g 50g
 <p>SID3537.0 DIISOPROPYLDICHLOROSILANE C₈H₁₈Cl₂Si Forms bis(blocked) or tethered alcohols^{1,2} Used as tether in ring-closing-metathesis (RCM) reaction.³ 1. Bradford, C. et al. <i>Tetrahedron Lett.</i> 1995, 36, 4189. 2. Hutchinson, J. et al. <i>Tetrahedron Lett.</i> 1991, 32, 573. 3. Evans, P. A. et al. <i>J. Am. Chem. Soc.</i> 2003, 125, 14702. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	185.17	64-5 / 25	1.026	1.4450
		Flashpoint: 43°C (109°F)		
[7751-38-4]			HMIS: 3-2-1-X	10g 50g 2kg
 <p>SID3538.0 DIISOPROPYLDIMETHOXYLSILANE C₈H₂₀O₂Si Cocatalyst for α-olefin polymerization.¹ 1. Lee, S. et al. U.S. Patent 5,223,466, 1993. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	176.33	85-7 / 50	0.875	1.4140
		Flashpoint: 43°C (109°F)		
[18230-61-0]	TSCA		HMIS: 3-2-1-X	10g 50g 2kg
 <p>SID3544.0 3,5-DIMETHOXYPHENYLTRIETHOXYLSILANE C₁₄H₂₄O₅Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	300.43	136-8 / 0.6	1.050	
			HMIS: 2-1-1-X	5g

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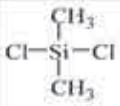
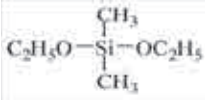
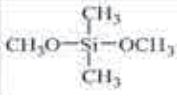
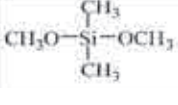
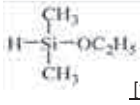
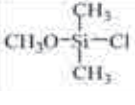
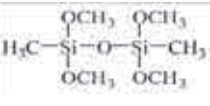
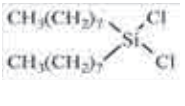
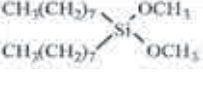
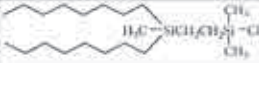
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name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰		
 <p>SID3605.0 (N,N-DIMETHYLAMINO)TRIMETHYLSILANE TMSDMA, PENTAMETHYLSILANAMINE C₇H₁₅NSi Flashpoint: -19°C (-2°F) ΔHvap: 7.6 kcal/mole Selectively silylates equatorial hydroxyl groups in prostaglandin synthesis.¹ Stronger silylation reagent than HMDS; silylates amino acids.² Dialkylaminotrimethylsilanes are used in the synthesis of pentamethinium salts.³ 1. Yankee, E. et al. <i>J. Am. Chem. Soc.</i> 1972, <i>94</i>, 3651. 2. Rühlman, K. <i>Chem. Ber.</i> 1961, <i>94</i>, 1876. 3. Kofínek, M. et al. <i>Synthesis</i> 2009, 1291. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	117.27	85-6	0.741	1.3970		
[2083-91-2]	TSCA	EC 218-222-3	HMIS: 3-4-1-X	25g	100g	2kg
 <p>SID4040.0 DIMETHYLBIS(S-BUTYLAMINO)SILANE, 95% C₁₀H₂₆N₂Si Flashpoint: 40°C (104°F) Vapor pressure, 20°: 3 mm TOXICITY: oral rat, LD50: 907 mg/kg Chain extender for silicones Autoignition temperature: 225° HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	202.42	82 / 15 (<50)	0.810	1.4271		
[93777-98-1]	TSCA	EC 298-130-8	HMIS: 3-3-1-X	25g	100g	
 <p>SID4065.0 (3,3-DIMETHYLBUTYL)DIMETHYLCHLOROSILANE NEOHEXYLDIMETHYLCHLOROSILANE C₈H₁₉ClSi Flashpoint: 38°C (100°F) Blocking agent HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	178.78	167	0.849	1.4240		
[96220-76-7]	TSCA-L		HMIS: 3-3-1-X	25g	100g	
 <p>SID4069.0 (3,3-DIMETHYLBUTYL)TRICHLOROSILANE NEOHEXYLTRICHLOROSILANE C₈H₁₃Cl₃Si Flashpoint: 92°C (198°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	219.61	183-4	1.1355	1.4479		
[105732-02-3]			HMIS: 3-3-1-X	25g		
 <p>SID4074.0 (DIMETHYLCHLOROSILYL)METHYLPINANE C₁₂H₂₃ClSi Flashpoint: 92°C (198°F) 1°S, 2°S, 5°S [α]_D: -5.15; >95% optical purity Acetylenic derivative forms chiral polymer membrane that resolves amino acids.¹ 1. Aoki, T. et al. <i>Makromol. Chem., Rapid Commun.</i> 1992, <i>13</i>, 565. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	230.85	93-4 / 2	0.957	1.478		
[2182-66-3]	TSCA	EC 218-562-2	HMIS: 3-2-1-X	10g		
 <p>SID4074.4 1,1-DIMETHYLCYCLOSILAZANES, 22-25% in hexane Primarily trimer and tetramer Flashpoint: 20°C (-25°F) Hydrophobic surface treatment for silica HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>			0.69			
[2182-66-3]	TSCA	EC 218-562-2	HMIS: 2-4-1-X	100g	1.5kg	
 <p>SID4076.0 DIMETHYLDIACETOXY-SILANE C₆H₁₂O₄Si Flashpoint: 37°C (99°F) Reagent for the preparation of cis-diols and corticosteroids.¹ 1. Kelley, R. J. <i>Chromatogr.</i> 1969, <i>43</i>, 229. F&F: Vol. 3, p. 113. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	176.24	164-6	1.054	1.4030		
[2182-66-3]	TSCA	EC 218-562-2	HMIS: 2-3-1-X	100g	500g	
 <p>SID4120.0 DIMETHYLDICHLOROSILANE C₂H₆Cl₂Si Flashpoint: -10°C (14°F) Viscosity: 0.47 cSt TOXICITY: ihl rat, LC50: 930 ppm/4H Surface tension: 20.1 mN/m Autoignition temperature: 410° ΔHvap: 8.0 kcal/mole Flammability limit: 3.4-10.4% ΔHcomb: -491 kcal/mole Critical temperature: 247.2° Vapor pressure, 17°: 100 mm Critical pressure: 34.4 atm Coefficient of thermal expansion: 1.3 x 10⁻³ 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.¹ 1. Van de Weghe, P. et al. <i>Org. Lett.</i> 2002, <i>4</i>, 4105. F&F: Vol. 3, p 114; Vol. 4, p 183. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	129.06	70-1 (-76)	1.0637	1.4055		
[75-78-5]	TSCA	EC 200-901-0	HMIS: 3-4-2-X	500g	2kg	18kg


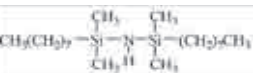
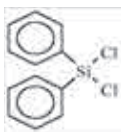
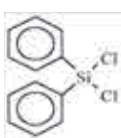
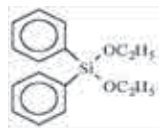
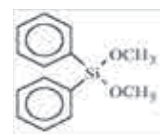
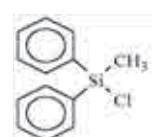
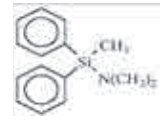
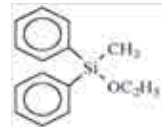
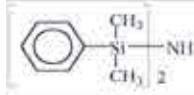
* zDR-S-019 or zCYL-S-019 container required - not included

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name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SID4120.1 DIMETHYLDICHLOROSILANE, 99+% C₂H₆Cl₂Si Flashpoint: -10°C (14°F) Redistilled AIR TRANSPORT FORBIDDEN 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
		25g 500g		18kg
* zDR-S-019 or zCYL-S-019 container required - not included				
 <p>SID4121.0 DIMETHYLDIETHOXSILANE C₆H₁₆O₂Si Flashpoint: 11°C (52°F) Viscosity: 0.53 cSt Vapor pressure, 25°: 15 mm Dipole moment: 1.39 Coefficient of thermal expansion: 1.3 x 10⁻³ 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
		100g 2kg		15kg
 <p>SID4123.0 DIMETHYLDIMETHOXSILANE, 96% C₄H₁₂O₂Si Flashpoint: -8°C (18°F) Viscosity, 20°: 0.44 cSt Vapor pressure, 36°: 100 mm Coefficient of thermal expansion: 1.3 x 10⁻³ 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
		25g 2kg		15kg
 <p>SID4123.1 DIMETHYLDIMETHOXSILANE, 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		
 <p>SID4125.0 DIMETHYLETHOXSILANE C₄H₁₂O₂Si Flashpoint: 15°C (59°F) TOXICITY: oral rat, LD50: 5,000 mg/kg Vapor pressure, 25°: 281 mm Undergoes hydrosilylation reactions Waterproofing agent for space shuttle thermal tiles.¹ 1. Hill, W. et al. <i>Polym. Mater. Sci. Eng.</i> 1990, 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
		25g 100g		
 <p>SID4210.0 DIMETHYLMETHOXYCHLOROSILANE, 90% C₃H₇ClOSi Flashpoint: -9°C (16°F) 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 ²⁵	1.3865
		25g 100g		
 <p>SID4236.0 1,3-DIMETHYLTETRAMETHOXYDISILOXANE, 95% C₆H₁₆O₆Si₂ Flashpoint: 30°C (86°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [18186-97-5] TSCA EC 242-072-8 HMIS: 3-3-1-X</p>	226.38	165	1.010	1.3834
		10g 50g		
 <p>SID4400.0 DI-n-OCTYLDICHLOROSILANE C₁₆H₃₄Cl₂Si 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 100g		
 <p>SID4400.4 DI-n-OCTYLDIMETHOXSILANE C₁₈H₄₀O₂Si 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		
 <p>SID4401.0 (DI-n-OCTYLMETHYLSILYL)ETHYLDIMETHYLCHLORO-SILANE C₂₁H₄₇ClSi₂ 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		

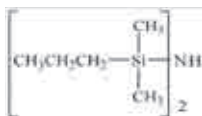
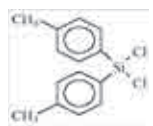
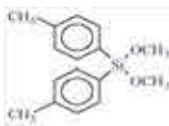
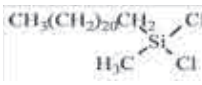
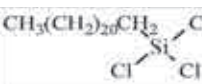
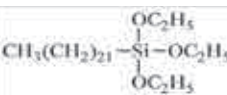
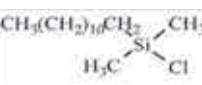
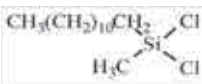
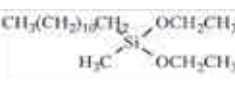
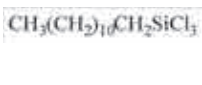
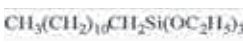
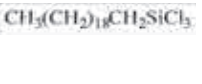
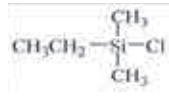


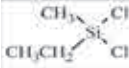
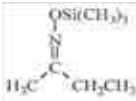
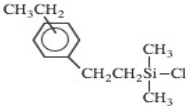

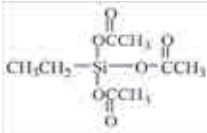
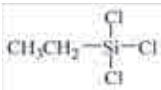
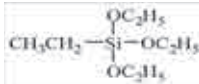
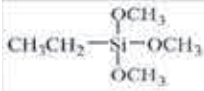
	name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰	
	SID4401.5 (DI-n-OCTYLMETHYLSILYL)ETHYLTRICHLOROSILANE C ₁₉ H ₄₁ Cl ₃ Si ₂ Forms bonded phases for reverse phase HPLC HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [475213-02-6] HMIS: 3-2-1-X	432.06	166-8 / 0.1	0.966		
	SID4404.0 1,3-DI-n-OCTYLTETRAMETHYLDISILAZANE C ₂₀ H ₄₇ NSi ₂ HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [69519-51-3] HMIS: 2-1-0-X	357.77	160-5 / 1 Flashpoint: >110°C (>230°F)	0.826	1.4500	
	SID4510.0 DIPHENYLDICHLOROSILANE, 95% C ₁₂ H ₁₀ Cl ₂ Si Viscosity, 25°: 4.1 cSt Dipole moment: 2.6 debye Coefficient of thermal expansion: 0.7 x 10 ⁻³ 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	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	COMMERCIAL
	SID4510.1 DIPHENYLDICHLOROSILANE, 99% C ₁₂ H ₁₀ Cl ₂ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [80-10-4] TSCA EC 201-251-0 HMIS: 3-1-1-X	253.20	304-5 (-22) Flashpoint: 157°C (314°F) TOXICITY: ipr mouse, LD50: 383 mg/kg	1.2216	1.5819	COMMERCIAL
	SID4525.0 DIPHENYLDIETHOXSILANE C ₁₆ H ₂₀ O ₂ 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	272.42	167 / 15 Flashpoint: 175°C (347°F)	1.0329	1.5269	COMMERCIAL
	SID4535.0 DIPHENYLDIMETHOXSILANE C ₁₄ H ₁₆ O ₂ 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	244.36	161 / 15 Flashpoint: 121°C (250°F)	1.0771	1.5447	COMMERCIAL
	SID4552.0 DIPHENYLMETHYLCHLOROSILANE C ₁₃ H ₁₃ ClSi Viscosity: 5.3 cSt Surface tension: 40.0 mN/m α-silylates esters, lactones; precursors to silyl enolates. ¹ 1. Larson, G. et al. <i>J. Am. Chem. Soc.</i> 1981 , <i>103</i> , 2418. F&F: Vol. 10, p 91; Vol. 12, p 321; Vol. 13, p 74. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [144-79-6] TSCA EC 205-639-0 HMIS: 3-1-1-X	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	COMMERCIAL
	SID4552.5 DIPHENYLMETHYL(DIMETHYLAMINO)SILANE C ₁₅ H ₁₉ NSi HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [68733-63-1] TSCA HMIS: 3-3-1-X	241.41	98-9 / 0.25	1.011		
	SID4553.0 DIPHENYLMETHYLETHOXSILANE C ₁₅ H ₁₈ 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	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 ²⁵	
	SID4586.0 1,3-DIPHENYLTETRAMETHYLDISILAZANE C ₁₆ H ₂₃ NSi ₂ HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [3449-26-1] TSCA EC 222-372-5 HMIS: 3-1-1-X	285.54	96-9 / 0.1 Flashpoint: 162°C (324°F)	0.985	1.5384	

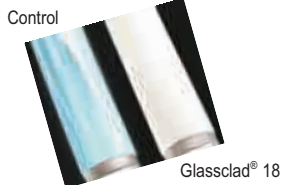
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HYDROPHOBIC

COMMERCIAL

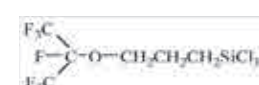
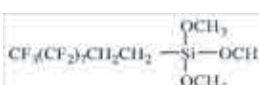
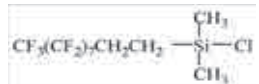
	name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
	SID4591.0 1,3-DI-n-PROPYLTETRAMETHYLDISILAZANE C ₁₀ H ₂₇ NSi ₂ Flashpoint: 65°C (149°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [14579-90-9] HMIS: 3-2-1-X	217.51	84 / 9	0.80	1.429
	SID4598.0 DI(p-TOLYL)DICHLOROSILANE, tech-95 C ₁₄ H ₁₄ Cl ₂ Si Contains 4,4'-dimethylbiphenyl Forms polymers with liquid crystal behavior. ¹ 1. Lee, M. et al. <i>Polymer</i> 1993 , <i>34</i> , 4882. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18414-38-5] HMIS: 3-2-1-X	281.26	225-6 / 50	1.10	1.568
	SID4599.0 DI(p-TOLYL)DIMETHOXYSilANE C ₁₈ H ₂₀ O ₂ Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [92779-72-1] HMIS: 3-2-1-X	272.42	140 / 0.5	1.023	1.5353 ²⁵
	SID4620.0 DOCOSYLMETHYLDICHLOROSILANE, blend C ₂₃ H ₄₈ Cl ₂ Si Contains C ₂₀ to C ₂₄ homologs Flashpoint: 172°C (342°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [67892-56-2] TSCA EC 267-590-1 HMIS: 3-1-1-X	423.62	218-20 / 0.5 (21-9)	0.93	
	SID4621.0 DOCOSYLTRICHLOROSILANE, blend C ₂₂ H ₄₅ Cl ₃ Si Contains C ₂₀ to C ₂₄ homologs Flashpoint: 200°C (392°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [7325-84-0] TSCA EC 230-802-8 HMIS: 3-1-1-X	444.04	210 / 0.2 (20-8)	0.94	
	SID4622.0 DOCOSYLTRIETHOXYSilANE, blend C ₂₈ H ₆₀ O ₃ Si Contains C ₂₀ to C ₂₄ homologs HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 1-1-1-X	472.87	(18-22)	0.86	
	SID4627.0 DODECYLDIMETHYLCHLOROSILANE C ₁₄ H ₃₁ ClSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [66604-31-7] EC 266-421-9 HMIS: 3-2-1-X	262.94	291-3	0.865	1.445
	SID4628.0 DODECYLMETHYLDICHLOROSILANE C ₁₃ H ₂₈ Cl ₂ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18407-07-3] TSCA EC 242-286-1 HMIS: 3-1-1-X	283.36	124-7 / 3	0.955	1.4581
	SID4629.0 DODECYLMETHYLDIETHOXYSilANE C ₁₇ H ₃₈ O ₂ Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [60317-40-0] TSCA EC 262-170-4 HMIS: 2-1-0-X	302.57	140 / 0.5	0.845 ²⁵	
	SID4630.0 DODECYLTRICHLOROSILANE C ₁₂ H ₂₅ Cl ₃ Si Flashpoint: 165°C (329°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [4484-72-4] TSCA EC 224-769-9 HMIS: 3-1-1-X	303.77	120 / 3 (-30)	1.024	1.4581
	SID4632.0 DODECYLTRIETHOXYSilANE C ₁₈ H ₄₀ O ₃ Si Flashpoint: >110°C (>230°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [18536-91-9] TSCA EC 242-409-9 HMIS: 2-1-0-X	332.60	152-3 / 3	0.884 ²⁵	1.4330 ²⁵
	SIE4661.0 EICOSYLTRICHLOROSILANE, 95% C ₂₀ H ₄₁ Cl ₃ Si Flashpoint: 230°C (446°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18733-57-8] TSCA EC 242-545-9 HMIS: 3-0-1-X	415.90	225-7 / 3	0.940	
	SIE4892.0 ETHYLDIMETHYLCHLOROSILANE C ₄ H ₁₁ ClSi Flashpoint: -4°C (25°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [6917-76-6] HMIS: 3-4-1-X	122.67	91	0.8756	1.4050

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

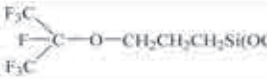

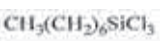
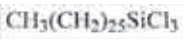

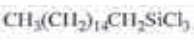


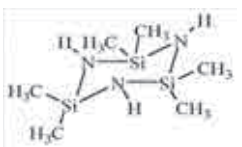


Surface conductivity of glass substrates is reduced by application of Glassclad® 18. Surface arc-tracking is eliminated on fluorescent light bulbs

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰	
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 ¹³ ohms Water-dispersible hydrophobic surface treatment For application information see Gelest's <i>Performance Products Brochure</i> Reduces blood protein adsorption. ¹ 1. Arkles, B. et al. In <i>Silanes Surfaces & 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	1.5kg	15kg
SIH5840.4 (HEPTADECYLAFLUORO-1,1,2,2-TETRAHYDRODECYL)- DIMETHYLCHLOROSILANE Packaged over copper powder PERFLUORODECYL-1H,1H,2H,2H-DIMETHYLCHLOROSILANE C ₁₂ H ₁₀ ClF ₁₇ Si Derivatizing agent for fluorous phase synthesis HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	540.72	197-8	1.51	1.3410	
[74612-30-9]	TSCA	HMIS: 3-2-1-X	5g	25g	
SIH5840.6 (HEPTADECYLAFLUORO-1,1,2,2-TETRAHYDRODECYL)- METHYLDICHLOROSILANE Packaged over copper powder C ₁₁ H ₉ Cl ₂ F ₁₇ 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	25g	
SIH5841.0 (HEPTADECYLAFLUORO-1,1,2,2-TETRAHYDRODECYL)- TRICHLOROSILANE Packaged over copper powder PERFLUORODECYL-1H,1H,2H,2H-TRICHLOROSILANE C ₁₀ H ₈ Cl ₃ F ₁₇ Si yc of treated surfaces: 12 mN/m. ¹ 1. Brzoska, J. et al. <i>Langmuir</i> 1994 , <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	25g	
SIH5841.2 (HEPTADECYLAFLUORO-1,1,2,2-TETRAHYDRODECYL)- TRIETHOXSILANE Packaged over copper powder C ₁₆ H ₁₉ F ₁₇ O ₃ Si Hydrolysis in combination with polydimethoxysiloxane gives hard hydrophobic coatings. ¹ 1. Oota, T. et al. Jpn. Kokai JP 06,293,782, 1993; <i>Chem. Abstr.</i> 1995 , 122: 136317d. See also SIP6720.3 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	610.38	103-6 / 3	1.407 ²⁵	1.3419	
[101947-16-4]	TSCA	HMIS: 3-2-1-X	5g	25g	
SIH5841.5 (HEPTADECYLAFLUORO-1,1,2,2-TETRAHYDRODECYL)- TRIMETHOXSILANE Packaged over copper powder C ₁₃ H ₁₃ F ₁₇ O ₃ Si Treated surface contact angle, water: 115° yc of treated surfaces: 12 mN/m Forms inorganic hybrids with photoinduceable refractive index reduction. ¹ 1. Park, J.-U. et al. <i>J. Mater. Chem.</i> 2003 , <i>13</i> , 738. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	568.30	247	1.54	1.331 ²⁵	
[83048-65-1]	TSCA-S	HMIS: 3-2-1-X	5g	25g	
SIH5842.0 (3-HEPTAFLUOROISOPROPOXY)PROPYLTRICHLORO- SILANE C ₈ H ₆ Cl ₃ F ₇ O ₃ Si Specific wetting surface area: 356 m ² /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		

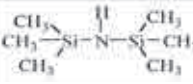
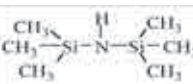
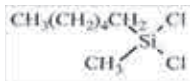
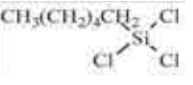








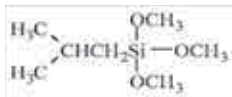

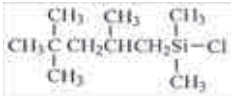
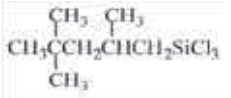
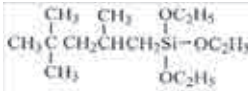

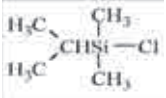
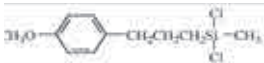

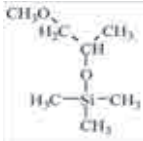

Water droplets on silicon wafer treated with SIH5841.5 exhibit high contact angle

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIH5842.2 3-(HEPTAFLUOROISOPROPOXY)PROPYL-TRIMETHOXSILANE C₉H₁₅F₇O₄Si Branched fluoroalkylsilane with low surface energy Contact angle, water on treated glass surface: 109-112° Aligns liquid crystals.¹ 1. Jap. Pat. 57177121, 1982 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	348.29	39 / 0.5		1.3841
[19116-61-1] HMIS: 3-2-1-X		10g		
 <p>SIH5845.0 n-HEPTYLDIMETHYLDICHLOROSILANE C₈H₁₈Cl₂Si Flashpoint: 66°C (151°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	213.22	207-8	0.978	1.4396 ²⁵
[18395-93-2] TSCA EC 242-274-6 HMIS: 3-2-1-X		25g		
 <p>SIH5846.0 n-HEPTYLTRICHLOROSILANE C₇H₁₅Cl₃Si Flashpoint: 64°C (147°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	233.64	211-2	1.087	1.4439 ²⁵
[871-41-0] TSCA EC 212-807-7 HMIS: 3-2-1-X		25g		
 <p>SIH5917.0 HEXACOSATRICHLOROSILANE, blend C₂₆H₅₃Cl₃Si Contains C₂₄-C₃₀ homologs A distilled cut product with more reproducible deposition than triacontylsilanes HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	500.15	(35-55)		
[60085-14-5] HMIS: 3-3-1-X		25g		
 <p>SIH5918.0 HEXADECAFLUORODODEC-11-EN-1-YLTRICHLORO-SILANE C₁₂H₇Cl₃F₁₆Si Forms self-assembled monolayers; reagent for immobilization of DNA HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	589.61	94-6 / 0.6	1.626	1.3713
		1.0g		
 <p>SIH5920.0 n-HEXADECYLTRICHLOROSILANE, 95% C₁₆H₃₃Cl₃Si yc of treated surfaces: 21 mN/m HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	359.88	202 / 10	0.98	1.4592
[5894-60-0] TSCA EC 227-575-2 HMIS: 3-1-1-X		25g	100g	
 <p>SIH5922.0 HEXADECYLTRIMETHOXSILANE, 95% C₂₂H₄₈O₃Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	388.71	160-1 / 1 (-9)	0.888	1.4370
[16415-13-7] TSCA EC 240-465-9 HMIS: 2-1-1-X		25g	100g	
 <p>SIH5925.0 HEXADECYLTRIMETHOXSILANE, 95% C₁₉H₄₂O₃Si 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</p>	346.63	155 / 0.2 (-1)	0.89	1.4356
[16415-12-6] TSCA EC 240-464-3 HMIS: 2-2-1-X		25g	2kg	16kg
 <p>SIH6102.0 1,1,3,3,5,5-HEXAMETHYLCYCLOTRISILAZANE C₆H₂₁N₃Si₃ Viscosity, 20°: 1.7 cSt Dipole moment: 0.92 Modifies positive resists for O₂ plasma resistance.¹ Polymerizes to polydimethylsilazane oligomer in presence of Ru/H₂.² Silylation reagent for diols.³ 1. Babich, E. et al. <i>Microelectron. Eng.</i> 1990, 11, 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> 1980, 187, 21. See also SID4074.4 1,1-DIMETHYLCYCLOSILAZANES HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	219.51	186-8 (-10)	0.922	1.4448
[1009-93-4] TSCA EC 213-773-6 HMIS: 2-2-1-X		25g	100g	2kg

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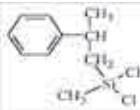
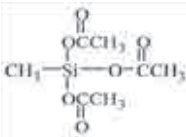
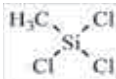
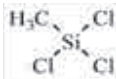
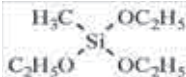
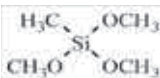
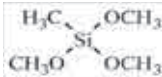
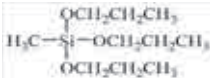
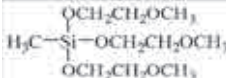
name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
SIH6110.0 HEXAMETHYLDISILAZANE <i>HMDs, HMDZ</i> C ₆ H ₁₈ NSi ₂ Vapor pressure, 50°: 50 mm Viscosity: 0.90 cSt Dielectric constant: 1000 Hz: 2.27 pKa: 7.55 Ea, reaction w/SiO ₂ surface: 17.6 kcal/mole Versatile silylation reagent; creates hydrophobic surfaces Converts acid chlorides and alcohols to amines in a three-component reaction. ¹ Reacts with formamide and ketones to form pyrimidines. ² 1. Li, H.-H. et al. <i>Eur. J. Org. Chem.</i> 2008 , 3623. 2. Tyagarajan, S. and Chakravarty, P. K. <i>Tetrahedron Lett.</i> 2005 , 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	1.5kg	14kg	
SIH6110.1 HEXAMETHYLDISILAZANE, 99% <i>HMDs, HMDZ</i> C ₆ H ₁₈ NSi ₂ <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	1.5kg		
SIH6165.6 HEXYLMETHYLDICHLOROSILANE C ₇ H ₁₆ Cl ₂ 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			
SIH6167.0 HEXYLTRICHLOROSILANE C ₆ H ₁₃ Cl ₃ 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	100g		
SIH6167.5 HEXYLTRIETHOXY SILANE C ₁₂ H ₂₈ O ₃ Si Flashpoint: 95°C (203°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	248.44	115 / 18	0.860	1.408 ²⁵
				
[18166-37-5] TSCA EC 213-178-1 HMIS: 2-1-1-X	25g	100g		
SIH6168.5 HEXYLTRIMETHOXY SILANE C ₉ H ₂₂ O ₃ Si Surface modification of TiO ₂ pigments improves dispersion HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	206.35	202-3	0.911 ²⁵	1.4070
				
[3069-19-0] TSCA EC 221-331-9 HMIS: 3-2-1-X	50g	2kg		
SII6452.5 ISOBUTYLDIMETHYLCHLOROSILANE C ₆ H ₁₅ ClSi Flashpoint: 18°C (64°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	150.72	131-3	0.863	1.4187 ²⁵
				
[27490-70-6] TSCA EC 248-493-3 HMIS: 3-4-1-X	10g			
SII6452.8 ISOBUTYLMETHYLDIMETHOXY SILANE C ₇ H ₁₈ O ₂ 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] TSCA EC 242-171-6 HMIS: 2-2-1-X	25g			
SII6453.0 ISOBUTYLTRICHLOROSILANE C ₅ H ₉ Cl ₃ 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	100g		
SII6453.5 ISOBUTYLTRIETHOXY SILANE C ₁₀ H ₂₄ O ₃ Si 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	2kg	16kg	


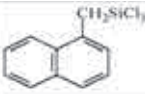
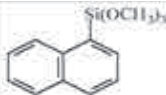

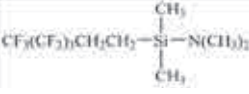
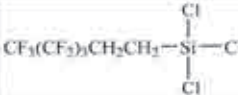

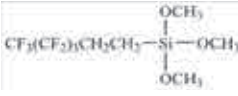
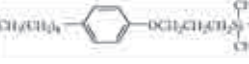

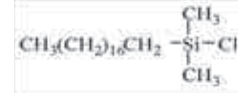
name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
<p>SII6453.7 ISOBUTYLTRIMETHOXYSILANE TRIMETHOXYSILYL-2-METHYLPROPANE C₇H₁₆O₃Si</p>   <p><i>Branched structure provides hydrophobic surface treatments for architectural coatings</i></p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	178.30	154	0.933	1.3960
[18395-30-7] TSCA EC 242-272-5 HMIS: 3-2-1-X	50g	2kg	17kg	
<p>SII6456.6 ISOOCTYLDIMETHYLCHLOROSILANE C₁₀H₂₃ClSi</p>  <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	206.83	83-5 / 10	0.852	
[79957-95-2] EC 279-358-7 HMIS: 3-3-1-X	25g			
<p>SII6457.0 ISOOCTYLTRICHLOROSILANE 1-TRICHLOROSILYL-2,4,4-TRIMETHYLPENTANE C₈H₁₇Cl₃Si</p>  <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	247.67	117 / 50	1.0684	1.4510
[18379-25-4] TSCA EC 242-262-0 HMIS: 3-2-1-X	25g	100g		
<p>SII6457.5 ISOOCTYLTRIETHOXYSILANE C₁₄H₃₂O₃Si</p>  <p>Flashpoint: >65°C (>150°F) TOXICITY: oral rat, LD50: >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
[35435-21-3] TSCA EC 252-558-1 HMIS: 1-2-1-X	50g	2kg		
<p>SII6458.0 ISOOCTYLTRIMETHOXYSILANE C₁₁H₂₆O₃Si</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
[34396-03-7] TSCA EC 251-995-5 HMIS: 3-2-1-X	25g	100g	2kg	
<p>SII6462.0 ISOPROPYLDIMETHYLCHLOROSILANE C₆H₁₃ClSi</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
[3634-56-8] TSCA HMIS: 3-4-1-X	25g	100g		
<p>SIM6492.4 3-(p-METHOXYPHENYL)PROPYLMETHYLDICHLORO-SILANE C₁₁H₁₆Cl₂O₂Si</p>  <p>Flashpoint: >110°C (>230°F)</p> <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	263.24	115-6 / 0.3	1.13	
[134438-26-9] HMIS: 3-1-1-X	store <5°C	25g		
<p>SIM6492.5 3-(p-METHOXYPHENYL)PROPYLTRICHLOROSILANE C₁₀H₁₃Cl₃O₂Si</p>  <p>Flashpoint: >110°C (>230°F)</p> <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	283.66	128-9 / 1	1.226	
[163155-57-5] HMIS: 3-1-1-X	25g			
<p>SIM6492.8 (1-METHOXY-2-PROPOXY)TRIMETHYLSILANE C₇H₁₆O₂Si</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
[55816-62-1] HMIS: 3-4-1-X	25g			
<p>SIM6511.0 p-(METHYLPHENETHYL)METHYLDICHLOROSILANE, -95% (p-TOLYLETHYL)METHYLDICHLOROSILANE C₁₀H₁₄Cl₂Si</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 ²⁵
[718635-97-3]/[63126-87-4] TSCA-L HMIS: 3-1-1-X	50g			

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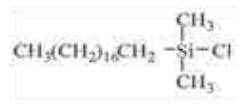
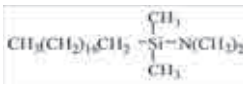
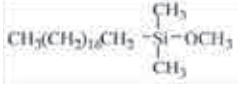


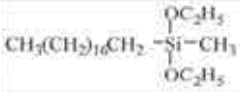
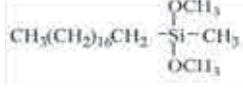
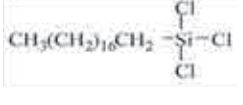
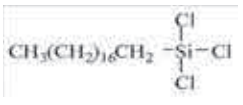
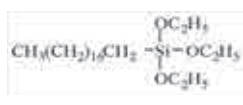
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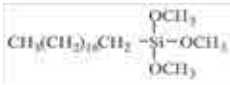
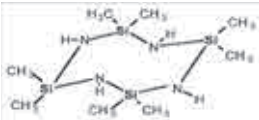
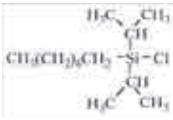
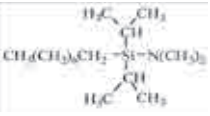
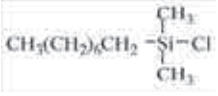
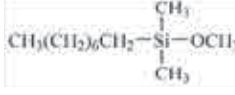

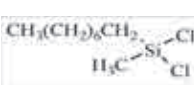
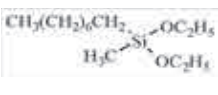
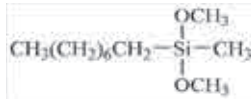

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIM6512.5 (2-METHYL-2-PHENYLETHYL)METHYLDICHLORO-SILANE METHYL(α-METHYLPHENETHYL)DICHLOROSILANE C₁₀H₁₄Cl₂Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [13617-28-2] TSCA EC 237-102-1 HMIS: 3-1-1-X</p>	233.21	104-5 / 9	1.1165	1.5152
 <p>SIM6519.0 METHYLTRIACETOXSILANE, 95% C₇H₁₂O₆Si 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 CH₃Cl₃Si 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 10⁻³ 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 ΔHvap: 7.4 kcal/mole	1.275	1.4110
* does not include container. zDR-S-019 or zCYL-S-019 required				
 <p>SIM6520.1 METHYLTRICHLOROSILANE, 99% CH₃Cl₃Si In combination with H₂ forms SiC by CVD.¹ 1. Josiek, A. et al. <i>Chem. Vap. Dep.</i> 1996, 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 C₇H₁₈O₃Si 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 C₄H₁₂O₃Si 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° ΔHcomb: 1,142 kcal/mole	0.955	1.3696
 <p>SIM6560.1 METHYLTRIMETHOXSILANE, 99% C₄H₁₂O₃Si 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° ΔHcomb: 1,142 kcal/mole	0.955	1.3696
 <p>SIM6579.0 METHYLTRI-n-PROPOXSILANE C₁₀H₂₄O₃Si 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 C₁₀H₂₄O₆Si 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 ₄ ²⁰	n _D ²⁰	
	SIM6590.0 METHYLTRIS(METHYLETHYLKETOXIMO)SILANE, tech-95 METHYLTRIS(2-BUTANONEOXIME)SILANE C ₁₃ H ₂₇ N ₃ O ₃ 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 ²⁵	COMMERCIAL
	[22984-54-9] TSCA EC 245-366-4 HMIS: 2-2-1-X		100g	2kg		
	SIN6596.0 (1-NAPHTHYLMETHYL)TRICHLOROSILANE C ₁₁ H ₉ Cl ₃ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	275.64	150-1 / 7	1.3112	1.5974	
	[17998-59-3] HMIS: 3-2-1-X		10g			
	SIN6597.0 1-NAPHTHYLTRIMETHOXSILANE C ₁₃ H ₁₆ O ₃ Si Employed in high refractive index surface modification HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	248.35	150 / 2 (33-5)		1.5562	
	[18052-76-1] HMIS: 3-2-1-X		5g			
	SIN6597.3 NONAFLUOROHEXYLDIMETHYLCHLOROSILANE C ₈ H ₁₀ ClF ₉ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	340.69	162-4	1.3422		
	[119386-82-2] HMIS: 3-3-1-X		10g			
	SIN6597.4 NONAFLUOROHEXYLDIMETHYL(DIMETHYLAMINO)-SILANE C ₁₀ H ₁₆ F ₉ NSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	349.31	86-8 / 35	1.214		
	[Flashpoint: 42°C (108°F)] HMIS: 3-3-1-X		10g			
	SIN6597.6 NONAFLUOROHEXYLTRICHLOROSILANE C ₈ H ₄ Cl ₃ F ₉ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	381.53	70-2 / 15	1.542		
	[78560-47-1] TSCA-L HMIS: 3-2-1-X		10g	50g		
	SIN6597.65 NONAFLUOROHEXYLTRIETHOXSILANE C ₁₂ H ₁₉ F ₉ O ₃ 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	100g		
	SIN6597.7 NONAFLUOROHEXYLTRIMETHOXSILANE C ₉ H ₁₃ F ₉ O ₃ Si Improves hydrolytic stability of dental composites. ¹ 1. Nikei, S. et al. <i>J. Dent. Res.</i> 2002 , 81(7), 482. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	368.27	68-9 / 15	1.335	1.3376	
	[85877-79-8] TSCA-L HMIS: 3-2-1-X		10g	50g		
	SIN6598.0 p-NONYLPHENOXYPROPYLDIMETHYLCHLOROSILANE C ₂₀ H ₃₅ ClOSi tech-95 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	355.04	181 / 0.75	0.963	1.4925	
	[HMIS: 3-1-1-X]		10g			
	SIO6615.0 n-OCTADECYLDIMETHYLCHLOROSILANE DIMETHYL-n-OCTADECYLCHLOROSILANE C ₂₀ H ₄₃ ClSi Contains 5-10% C ₁₈ isomers Employed in bonded HPLC reverse phases. ¹ 1. Wise, S. et al. In <i>Silanes Surfaces & 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)	0.856 ²⁹	1.4498 ²⁹	COMMERCIAL
	[Flashpoint: 201°C (394°F)] [18643-08-8] TSCA EC 242-472-2 HMIS: 3-1-1-X		25g	2kg		
	SIO6615.1 n-OCTADECYLDIMETHYLCHLOROSILANE, 97% DIMETHYL-n-OCTADECYLCHLOROSILANE C ₂₀ H ₄₃ ClSi Contains 3-6% C ₁₈ isomers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	347.10	159 / 0.1 (28-30)	0.856 ²⁹	1.4998 ²⁹	
	[Flashpoint: 201°C (394°F)] [18643-08-8] TSCA EC 242-472-2 HMIS: 3-1-1-X		25g	100g		

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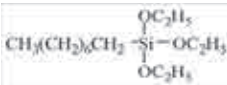
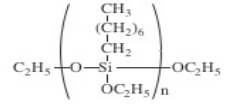
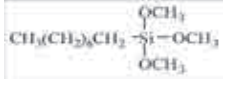
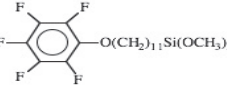
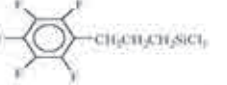
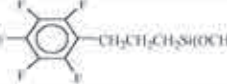
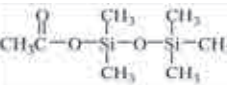
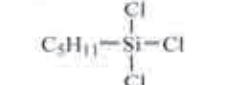
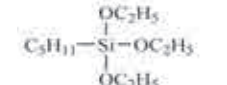
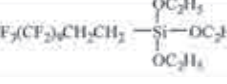
name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIO6615.2 n-OCTADECYLDIMETHYLCHLOROSILANE 70% in toluene Contains 5-10% C₁₈ isomers C₂₀H₄₃ClSi Flashpoint: 5°C (41°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18643-08-8] TSCA EC 242-472-2 HMIS: 3-4-1-X</p>	347.10	159 / 0.1	0.854	
 <p>SIO6617.0 n-OCTADECYLDIMETHYL(DIMETHYLAMINO)SILANE C₂₂H₄₉NSi Contains 5-10% C₁₈ isomers Flashpoint: 5°C (41°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [76328-77-3] TSCA HMIS: 3-3-1-X</p>	355.72	160 / 0.1	0.818	1.4512
 <p>SIO6618.0 n-OCTADECYLDIMETHYLMETHOXSILANE C₂₁H₄₆OSi Contains 5-10% C₁₈ isomers Flashpoint: 5°C (41°F) Employed in SAM resist.¹ 1. Oh, T. et al. <i>Mol. Cryst. Liq. Cryst. Sci. Technol., Sect. A</i> 1999, 337, 7. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [71808-65-6] TSCA EC 276-039-4 HMIS: 2-1-0-X</p>	342.68	184-6 / 0.2	0.83 ²⁵	1.444
 <p>SIO6624.0 n-OCTADECYLMETHOXYDICHLOROSILANE, tech-95 C₁₉H₄₀Cl₂OSi Contains 5-10% C₁₈ isomers Flashpoint: 5°C (41°F) 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</p>	383.51	144-7 / 1.5	0.94 ²⁵	1.452
 <p>SIO6625.0 n-OCTADECYLMETHYLDICHLOROSILANE C₁₉H₄₀Cl₂Si Contains 5-10% C₁₈ isomers Flashpoint: 5°C (41°F) Viscosity: 7 cSt Autoignition temperature: 230°C HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [5157-75-5] TSCA EC 225-931-1 HMIS: 3-1-1-X</p>	367.52	185 / 2.5 (24-6)	0.930	
 <p>SIO6627.0 n-OCTADECYLMETHYLDIETHOXSILANE C₂₃H₅₀O₂Si Contains 5-10% C₁₈ isomers Flashpoint: 5°C (41°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [67859-75-0] TSCA EC 267-423-2 HMIS: 2-1-0-X</p>	386.73	197 / 2	0.852	1.4407
 <p>SIO6629.0 n-OCTADECYLMETHYLDIMETHOXSILANE C₂₁H₄₆O₂Si Contains 5-10% C₁₈ isomers Flashpoint: 5°C (41°F) Autoignition temperature: 225°C HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [70851-50-2] TSCA EC 274-936-5 HMIS: 3-1-0-X</p>	358.68	190 / 3 (12-18)	0.85	1.4427
 <p>SIO6640.0 n-OCTADECYLTRICHLOROSILANE, 95% OTS C₁₈H₃₇Cl₃Si Contains 5-10% C₁₈ isomers Flashpoint: 5°C (41°F) Provides lipophilic surface coatings Employed in patterning and printing of electroactive molecular films.^{1,2} Immobilizes physiologically active cell organelles.³ Treated substrates increase electron transport of pentacene films.⁴ 1. Huan, Z. et al. <i>Synth. Met.</i> 1997, 85, 1375. 2. Jeon, J. et al. <i>Langmuir</i> 1997, 13, 3382. 3. Arkles, B. et al. <i>J. Biol. Chem.</i> 1976, 250, 8856. 4. Skankar, K. et al. <i>J. Mater. Res.</i> 2004, 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</p>	387.93	160-2 / 3 (22)	0.950 ²²	1.4602
 <p>SIO6640.1 n-OCTADECYLTRICHLOROSILANE C₁₈H₃₇Cl₃Si Contains <3% C₁₈ isomers Flashpoint: 5°C (41°F) 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</p>	387.93	160-2 / 3 (22)	0.950 ²²	1.4602
 <p>SIO6642.0 n-OCTADECYLTRIETHOXSILANE, 95% C₂₄H₅₂O₃Si Contains 5-10% C₁₈ isomers Flashpoint: 5°C (41°F) Forms hydrophobic, oleophilic coatings HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [7399-00-0] EC 230-995-9 HMIS: 2-1-0-X</p>	416.76	165-9 / 2 (10-12)	0.87	1.4386



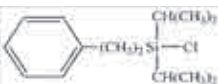
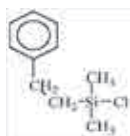
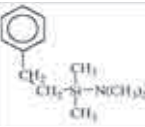
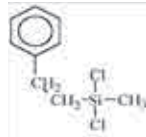
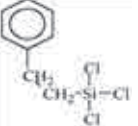
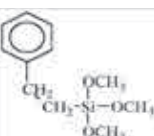
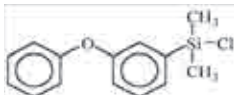
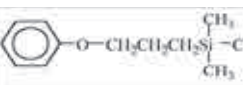


COMMERCIAL

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIO6645.0 n-OCTADECYLTRIMETHOXYSILANE, 95% C₂₁H₄₆O₃Si Contains 5-10% C₁₈ isomers</p> <p>Forms hydrophobic, oleophilic coatings Forms clear, ordered films w/ tetramethoxysilane.¹ Undergoes oscillatory adsorption to form SAMs.² 1. Shimjima, A. et al. <i>J. Am. Chem. Soc.</i> 1998, 120, 4528. 2. Thomsen, L. et al. <i>Surf. & Interface Analysis</i> 2005, 37, 472. See also SIS6952.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p> <p>[3069-42-9] TSCA EC 221-339-2 HMIS: 2-1-1-X</p>	374.68	170 / 0.1 (13-17)	0.885	1.439
 <p>SIO6698.0 OCTAMETHYLCYCLOTETRASILAZANE OCTAMETHYLSILANETETRAMINE C₈H₂₈N₄Si₄</p> <p>Forms α-Si₃N₄ by ammonia thermal synthesis.¹ 1. Schaible, S. et al. <i>Applied Organomet. Chem.</i> 1993, 7, 53. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p> <p>[1020-84-4] TSCA EC 213-817-4 HMIS: 2-2-1-X</p>	292.68	225 (97)	0.950 ²²	1.458 ²⁵
 <p>SIO6710.5 n-OCTYLDIISOPROPYLCHLOROSILANE C₁₄H₃₁ClSi</p> <p>Reagent for preparation of HPLC stationary phases w/ high stability and efficiency.¹ 1. Kirkland, J. et al. <i>J. Chromatogr. Sci.</i> 1994, 32, 473. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p> <p>[117559-37-2] HMIS: 3-1-1-X</p>	262.94	95-9 / 0.5	0.875	1.4550
 <p>SIO6710.7 n-OCTYLDIISOPROPYL(DIMETHYLAMINO)SILANE C₁₆H₃₇NSi</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p> <p>[151613-25-1] TSCA HMIS: 3-2-1-X</p>	271.57	105 / 0.7	0.833	1.4560
 <p>SIO6711.0 n-OCTYLDIMETHYLCHLOROSILANE C₁₀H₂₃ClSi</p> <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p> <p>[18162-84-0] TSCA EC 242-044-5 HMIS: 3-1-1-X</p>	206.83	222-5	0.873	1.4328 ²⁵
 <p>SIO6711.1 n-OCTYLDIMETHYLMETHOXYSILANE C₁₁H₂₆O₂Si</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p> <p>[93804-29-6] EC 298-404-7 HMIS: 3-2-1-X</p>	202.42	221-223	0.813	1.4230
 <p>SIO6711.3 n-OCTYLDIMETHYL(DIMETHYLAMINO)SILANE C₁₂H₂₉NSi</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p> <p>[110348-62-4] HMIS: 3-2-1-X</p>	215.45	94-6 / 10	0.80 ²⁵	1.4347
 <p>SIO6712.0 n-OCTYLMETHYLDICHLOROSILANE C₉H₂₀Cl₂Si</p> <p>HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p> <p>[14799-93-0] TSCA EC 238-863-2 HMIS: 3-2-1-X</p>	227.25	94 / 6	0.9761	1.4440
 <p>SIO6712.2 n-OCTYLMETHYLDIETHOXYSILANE C₁₃H₃₀O₂Si</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p> <p>[2652-38-2] HMIS: 2-1-0-X</p>	246.47	80-2 / 2	0.8478	1.4190
 <p>SIO6712.4 n-OCTYLMETHYLDIMETHOXYSILANE C₁₁H₂₆O₂Si</p> <p>HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p> <p>[85712-15-8] EC 288-374-3 HMIS: 3-2-1-X</p>	218.42	87-9 / 5	0.858	1.4190
 <p>SIO6713.0 n-OCTYLTRICHLOROSILANE C₈H₁₇Cl₃Si</p> <p>Vapor pressure, 125°: 1 mm HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p> <p>[5283-66-9] TSCA EC 226-112-1 HMIS: 3-1-1-X</p>	247.67	224-6 (<-50)	1.0744	1.4490

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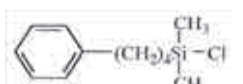
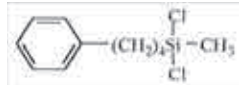
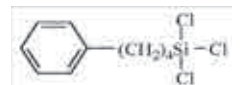
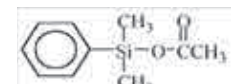

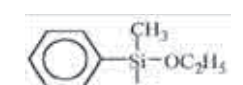
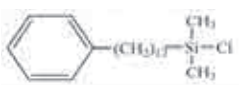
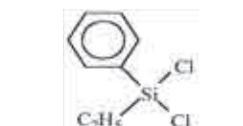
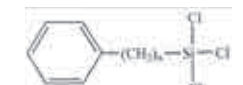
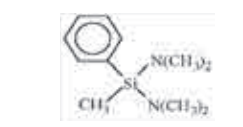
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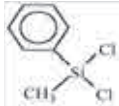

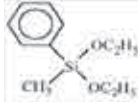
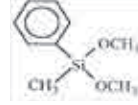
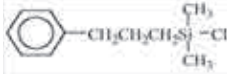

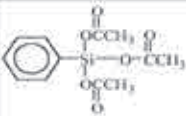
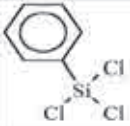
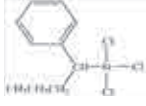
name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIO6715.0 n-OCTYLTRIETHOXSILANE C₁₄H₃₂O₃Si Flashpoint: 109°C (228°F) TOXICITY: oral rat, LD50: >5,110 mg/kg Viscosity: 1.9 cSt Widely used in architectural hydrophobation May be formulated to stable water emulsions.¹ 1. Depasquale, R. et al. US Patent 4,648,904, 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	2kg	15kg	
 <p>SIO6715.2 OCTYLTRIETHOXSILANE, oligomeric hydrolysate 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			
 <p>SIO6715.5 n-OCTYLTRIMETHOXSILANE C₁₁H₂₆O₃Si Flashpoint: 68°C (154°F) Viscosity: 1 cSt Vapor pressure, 75°: 0.1 mm Treatment for particles used in non-aqueous liquid dispersions See also SI6458.0 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	2kg		
 <p>SIP6716.0 PENTAFLUOROPHENOXYUNDECYLTRIMETHOXY-SILANE C₂₀H₃₁F₅O₄Si 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			
 <p>SIP6716.4 PENTAFLUOROPHENYLPROPYLTRICHLOROSILANE C₉H₆Cl₃F₅Si 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			
 <p>SIP6716.6 PENTAFLUOROPHENYLPROPYLTRIMETHOXSILANE C₁₂H₁₅F₅O₃Si 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			
 <p>SIP6717.0 1,1,1,3,3-PENTAMETHYL-3-ACETOXYDISILOXANE C₇H₁₈O₃Si₂ Flashpoint: 40°C (104°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	206.39	149-50	0.90	1.3887 ²⁵
[70693-47-9] TSCA EC 274-767-7 HMIS: 2-2-1-X	10g	50g		
 <p>SIP6720.0 PENTYLTRICHLOROSILANE AMYLTRICHLOROSILANE C₅H₁₁Cl₃Si Mixed isomers See also SI6453.5 Flashpoint: 30°C (86°F) 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			
 <p>SIP6720.2 PENTYLTRIETHOXSILANE AMYLTRIETHOXSILANE C₁₁H₂₆O₃Si 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			
 <p>SIP6720.5 PERFLUORODODECYL-1H,1H,2H,2H-TRIETHOXY-SILANE - PERFLUOROTETRADECYL-1H,1H,2H,2H-TRIETHOXSILANE MIXTURE, 80% 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			

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIP6720.71 (PERFLUOROCTYL)PHENYLTRIETHOXSILANE C₂₀H₁₉F₁₇O₃Si Thermally stable to >300° Contact angle treated glass surface, water: 115°.¹ 1. Kondo, Y. <i>J. Oleoscience</i>, 2004, 53, 143 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	658.50	101-3 / 1 Flashpoint: >110°C (>230°F)	1.448	
		HMIS: 3-1-1-X	1.0g	
 <p>SIP6720.72 [PERFLUORO(POLYPROPYLENEOXY)]METHOXY- PROPYLTRIMETHOXSILANE, 20% in fluorinated hydrocarbon Contact angle, water:112° HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	4,000-8,000		1.5	
		[870998-79-0] TSCA HMIS: 2-0-1-X	10g	
 <p>SIP6720.8 PHENETHYLDIISOPROPYLCHLOROSILANE C₁₄H₂₃ClSi Mixed α-, β-isomers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	254.86	105-9 / 0.3	0.970	
		[151613-24-0] TSCA HMIS: 3-2-1-X	5g	
 <p>SIP6721.0 PHENETHYLDIMETHYLCHLOROSILANE C₁₀H₁₅ClSi Contains α-, β-isomers See also SIP6724.7 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	198.77	56 / 0.2 Flashpoint: 70°C (158°F)	0.999	1.5185
		[17146-08-6] TSCA EC 241-207-8 HMIS: 3-2-1-X	50g	
 <p>SIP6721.2 PHENETHYLDIMETHYL(DIMETHYLAMINO)SILANE C₁₂H₂₁NSi Contains 10-15% α-isomer HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	207.39	109 / 2	0.890	1.4946
		[181231-68-5] TSCA HMIS: 3-2-1-X	10g	
 <p>SIP6721.5 PHENETHYLMETHYLDICHLOROSILANE METHYL(PHENETHYL)DICHLOROSILANE C₉H₁₂Cl₂Si Contains α-, β-isomers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	219.19	99 / 6 Flashpoint: 80°C (176°F)	1.127	1.5120
		[772-65-6] TSCA EC 212-253-6 HMIS: 3-2-1-X	25g	100g
 <p>SIP6722.0 PHENETHYLTRICHLOROSILANE C₉H₉Cl₃Si Contains α-, β-isomers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	239.60	93-6 / 3 Flashpoint: 91°C (196°F) TOXICITY: oral rat, LD50: 2,830 mg/kg	1.240	1.5185
		[940-41-0] TSCA EC 213-371-0 HMIS: 3-2-1-X	25g	100g
 <p>SIP6722.6 PHENETHYLTRIMETHOXSILANE C₁₁H₁₈O₃Si Contains α-, β-isomers Component in optical coating resins In combination with TEOS forms hybrid silicalite-1 molecular sieves.¹ 1. Yeong, Y. et al. <i>Adv. Mater. Res.</i> 2008, 47-50, 238. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	226.35	95-6 / 2 Flashpoint: 109°C (228°F)	1.037	1.4753
		[49539-88-0] TSCA EC 256-363-2 HMIS: 3-1-1-X	25g	100g
			2kg	
 <p>SIP6723.0 m-PHENOXYPHENYLDIMETHYLCHLOROSILANE, 95% C₁₄H₁₅ClOSi Contains other isomers End-capper for low-temperature lubricating fluids.¹ 1. Gardos, M. <i>ASLE Transactions</i> 1972, 18, 31. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	262.81	102-6 / 1	1.11 ²⁵	1.5603 ²⁵
		[41318-68-7] HMIS: 3-2-1-X	5g	
 <p>SIP6723.2 3-PHENOXYPROPYLDIMETHYLCHLOROSILANE C₁₁H₁₇ClOSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	228.78	90-2 / 0.25	1.034	1.5052
		[69733-73-9] HMIS: 3-2-1-X	25g	100g
 <p>SIP6723.25 3-PHENOXYPROPYLMETHYLDICHLOROSILANE C₁₀H₁₄Cl₂OSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	249.21	110 / 1	1.158	1.5150
		[28229-56-3] HMIS: 3-2-1-X	25g	
 <p>SIP6723.3 3-PHENOXYPROPYLTRICHLOROSILANE C₉H₁₁Cl₃OSi Flashpoint: >110°C (>230°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	269.63	40 / 0.02 Flashpoint: >110°C (>230°F)	1.2574	1.5190
		[60333-76-8] HMIS: 3-1-1-X	25g	100g

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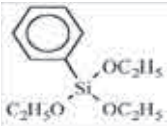
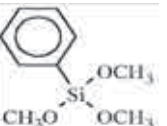

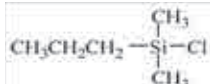
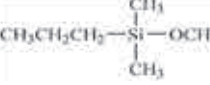
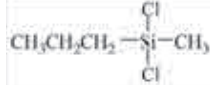
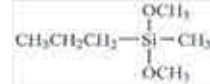
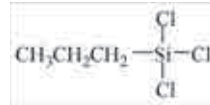
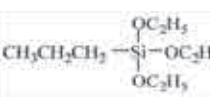
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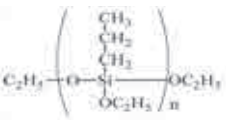
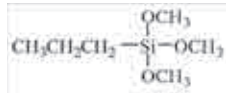
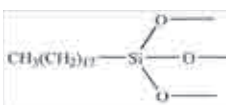
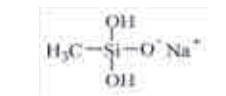
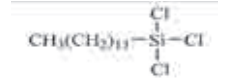
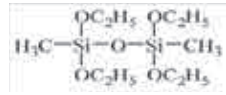
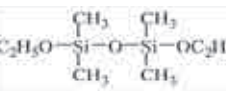

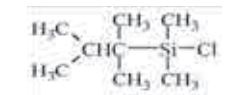
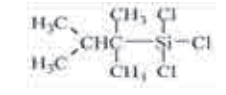
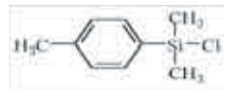
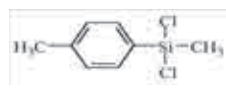
name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIP6723.4 11-PHENOXYUNDECYLTRICHLOROSILANE C₁₇H₂₇Cl₃O₂Si Forms SAMs that orient pentadecene HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [526204-46-6] HMIS: 3-1-1-X 5g</p>	381.85	166-7 / 0.3	1.089 ²⁵	
 <p>SIP6724.7 4-PHENYLBUTYLDIMETHYLCHLOROSILANE C₁₂H₁₉ClSi Flashpoint: >110°C (>230°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [32328-67-9] HMIS: 3-1-1-X 25g</p>	226.83	85-7 / 0.6	0.964 ²⁵	1.4979 ²⁵
 <p>SIP6724.8 4-PHENYLBUTYLMETHYLDICHLOROSILANE C₁₁H₁₆Cl₂Si Flashpoint: >110°C (>230°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [17776-69-1] HMIS: 3-1-1-X 25g</p>	247.24	105-9 / 1.5	1.09 ²⁵	
 <p>SIP6724.9 4-PHENYLBUTYLTRICHLOROSILANE C₁₀H₁₃Cl₃Si Employed as bonded phase in HPLC separation of aromatics HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [17886-88-3] TSCA-L HMIS: 3-1-1-X 25g 100g</p>	267.66	82 / 0.4	1.192	1.512
 <p>SIP6726.0 PHENYLDIMETHYLACETOXYLSILANE C₁₀H₁₄O₂Si Flashpoint: 72°C (162°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [17887-60-4] TSCA EC 241-836-8 HMIS: 2-2-1-X 25g</p>	194.30	127-9 / 44	1.006	1.4907
 <p>SIP6728.0 PHENYLDIMETHYLCHLOROSILANE C₉H₁₁ClSi Viscosity: 1.4 cSt Vapor pressure, 25°: 1 mm Forms cuprate.¹ 1. Fleming, I. and Terrett, N. K. <i>Tetrahedron Lett.</i> 1984, 25, 5103. F&F: Vol. 7, p 133; Vol. 8, p 196; Vol. 11, p 209; Vol. 12, p 210. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [768-33-2] TSCA EC 212-193-0 HMIS: 3-2-1-X 25g 100g 2kg</p>	170.71	192-3	1.032	1.5082
 <p>SIP6728.4 PHENYLDIMETHYLETHOXYLSILANE C₁₀H₁₆O₂Si Viscosity: 1.3 cSt Dipole moment: 1.34 Antiepileptic activity in petit mal syndrome HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [1825-58-7] TSCA EC 217-366-4 HMIS: 2-2-1-X 10g 50g</p>	180.32	93 / 25	0.926	1.4799
 <p>SIP6729.5 12-PHENYLDODECYLDIMETHYLCHLOROSILANE C₂₀H₃₅ClSi HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 3-2-1-X 5g</p>	339.03	172-4 / 0.25	0.921	1.487
 <p>SIP6730.0 PHENYLETHYLDICHLOROSILANE C₈H₁₀Cl₂Si Vapor pressure, 100°: 13 mm Flashpoint: 92°C (198°F) ΔHvap: 11.9 kcal/mole HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [1125-27-5] TSCA EC 214-407-8 HMIS: 3-2-1-X 25g</p>	205.16	225-6	1.184	1.5321
 <p>SIP6736.4 6-PHENYLHEXYLTRICHLOROSILANE C₁₂H₁₇Cl₃Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18035-33-1] HMIS: 3-1-1-X 5g</p>	295.71	95 / 0.1	1.144	1.5065
 <p>SIP6736.8 PHENYLMETHYLBIS(DIMETHYLAMINO)SILANE C₁₁H₂₀N₂Si Flashpoint: 78°C (172°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [33567-83-8] HMIS: 3-2-1-X 10g</p>	208.38	108-9 / 11		1.4982

	name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
	SIP6738.0 PHENYLMETHYLDICHLOROSILANE C ₇ H ₆ Cl ₂ 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	500g	
	SIP6738.5 1-PHENYL-1-(METHYLDICHLOROSILYL)BUTANE C ₁₁ H ₁₆ Cl ₂ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	247.24	87-9 / 1 Flashpoint: >110°C (>230°F)	1.1	1.512
	HMIS: 3-2-1-X		25g		
	SIP6739.0 PHENYLMETHYLDIETHOXSILANE C ₁₁ H ₁₆ O ₂ Si Dipole moment: 1.32 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	210.35	117-8 / 31 Flashpoint: 89°C (192°F)	0.963	1.4690
	[775-56-4] TSCA EC 212-275-6 HMIS: 2-2-1-X		25g	100g	
	SIP6740.0 PHENYLMETHYLDIMETHOXSILANE C ₉ H ₁₄ O ₂ 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 Flashpoint: 76°C (169°F) TOXICITY: oral rat, LD50: 892 mg/kg	0.9934	1.4694
	[3027-21-2] TSCA EC 221-192-4 HMIS: 3-2-1-X		25g	250g	2kg
	SIP6743.0 (3-PHENYLPROPYL)DIMETHYLCHLOROSILANE C ₁₁ H ₁₇ ClSi See also SIP6724.7 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	212.78	75 / 0.5 Flashpoint: 103°C (217°F)	0.963	
	[17146-09-7] TSCA EC 241-208-3 HMIS: 3-1-1-X		5g	50g	
	SIP6744.0 (3-PHENYLPROPYL)METHYLDICHLOROSILANE C ₁₀ H ₁₄ Cl ₂ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	233.21	96-8 / 4	1.086 ²⁵	1.5090 ²⁵
	[17776-66-8] TSCA HMIS: 3-2-1-X		25g		
	SIP6790.0 PHENYLTRIACETOXSILANE, tech-95 C ₁₂ H ₁₄ O ₆ Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	282.32	144-6 / 2 (36-7) Flashpoint: 102°C (216°F)	1.1939	1.4708
	[18042-54-1] TSCA EC 241-952-9 HMIS: 3-1-1-X		25g	100g	
	SIP6810.0 PHENYLTRICHLOROSILANE C ₆ H ₅ Cl ₃ 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) Flashpoint: 91°C (196°F) TOXICITY: oral rat, LD50: 2,340 mg/kg Critical temperature: 438° ΔHvap: 11.4 kcal/mole Specific heat: 0.24 cal/g° Coefficient of thermal expansion: 1.2 x 10 ⁻³	1.324	1.5247
	[98-13-5] TSCA EC 202-640-8 HMIS: 3-2-1-X		25g	2kg	18kg
	SIP6813.0 1-PHENYL-1-TRICHLOROSILYLBUTANE C ₁₀ H ₁₃ Cl ₃ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	267.65	78-80 / 0.8 Flashpoint: >110°C (>230°F)	1.201	1.518
	HMIS: 3-2-1-X		10g		

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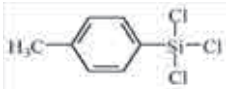
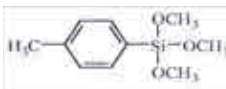

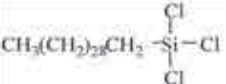
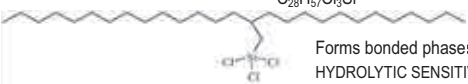
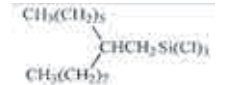



name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIP6821.0 PHENYLTRIETHOXSILANE C₁₂H₂₀O₃Si Flashpoint: 96°C (205°F) TOXICITY: oral rat, LD50: 2,830 mg/kg Autoignition temperature: 265°C Coefficient of thermal expansion: 0.9 x 10⁻³ Surface tension: 28 mN/m Electron donor component of polyolefin polymerization catalyst complexes Improves photoresist adhesion to silicon nitride Effective treatment for organic-grafted clays.¹ Phenylates allyl benzoates.² 1. Canrado, K. et al. <i>Chem. Mater.</i> 2001, 13, 3766. 2. Correia, R. and DeShong, P. <i>J. Org. Chem.</i> 2001, 66, 7159. 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	2kg	17kg	
 <p>SIP6822.0 PHENYLTRIMETHOXSILANE C₉H₁₄O₃Si Flashpoint: 86°C (187°F) TOXICITY: ivn mouse, LD50: 180 mg/kg Dielectric constant: 4.44 Intermediate for high temperature silicone resins Hydrophobic additive to other silanes with excellent thermal stability Cross couples with aryl halides.¹ Phenylates heteroaromatic carboxamides.² Directly couples w/ 1° alkyl bromides and iodides.³ 1. Mowery, M. E. and DeShong, P. <i>J. Org. Chem.</i> 1999, 64, 1684. 2. Lam, P. Y. S. et al. <i>Tetrahedron Lett.</i> 2001, 42, 2427. 3. Young, J.-Y. and Fu, G. C. <i>J. Am. Chem. Soc.</i> 2003, 125, 5616. 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	2kg	18kg	
 <p>SIP6826.5 PHENYLTRIS(METHYLETHYLKETOXIMINO)SILANE C₁₈H₂₈N₃O₃Si 95% Flashpoint: >61°C (>142°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	363.53	60-5 / 3	0.995	
[34036-80-1] TSCA HMIS: 3-2-1-X	50g	250g		
 <p>SIP6910.0 n-PROPYLDIMETHYLCHLOROSILANE C₆H₁₃ClSi Flashpoint: 10°C (50°F) 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	100g		
 <p>SIP6911.0 n-PROPYLDIMETHYLMETHOXSILANE C₆H₁₆O₂Si Flashpoint: 10°C (50°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	132.28	94-6	0.787	1.3927 ²⁵
[18182-14-4] HMIS: 3-3-1-X	10g			
 <p>SIP6912.0 n-PROPYLMETHYLDICHLOROSILANE C₄H₁₀Cl₂Si Flashpoint: 27°C (81°F) Viscosity, 20°: 0.8 cSt 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	100g		
 <p>SIP6914.0 n-PROPYLMETHYLDIMETHOXSILANE C₆H₁₆O₂Si Flashpoint: 10°C (50°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	148.28	126	0.8689	1.3931
[18173-73-4] HMIS: 3-3-1-X	25g			
 <p>SIP6915.0 n-PROPYLTRICHLOROSILANE C₃H₇Cl₃Si Flashpoint: 35°C (95°F) ΔHvap: 8.7 kcal/mole 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	2.5kg		
 <p>SIP6917.0 n-PROPYLTRIETHOXSILANE C₉H₂₂O₃Si Flashpoint: 57°C (135°F) Architectural masonry water repellent 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	2kg		

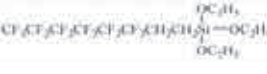



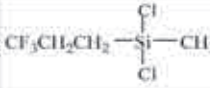
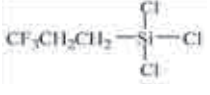
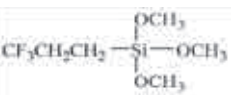
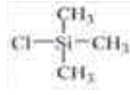
	name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
	SIP6917.2 PROPYLTRIETHOXSILANE, oligomeric hydrolysate Viscosity: 25-40 cSt Reactive hydrophobic surface treatment with reduced volatile by-products HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water			1.03	1.4243
	[314270-00-3] TSCA HMIS: 2-2-1-X		100g		
	SIP6918.0 n-PROPYLTRIMETHOXSILANE C ₆ H ₁₆ O ₃ Si yc of treated surface: 28.5 mN/m Hydrophobic surface treatment HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	164.27	142	0.932 ²⁵	1.3880
	[1067-25-0] TSCA EC 213-926-7 HMIS: 3-3-1-X		25g 2kg		16kg
	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 ¹³ ohms yc of treated glass surface: 31 mN/m For application information see Performance Products Brochure Reduces blood protein adsorption. ¹ Anti-stiction coating for polysilicon. ² 1. Arkles, B. et al. In <i>Silanes Surfaces & Interfaces</i> ; Leyden, D., Ed; Gordon & Breach: 1986; p 91. 2. Almanza-Workman, A. et al. <i>J. Electrochem. Soc.</i> 2002 , 149, H6. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water			0.88	
	[39443-39-5] TSCA HMIS: 2-3-1-X		100g 1.5kg		15kg
	SIS6984.0 SODIUM METHYLSILICONATE, 30% in water CH ₃ NaO ₃ Si Viscosity: 10 cSt. 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 2kg		20kg
	SIT7093.0 TETRADECYLTRICHLOROSILANE C ₁₄ H ₂₉ Cl ₃ 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		
	SIT7095.0 1,1,3,3-TETRAETHOXY-1,3-DIMETHYLDISILOXANE, 95% C ₁₀ H ₂₆ O ₅ Si ₂ 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		
	SIT7534.0 1,1,3,3-TETRAMETHYL-1,3-DIETHOXYDISILOXANE C ₈ H ₂₂ O ₃ Si ₂ 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 100g		
	SIT7753.0 1,1,3,3-TETRAPHENYLDIMETHYLDISILAZANE C ₂₆ H ₂₇ NSi ₂ Deactivates glass capillary columns by persilylation. ¹ 1. Grob, K. et al. <i>High Resol. Chrom. & Col Chrom.</i> 1980 , 3, 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 25g		
	SIT7906.0 THEXYLDIMETHYLCHLOROSILANE t-HEXYLDIMETHYLCHLOROSILANE C ₈ H ₁₉ 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 100g		
	SIT7906.6 THEXYLTRICHLOROSILANE C ₈ H ₁₃ Cl ₃ 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		
	SIT8030.0 p-TOLYLDIMETHYLCHLOROSILANE C ₉ H ₁₃ ClSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	184.74	215-7	1.007 ²⁵	1.5055
	[35239-30-6] TSCA EC 252-456-7 HMIS: 3-2-1-X		5g		
	SIT8035.0 p-TOLYLMETHYLDICHLOROSILANE C ₈ H ₁₀ Cl ₂ Si 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		

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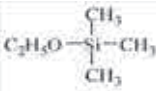
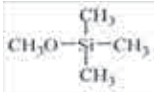
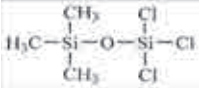
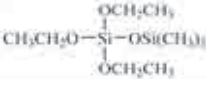
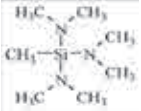
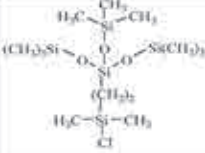

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIT8040.0 p-TOLYLTRICHLOROSILANE C₇H₇Cl₃Si Flashpoint: 92°C (198°F) yc of treated surface: 34 mN/m HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	225.58	218-20	1.28	1.5224 ²⁵
[701-35-9]	TSCA	EC 211-854-0	HMIS: 3-2-1-X	25g 100g
 <p>SIT8042.0 p-TOLYLTRIMETHOXYOSILANE C₁₀H₁₆O₃Si Flashpoint: 94°C (201°F) yc of treated surface: 34 mN/m Charge control surface treatment for electrostatic copier particles.¹ 1. Yamazaki, H. Jpn. Kokai JP 06027719 A2, 1994. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	212.32	75-8 / 8	1.033	1.4726 ²⁵
[17873-01-7]			HMIS: 3-1-1-X	10g 50g
 <p>SIT8045.0 TRIACONTYLDIMETHYLCHLOROSILANE, blend C₃₂H₆₇ClSi 80% C₃₀ and higher, 20% C₂₂-C₂₈ Flashpoint: (60-82) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	515.42	(60-82)		
[70851-52-4]	TSCA	EC 274-938-6	HMIS: 3-1-0-X	25g 100g
 <p>SIT8048.0 TRIACONTYLTRICHLOROSILANE, blend C₃₀H₆₁Cl₃Si 80% C₃₀ and higher, 20% C₂₂-C₂₈ Flashpoint: (60-82) 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</p>	556.26	(60-82)		
[70851-48-8]	TSCA	EC 274-933-9	HMIS: 3-1-1-X	25g 100g
 <p>SIT8162.0 13-(TRICHLOROSILYLMETHYL)HEPTACOSANE, 95% C₂₈H₅₇Cl₃Si 2-DODECYLHEXADECYLTRICHLOROSILANE Contains isomers Flashpoint: 215 / 0.01 (20-35) Forms bonded phases for HPLC applications HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	528.21	215 / 0.01 (20-35)	0.946	
[194242-99-4]	TSCA-L		HMIS: 3-1-1-X	10g
 <p>SIT8162.4 7-(TRICHLOROSILYLMETHYL)PENTADECANE, tech-95 C₁₈H₃₃Cl₃Si 2-HEXYLDECYLTRICHLOROSILANE Contains isomers Flashpoint: 146-152 / 0.2 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	359.88	146-152 / 0.2	0.985	
			HMIS: 3-2-1-X	10g
 <p>SIT8170.0 (TRIDecaFLUORO-1,1,2,2-Tetrahydrooctyl)- DIMETHYLCHLOROSILANE C₁₀H₁₀ClF₁₃Si Flashpoint: 52°C (126°F) PERFLUOROOctyl-1H,1H,2H,2H-DIMETHYLCHLOROSILANE Packaged over copper powder Employed in column chromatography where low protein retentivity is required.¹ Employed in solid phase extraction of fluorous phases.² Modification of layered silicates yields film-forming compositions.³ 1. Xindu, G. et al. <i>J. Chromatogr.</i> 1983, 269, 96. 2. Curran, D. <i>J. Org. Chem.</i> 1997, 62, 6714. 3. Ogawa, M. et al. <i>Chem. Mater.</i> 1998, 10, 3787. For branched fluorinated alkylsilane see SIB1706.0 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	440.70	189-91	1.473	1.3453
[102488-47-1]			HMIS: 3-2-1-X	10g 50g
 <p>SIT8172.0 (TRIDecaFLUORO-1,1,2,2-Tetrahydrooctyl)- METHYLDICHLOROSILANE C₈H₇Cl₂F₁₃Si Flashpoint: 51°C (124°F) Packaged over copper powder Vapor pressure, 76°: 12 mm HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	461.12	189-90	1.550 ²⁵	1.3500
[73609-36-6]		EC 277-551-0	HMIS: 3-2-1-X	10g 50g
 <p>SIT8174.0 (TRIDecaFLUORO-1,1,2,2-Tetrahydrooctyl)- TRICHLOROSILANE C₈H₄Cl₃F₁₃Si Flashpoint: 54°C (129°F) Packaged over copper powder Lowers the coefficient of friction of silicon substrates.¹ 1. DePalma, V. et al. <i>Langmuir</i> 1989, 5, 868. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	481.55	84-5 / 17	1.639	1.3521
[78560-45-9]	TSCA	EC 278-947-6	HMIS: 3-2-1-X	10g 50g

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 SIT8175.0 (TRIDecaFLUORO-1,1,2,2-Tetrahydrooctyl)- TRIETHOXSILANE C ₁₄ H ₁₉ F ₁₃ O ₃ Si <i>Automotive side windows are treated with fluoroalkylsilanes to provide self-cleaning properties</i> HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [51851-37-7] TSCA EC 257-473-3 HMIS: 2-2-1-X 10g 50g	510.36	86 / 1.5 (<-38)	1.351	1.3436
 SIT8176.0 (TRIDecaFLUORO-1,1,2,2-Tetrahydrooctyl)- TRIMETHOXSILANE C ₁₁ H ₁₃ F ₁₃ O ₃ Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [85857-16-5] TSCA-L EC 288-657-1 HMIS: 3-1-1-X 10g 50g	468.29	60-2 / 0.5	1.44	1.3322
 SIT8176.3 5,5,6,6,7,7,8,8,9,9,10,10-TRIDecaFLUORO-2- (TRIDecaFLUOROHEXYL)DECYLTRICHLOROSILANE, 95% C ₁₆ H ₇ Cl ₃ F ₂₆ Si Contains ~ 5% isomers Branched structure forms low surface tension SAMs HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 3-1-1-X 1.0g	827.63	110-4 / 0.8	1.709	1.338
 SIT8364.0 (3,3,3-TRIFLUOROPROPYL)DIMETHYLCHLOROSILANE C ₅ H ₁₀ ClF ₃ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [1481-41-0] TSCA EC 216-039-3 HMIS: 3-4-1-X 5g 25g	190.67	118	1.113	1.3727
 SIT8369.0 (3,3,3-TRIFLUOROPROPYL)METHYLDICHLOROSILANE C ₄ H ₇ Cl ₂ F ₃ 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 10g 50g	211.08	121-2	1.2611	1.3850
 SIT8371.0 (3,3,3-TRIFLUOROPROPYL)TRICHLOROSILANE C ₃ H ₄ Cl ₃ F ₃ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [592-09-6] TSCA EC 209-744-2 HMIS: 3-4-1-X 10g 50g	231.50	113-4	1.395	1.385
 SIT8372.0 (3,3,3-TRIFLUOROPROPYL)TRIMETHOXSILANE C ₆ H ₁₃ F ₃ O ₃ Si yc of treated surface: 33.5 mN/m Forms catalytic gels for aerobic oxidation of alcohols in combination with tetrapropylammonium perchhenate. ¹ 1. Cirminna, R. et al. <i>Org. Biomol. Chem.</i> 2006 , 4, 2637. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [429-60-7] TSCA EC 207-059-3 HMIS: 3-3-1-X 5g 25g 2.5kg	218.25	144	1.137	1.3546
 SIT8510.0 TRIMETHYLCHLOROSILANE TMCS C ₃ H ₉ 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 ⁻³ Most economical and broadly used silylation reagent Enhances Claisen rearrangement. ¹ Enhances the deprotection of tBOC-protected amino acids. ² Enhances ethylene glycol ketalization reaction. ³ Catalyzes the formation of chlorohydrin esters from diols. ⁴ Reviewed as water scavenger in reactions of carbonyl compounds. ⁵ 1. Snider, B. B. and Hawryluk, N. A. <i>Org. Synth.</i> 2000 , 2, 635. 2. Chen, B. C. et al. <i>J. Org. Chem.</i> 1999 , 64, 9294. 3. Chan, T. H. et al. <i>Synthesis</i> 1983 , 203. 4. Eras, J. et al. <i>J. Org. Chem.</i> 2002 , 1, 8631. 5. Volochnuk, D. M. et al. <i>Synthesis</i> 2009 , 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 25g 750g 3kg	108.64	57.6 (-57.7)	0.8580	1.3885

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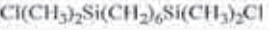
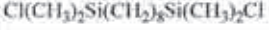
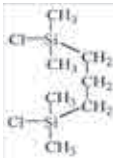




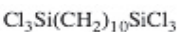
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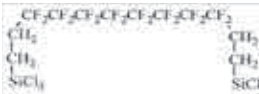

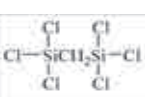





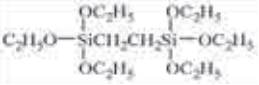
name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIT8515.0 TRIMETHYLETHOXYLSILANE ETHOXYTRIMETHYLSILANE C₅H₁₄O_{Si} Vapor pressure, 25°: 111 mm Dipole moment: 1.2 Anti-structuring additive for silicone rubber HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	118.25	75-6 (-83)	0.7573	1.3742
[1825-62-3] TSCA EC 217-370-6 HMIS: 2-4-1-X	25g	1.5kg	14kg	
 <p>SIT8566.0 TRIMETHYLMETHOXYLSILANE C₄H₁₂O_{Si} Dipole moment: 1.18 debye ΔHcomb: 908 kcal/mole Undergoes α-lithiation w/ tert-butyllithium.¹ 1. Bates, T.F. et al. <i>J. Organometal. Chem.</i> 2000, 595, 87. F&F: Vol. 14, p 119. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	104.22	57-8	0.7560	1.3678
[1825-61-2] TSCA EC 217-369-0 HMIS: 3-4-1-X	25g	100g	1.5kg	
 <p>SIT8572.6 TRIMETHYLSILOXYTRICHLOROSILANE C₃H₅Cl₃O_{Si}₂ Flashpoint: 16°C (61°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	223.63	128	1.1405	1.4032
[2750-45-0] HMIS: 3-4-1-X	25g			
 <p>SIT8582.7 TRIMETHYLSILOXYTRIETHOXYLSILANE C₉H₂₄O₄Si₂ HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	252.46	62 / 9	0.897	1.3866 ²⁵
[17861-35-7] HMIS: 2-2-1-X	25g			
 <p>SIT8712.0 TRIS(DIMETHYLAMINO)METHYLSILANE C₇H₂₁N₃Si Flashpoint: 30°C (86°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	175.35	55-6 / 17 (-11)	0.850 ²²	1.432 ²²
[3768-57-8] TSCA EC 223-199-8 HMIS: 3-3-1-X	10g	50g		
 <p>SIT8719.5 [TRIS(TRIMETHYLSILOXY)SILYLETHYL]DIMETHYL- CHLOROSILANE C₁₃H₃₇ClO₃Si₅ Forms highly hydrophobic monolayers Candidate for self-cleaning surfaces Water contact angle: advancing = receding = 104°.¹ 1. McCarthy, T. et al. <i>Langmuir</i> 1999, 15, 7328. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	417.32	85 / 0.6	0.9056	1.4135
[225794-57-0] HMIS: 3-2-1-X	10g			
 <p>SIU9050.0 UNDECYLTRICHLOROSILANE C₁₁H₂₃Cl₃Si Employed in SAMS as a spacer molecule for functionally tipped silanes HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	289.75	155-60 / 15	1.02	
[18052-07-8] HMIS: 3-1-1-X	25g			

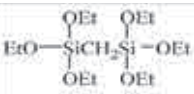

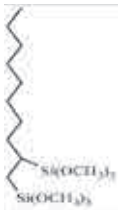
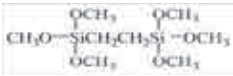
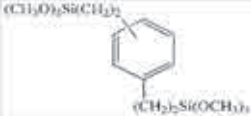
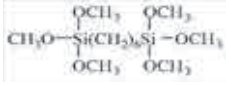

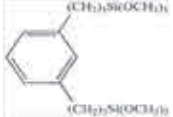

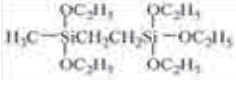
Hydrophobic Dipodal Silanes

Dipodal Surface Bonding

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIB1030.0 BIS[2-(CHLORODIMETHYLSILYL)ETHYL]BENZENE C₁₄H₂₄Cl₂Si₂ Mixed isomers Intermediate for silahydrocarbon polymers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	319.42	116-7 / 0.2 Flashpoint: 187°C (369°F)	1.02	
[74129-20-7]	TSCA	HMIS: 3-1-1-X	50g	
 <p>SIB1042.0 1,2-BIS(CHLORODIMETHYLSILYL)ETHANE TETRAMETHYLDICHLORODISILETHYLENE C₆H₁₆Cl₂Si₂ Reagent for protection of primary amines, including amino acids.¹ 1. Djuric, S. et al. <i>Tetrahedron Lett.</i> 1981, 22, 1787. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	215.27	198-9 (36-9) Flashpoint: 40°C (104°F)		
[13528-93-3]	TSCA	EC 236-871-0	25g	100g
 <p>SIB1046.0 1,6-BIS(CHLORODIMETHYLSILYL)HEXANE, 95% C₁₀H₂₄Cl₂Si₂ HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	271.38	113-6 / 3 Flashpoint: 150°C (302°F)	0.961	1.4538
[14799-66-7]		HMIS: 3-1-1-X	25g	
 <p>SIB1048.0 1,8-BIS(CHLORODIMETHYLSILYL)OCTANE, 95% C₁₂H₂₆Cl₂Si₂ Intermediate for silahydrocarbon polymers HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	299.43	106-7 / 0.4 Flashpoint: 180°C (356°F)	0.946	1.4540
[5089-28-1]	EC 225-804-0	HMIS: 3-1-1-X	25g	100g
 <p>SIB1048.2 1,3-BIS(CHLORODIMETHYLSILYL)PROPANE C₇H₁₆Cl₂Si₂ Forms cyclic derivatives of polyalkyleneoxides suitable for anionic copolymerization.¹ 1. Zundel, T. et al. <i>Macromol.</i> 1998, 31, 2724. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	229.30	94/19	1.0244	1.4647
[2295-06-9]		HMIS: 3-2-1-X	5g	
 <p>SIB1614.0 1,2-BIS(METHYLDICHLOROSILYL)ETHANE 2,2,5,5-TETRACHLORO-2,5-DISILAHEXANE C₄H₁₀Cl₄Si₂ Dipodal coupling agent HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	256.11	208-210 (31-3) Flashpoint: 94°C (201°F)	1.2628	1.4760
[3353-69-3]	TSCA	EC 222-123-0	25g	100g
 <p>SIB1615.0 1,2-BIS(METHYLDIETHOXSILYL)ETHANE C₁₂H₃₀O₄Si₂ HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	294.54	80 / 1.5 Flashpoint: >65°C (>150°F)	0.92	1.4170
[18043-74-8]	EC 241-953-4	HMIS: 2-2-1-X	25g	
 <p>SIB1630.0 1,2-BIS(METHYLDIFLUOROSILYL)ETHANE C₄H₁₀F₄Si₂ HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	190.29	114	1.118	
[170381-99-4]		HMIS: 3-3-1-X	10g	
 <p>SIB1808.0 1,2-BIS(TRICHLOROSILYL)DECANE C₁₀H₂₀Cl₆Si₂ Bonded phase for HPLC stable over wide range of pH HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	409.16	114 / 1	1.2496	1.4754
[620987-03-3]	TSCA-L	HMIS: 3-2-1-X	25g	
 <p>SIB1809.0 1,10-BIS(TRICHLOROSILYL)DECANE, tech-95 C₁₀H₂₀Cl₆Si₂ HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	409.16	156-9 / 1		
[52217-62-6]		HMIS: 3-2-1-X	10g	

PLEASE INQUIRE ABOUT BULK QUANTITIES

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIB1811.5 1,8-BIS(TRICHLOROSILYLETHYL)HEXADECAFLUORO-OCTANE C₁₂H₆Cl₆F₁₆Si₂ Forms hydrolysis-resistant oleophobic coatings HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [445303-83-3] HMIS: 3-1-1-X 1.0g</p>	725.06	142-4 / 0.6 (69-70)		
 <p>SIB1812.0 1,6-BIS(TRICHLOROSILYL)HEXANE C₆H₁₂Cl₆Si₂ 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 50g</p>	353.05	148-50 / 10 Flashpoint: 75°C (167°F)	1.327	1.4759
 <p>SIB1813.0 BIS(TRICHLOROSILYL)METHANE CH₂Cl₂Si₂ 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 25g</p>	282.90	183	1.5567	1.4740
 <p>SIB1813.7 1,2-BIS(TRICHLOROSILYL)OCTADECANE C₁₈H₃₆Cl₆Si₂ Hydrolysis resistant dipodal bonded phase for high acidity aqueous HPLC HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents HMIS: 3-1-1-X 10g</p>	520.36	186-9 / 0.2	1.103	
 <p>SIB1814.0 1,8-BIS(TRICHLOROSILYL)OCTANE C₈H₁₆Cl₆Si₂ 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 100g</p>	381.10	140 / 1 Flashpoint: 115°C (239°F)	1.22	1.4757
 <p>SIB1815.0 1,3-BIS(TRICHLOROSILYL)PROPANE C₃H₆Cl₆Si₂ Forms mesoporous sol-gel structures HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18171-50-1] HMIS: 3-2-1-X 10g</p>	310.97	115-7 / 4 (29-30)	1.4394	1.4732
 <p>SIB1815.4 BIS(TRICHLOROSILYLUNDECYL) ETHER C₂₂H₄₄Cl₆O₂Si₂ HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents HMIS: 3-1-1-X 5g</p>	593.48			
 <p>SIB1816.6 1,4-BIS(TRIETHOXYSILYL)BENZENE C₁₈H₃₄O₆Si₂ Forms phenylene-bridged silica with ordered pore walls.^{1,2} 1. Inagaki, S. et al. <i>Nature</i> 2002, 416, 304. 2. Wang, W. et al. <i>Chem. Mater.</i> 2003, 15, 4886. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [2615-18-1] HMIS: 2-2-1-X 5g 25g</p>	402.64	130-2 / 0.4	1.015	1.4549
 <p>SIB1817.0 BIS(TRIETHOXYSILYL)ETHANE HEXAETHOXYDISILETHYLENE, BSE C₁₄H₃₄O₆Si₂ Vapor pressure, 150°: 10mm Additive to silane coupling agents formulations that enhances hydrolytic stability Employed in corrosion resistant coatings/primers for steel and aluminum.^{1,2} Sol-gels of α,ω-bis(trimethoxysilyl)alkanes reported.³ Component in evaporation-induced self-assembly of mesoporous structures.⁴ Forms mesoporous, derivatizable molecular sieves.^{5,6} 1. Van Ooij, W. et al. <i>J. Adhes. Sci. Tech.</i> 1997, 11, 29. 2. Van Ooij, W. et al. <i>Chemtech</i> 1999, 28, 3302. 3. Loy, D. A. et al. <i>J. Am. Chem. Soc.</i> 1999, 121, 5413. 4. Lu, Y. et al. <i>J. Am. Chem. Soc.</i> 2000, 122, 5258. 5. Molde, B. et al. <i>Chem. Mater.</i> 1999, 11, 3302. 6. Cho, E. et al. <i>Chem Mater.</i> 2004, 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 100g 2kg</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 ₄ ²⁰	n _D ²⁰
SIB1821.0 BIS(TRIETHOXSILYL)METHANE 4,4,6,6-TETRAETHOXY-3,7-DIOXA-4,6-DISILANONANE C ₁₃ H ₃₂ O ₆ Si ₂ 	340.56	114-5 / 3.5	0.9741	1.4098
Intermediate for sol-gel coatings, hybrid inorganic-organic polymers Forms methylene-bridged mesoporous structures. ¹ 1. Zhang, W. et al. <i>Chem. Mater.</i> 2005 , <i>17</i> , 6407. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
[18418-72-9] TSCA-L HMIS: 3-2-1-X		5g	25g	
SIB1824.0 1,8-BIS(TRIETHOXSILYL)OCTANE C ₂₀ H ₄₈ O ₆ Si ₂ 	438.76	172-5 / 0.75	0.926	1.4240
Employed in sol-gel synthesis of mesoporous structures Sol-gels of α,ω-bis(trialkoxysilyl)alkanes reported. ¹ 1. Loy, D.A. et al. <i>J. Am. Chem. Soc.</i> 1999 , <i>121</i> , 5413. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
[52217-60-4] TSCA HMIS: 2-1-1-X		25g	100g	
SIB1829.0 1,2-BIS(TRIMETHOXSILYL)DECANE C ₁₆ H ₃₈ O ₆ Si ₂ 	382.65	130-2 / 0.4	0.984	1.4303
Pendant dipodal silane; employed in high pH HPLC HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
[832079-33-1] TSCA-L HMIS: 3-2-1-X		25g	100g	
SIB1830.0 1,2-BIS(TRIMETHOXSILYL)ETHANE C ₈ H ₂₂ O ₆ Si ₂ 	270.43	103-4 / 5	1.068	1.4091
Flashpoint: 65°C (149°F) TOXICITY: inh rat, LC50: 2.4 ppm Vapor pressure, 20°: 0.08mm				
CAUTION: INHALATION HAZARD AIR TRANSPORT FORBIDDEN Employed in fabrication of multilayer printed circuit boards. ¹ 1. Palladino, J. U.S. Patent 5,073,456, 1991. See also SIB1817.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
[18406-41-2] TSCA EC 242-285-6 HMIS: 4-2-1-X		25g	100g	
SIB1831.0 BIS(TRIMETHOXSILYLETHYL)BENZENE C ₁₆ H ₃₀ O ₆ Si ₂ 	374.58	148-50 / 0.1	1.08	1.4734
Mixed isomers Forms high refractive index coatings HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
[58298-01-4] TSCA HMIS: 2-1-0-X		10g	50g	
SIB1832.0 1,6-BIS(TRIMETHOXSILYL)HEXANE C ₁₂ H ₃₀ O ₆ Si ₂ 	326.54	161 / 2	1.014	1.4213
Sol-Gels of α,ω-bis(trimethoxysilyl)alkanes reported. ¹ 1. Loy, D.A. et al. <i>J. Am. Chem. Soc.</i> 1999 , <i>121</i> , 5413. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
[87135-01-1] HMIS: 3-2-1-X		10g	50g	
SIB1832.2 1,4-BIS(TRIMETHOXSILYLMETHYL)BENZENE C ₁₄ H ₂₆ O ₆ Si ₂ 	346.53	124-5 / 0.05	1.097	1.47 ²⁵
Forms adherent films on metal substrates HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
[193358-40-6] HMIS: 3-1-1-X		10g		
SIB1833.4 1,3-BIS(TRIMETHOXSILYL)PROPYL)BENZENE C ₁₈ H ₃₄ O ₆ Si ₂ 	402.64			
HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
HMIS: 3-2-1-X		5g		
SIC2265.5 (CHLORODIMETHYLSILYL)-6-[2-(CHLORODIMETHYLSILYL)ETHYL]BICYCLOHEPTANE C ₁₃ H ₂₆ Cl ₂ Si ₂ 	309.43		1.03	1.4863
Mixture of 1 and 2 regio isomers, exo and endo Forms polymers HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
[220527-24-2] HMIS: 3-2-1-X		25g		
SIT8185.8 1-(TRIETHOXSILYL)-2-(DIETHOXYMETHYLSILYL)-ETHANE C ₁₃ H ₃₂ O ₅ Si 	324.56	100 / 0.5	0.946	1.4112
Flashpoint: 102°C (216°F) TOXICITY: oral rat, LD50: >500 mg/kg Dipodal silane; forms abrasion-resistant sol-gel coatings Improves hydrolytic stability of silane adhesion promotion systems HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water				
[18418-54-7] TSCA HMIS: 3-1-1-X		25g	100g	2kg

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Polymeric Hydrophobic Silanes

Polymeric Surface Bonding

POLYMERIC HYDROPHOBIC

	name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
	Polybutadiene 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 2kg				
	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				
	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				
	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				

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		
DMS-K13	20-50	2000-4000	0.99		
DMS-K26	500-800	15,000-20,000	0.99		

Dimethylamino Terminated PolyDimethylsiloxanes

CAS: [67762-92-9] TSCA

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

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		

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		






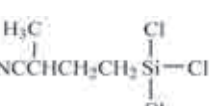
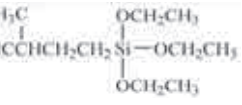
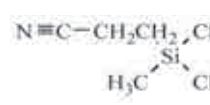

Silanol Terminated PolyDimethylsiloxanes

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			
DMS-S14	35-45	700-1500	3.0-4.0	1.7-2.3	0.96	1.402			
DMS-S15	45-85	2000-3500	0.9-1.2	0.53-0.70	0.96	1.402			

Hydrophilic Silane Properties

Polar - Non-hydrogen Bonding

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>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</p>	600-800		1.00	1.452 ²⁵
[75009-88-0] TSCA	HMIS: 3-1-1-X	100g	2kg	
 <p>SIB1824.9 1,3-[BIS(3-TRIETHOXSILYL)POLYETHYLENE-OXY]-2-METHYLENEPROPANE C₅₀H₁₀₄O₂₀Si₂ (av) Vinyl functional hydrophilic dipodal coupling agent for protein immobilization HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	1113.50			
	HMIS: 2-2-1-X	1.0g		
 <p>SIC2436.0 (3-CYANOBTYL)DIMETHYLCHLOROSILANE C₇H₁₄ClNSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	175.73	80-4 / 1	0.993	
	HMIS: 3-2-1-X	25g	100g	
 <p>SIC2437.0 (3-CYANOBTYL)METHYLDICHLOROSILANE C₆H₁₁Cl₂NSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	196.17	63 / 0.3	1.104	
[71550-62-4] TSCA	EC 275-613-1	HMIS: 3-2-1-X	25g	100g
 <p>SIC2437.5 (3-CYANOBTYL)METHYLDIMETHOXSILANE C₈H₁₇NO₂Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	187.32	77 / 1.5	0.947	1.4213 ²⁵
[793681-94-4] TSCA	HMIS: 3-2-1-X	25g		
 <p>SIC2438.0 (3-CYANOBTYL)TRICHLOROSILANE C₅H₆Cl₃NSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	216.57	61-3 / 2	1.22	1.469 ²⁵
[163155-56-4]	HMIS: 3-2-1-X	25g	100g	
 <p>SIC2439.0 3-CYANOBTYLTRIETHOXSILANE C₁₁H₂₃NO₃Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	245.39			
	HMIS: 2-2-1-X	25g		
 <p>SIC2440.0 2-CYANOETHYLMETHYLDICHLOROSILANE C₄H₇Cl₂NSi Vapor pressure, 60°: 4 mm Monomer for polar silicones used in GC phases HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	168.10	60-4 / 4	1.2015	1.4550 ²⁵
[1071-21-2] TSCA	EC 213-985-9	HMIS: 3-2-1-X	25g	
 <p>SIC2442.0 2-CYANOETHYLTRICHLOROSILANE C₃H₄Cl₃NSi Vapor pressure, 85°: 12 mm ΔHvap: 11.2 kcal/mole HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	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	50g

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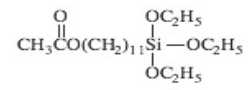


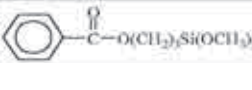
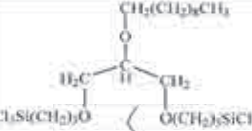
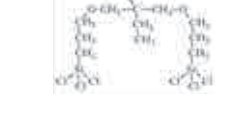
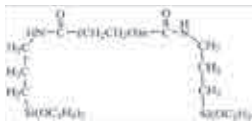
name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
<chem>N#C-CH2CH2Si(OC2H5)3</chem> SIC2445.0 2-CYANOETHYLTRIEHOXSILANE C ₈ H ₁₉ NO ₃ Si Flashpoint: 86°C (187°F) TOXICITY: oral rat, LD50: 5,630 mg/kg Crosslinker for moisture-cure silicone RTVs - improves fuel resistance HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [919-31-3] TSCA EC 213-050-5 HMIS: 2-2-0-X	217.34	224-5	0.9792	1.4140
<chem>N#C-CH2CH2Si(OCH3)3</chem> SIC2446.0 2-CYANOETHYLTRIMETHOXSILANE C ₈ H ₁₃ NO ₃ Si Flashpoint: 79°C (174°F) Crosslinker for moisture-cure silicones - improves solvent resistance HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [2526-62-7] TSCA EC 219-764-3 HMIS: 3-2-1-X	175.26	112 / 15	1.079	1.4126
<chem>N#C-CH2CH2CH2Si(CH2CH(CH3)2)2N(CH2CH(CH3)2)2</chem> SIC2451.0 3-CYANOPROPYLDIISOPROPYL(DIMETHYLAMINO)- SILANE 4-[DIMETHYLAMINO]BIS(1-METHYLETHYL)SILYL]BUTANENITRILE C ₁₂ H ₂₈ N ₂ Si Stable cyanofunctional bonded phase HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [163794-91-0] TSCA HMIS: 3-2-1-X	226.44	96-8 / 0.2	0.89	
<chem>N#C-CH2CH2CH2Si(CH3)2Cl</chem> SIC2452.0 3-CYANOPROPYLDIMETHYLCHLOROSILANE 4-(CHLORODIMETHYLSILYL)BUTYRONITRILE C ₈ H ₁₂ ClNSi Coupling agent for antibodies. ¹ Allows formation of electrostatic gated nanopore electrodes. ² 1. Falipou, S. et al. <i>Bioconjugate Chem.</i> 1999 , <i>10</i> , 36. 2. Wang, G. et al. <i>J. Am. Chem. Soc.</i> 2006 , <i>128</i> , 7679. HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [18156-15-5] TSCA EC 242-039-8 HMIS: 3-2-1-X	161.71	108-9 / 15	0.986	1.4460
<chem>N#C-CH2CH2CH2Si(CH3)2Cl</chem> SIC2453.0 3-CYANOPROPYLMETHYLDICHLOROSILANE C ₈ H ₉ Cl ₂ NSi Monomer for silicone films for microelectrodes permeable to polar molecules HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [1190-16-5] TSCA EC 214-717-3 HMIS: 3-2-1-X	182.12	79-82 / 1	1.145 ²⁵	1.4551 ²⁵
<chem>N#C-CH2CH2CH2Si(OCH3)2CH3</chem> SIC2453.5 3-CYANOPROPYLMETHYLDIMETHOXSILANE C ₇ H ₁₅ NO ₂ Si See also SIC2437.5 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [153723-40-1] HMIS: 3-2-1-X	173.29	82-3 / 3	0.9970	1.4235
<chem>N#C-CH2CH2CH2SiCl3</chem> SIC2454.0 3-CYANOPROPYLTRICHLOROSILANE 4-(TRICHLOROSILYL)BUTYRONITRILE C ₄ H ₆ Cl ₃ NSi HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [1071-27-8] TSCA EC 213-990-6 HMIS: 3-2-1-X	202.54	93-4 / 8	1.302	1.465
<chem>N#C-CH2CH2CH2Si(OC2H5)3</chem> SIC2455.0 3-CYANOPROPYLTRIEHOXSILANE C ₁₀ H ₂₁ NO ₃ 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 [1067-47-6] TSCA EC 213-931-4 HMIS: 3-2-1-X	231.37	79-80 / 0.6	0.961	1.4174
<chem>N#C-CH2CH2CH2Si(OCH3)3</chem> SIC2456.0 3-CYANOPROPYLTRIMETHOXSILANE C ₇ H ₁₅ NO ₃ Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [55453-24-2] TSCA EC 259-646-9 HMIS: 3-2-1-X	189.29	90-2 / 7	1.027	1.4416
<chem>NC(CH2)11SiCl3</chem> SIC2456.3 11-CYANOUNDECYLTRICHLOROSILANE C ₁₂ H ₂₂ Cl ₃ NSi Long chain organofunctional silane HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [724460-16-6] HMIS: 3-2-1-X	314.76	162-4 / 1	1.075	

Hydrophilic Silane Properties

Polar - Hydrogen Bonding

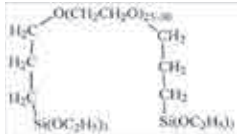




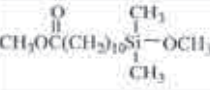
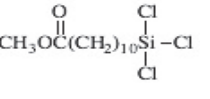



	name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
	SIA0006.0 ACETAMIDOPROPYLTRIMETHOXSILANE C ₈ H ₁₉ NO ₄ Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	221.33	162-5 / 2-3		1.441
	[57757-66-1] HMIS: 3-2-1-X		10g		
	SIA0010.0 ACETOXYETHYLDIMETHYLCHLOROSILANE C ₆ H ₁₃ ClO ₂ Si Flashpoint: 63°C (145°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	180.71	108-9 / 50	1.031 ²⁵	1.4301 ²⁵
	[18306-45-1] HMIS: 3-2-1-X		25g		
	SIA0015.0 ACETOXYETHYLMETHYLDICHLOROSILANE C ₅ H ₁₀ Cl ₂ O ₂ Si Flashpoint: 65°C (149°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	201.12	117 / 62	1.177 ²⁵	1.4390 ²⁵
	[18163-34-3] TSCA EC 242-045-0 HMIS: 3-2-1-X		25g		
	SIA0020.0 ACETOXYETHYLTRICHLOROSILANE C ₄ H ₇ Cl ₃ O ₂ Si Flashpoint: 82°C (180°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	221.54	143 / 70	1.272 ²⁵	1.4427 ²⁵
	[18204-80-3] TSCA EC 242-092-7 HMIS: 3-2-1-X		25g	100g	
	SIA0025.0 ACETOXYETHYLTRIETHOXSILANE C ₁₀ H ₂₂ O ₅ Si >280° rearranges to acetoxytriethoxysilane w/ extrusion of ethylene. ¹ 1. Ezbiatsky, K. A. et al. <i>Chemical Processing of Dielectrics, Insulators & Electronic Ceramics</i> , MRS Proc. 2000 : 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		
	SIA0030.0 ACETOXYETHYLTRIMETHOXSILANE, 95% C ₇ H ₁₆ O ₅ 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		
	SIA0040.0 ACETOXYMETHYLDIMETHYLACETOXSILANE C ₇ H ₁₄ O ₅ 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		
	SIA0050.0 ACETOXYMETHYLTRIETHOXSILANE C ₉ H ₂₀ O ₅ Si Hydrolyzes to form stable silanol solutions in neutral water HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	236.34	106 / 15	1.042 ²⁵	1.4092
	[5630-83-1] HMIS: 2-2-1-X		25g	100g	
	SIA0055.0 ACETOXYMETHYLTRIMETHOXSILANE, 95% C ₆ H ₁₄ O ₅ 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	50g	
	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
	[50000-00-0] HMIS: 2-1-1-X		25g		

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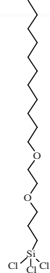

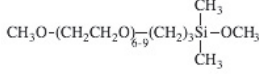

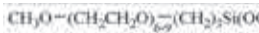


name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIA0090.0 ACETOXYPROPYLMETHYLDICHLOROSILANE C₆H₁₂Cl₂O₂Si Flashpoint: 85°C (185°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [5290-24-4] TSCA EC 226-126-8 HMIS: 3-2-1-X 25g</p>	215.15	142 / 73	1.151 ²⁵	1.4434 ²⁵
 <p>SIA0100.0 ACETOXYPROPYLTRIMETHOXSILANE C₈H₁₆O₅Si Flashpoint: 93°C (199°F) 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 25g 100g</p>	222.31	92 / 2	1.062	1.4146
 <p>SIA0114.0 11-ACETOXYUNDECYLTRICHLOROSILANE C₁₃H₂₆Cl₃O₂Si Flashpoint: >110°C (>230°F) HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [53605-77-9] HMIS: 3-1-1-X 10g</p>	347.78	147-9 / 1	1.084	
 <p>SIA0115.0 11-ACETOXYUNDECYLTRIETHOXSILANE C₁₉H₄₀O₅Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [959053-85-1] HMIS: 2-2-1-X 1.0g</p>	376.61			
 <p>SIA0120.2 (N-ACETYLGLYCYL)-3-AMINOPROPYLTRIMETHOXY-SILANE, 5% in methanol C₁₀H₂₂N₂O₅Si Amino acid-tipped silane HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 3-4-1-X 25g</p>	278.38	(171-3)	0.80	
 <p>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 25g</p>	337-435		0.984	1.4508
 <p>SIB0959.0 BENZOYLOXYPROPYLTRIMETHOXSILANE C₁₃H₂₀O₅Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [76241-02-6] TSCA HMIS: 3-2-1-X 25g</p>	284.38	145 / 0.2	1.104	1.4806
 <p>SIB1815.1 1,3-BIS(3-TRICHLOROSILYLPROPOXY)-2-DECYLOXY-PROPANE C₁₉H₃₈Cl₆O₃Si₂ Dipodal C₁₈ analog with embedded hydrophilicity HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [862912-02-5] HMIS: 3-1-1-X 10g</p>	583.40	190-200 / 0.4	1.158	
 <p>SIB1815.3 3,3-BIS(TRICHLOROSILYLPROPOXYMETHYL)-5-OXA-TRIDECAENE, 95% C₂₀H₄₀Cl₆O₃Si₂ Dipodal hydrophobic surface treatment with embedded hydrophobicity for chromatography HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [862911-99-7] HMIS: 3-1-1-X 10g</p>	597.42	220-2 / 0.9	1.135	
 <p>SIB1824.82 N,N'-BIS-[(3-TRIETHOXSILYLPROPYL)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.¹ Forms proton conducting hybrid organic-inorganic polymer electrode membranes.² 1. Stathatos, E. et al. <i>Adv. Funct. Mater.</i> 2004, <i>14</i>, 45. 2. Honma, I. et al. <i>J. Membr. Sci.</i> 2001, <i>185</i>, 83. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [178884-91-8] TSCA HMIS: 1-1-1-X 25g</p>	1,000 - 1,200		1.088	1.4583 ²⁵

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



	name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
	SIB1824.84 BIS[3-(TRIETHOXYSILYL)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		
	SIB1827.0 BIS[3-(TRIETHOXYSILYL)PROPYL]THIOUREA, 90% C ₁₉ H ₄₄ N ₂ O ₆ SSi ₂ Viscous yellow liquid Forms films on electrodes for determination of mercury. ¹ 1. Guo, Y. et al. <i>J. Pharm. Biol. Anal.</i> 1999 , 19 175. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	484.73	Flashpoint: >110°C (>230°F)	1.047	1.4696
		[69952-89-2]	HMIS: 2-1-1-X	25g	
	SIB1828.0 BIS[3-(TRIETHOXYSILYL)PROPYL]UREA, 60% in ethanol C ₁₉ H ₄₄ N ₂ O ₇ Si ₂ See also SIB1835.5, SIU9055.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	468.73	Flashpoint: 24°C (75°F)	0.923	
		[69465-84-5]	HMIS: 2-1-1-X	25g	100g
	SIB1835.5 BIS(TRIMETHOXYSILYL)PROPYL]UREA, 95% C ₁₃ H ₃₂ N ₂ O ₇ Si ₂ 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
		[18418-53-6]	TSCA	HMIS: 3-2-1-X	25g
				100g	2kg
	SIC2065.0 10-(CARBOMETHOXY)DECYLDIMETHYLCHLORO-SILANE C ₁₄ H ₂₉ ClO ₂ 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 ²⁵
		[53749-38-5]	HMIS: 3-1-1-X	10g	50g
	SIC2067.0 10-(CARBOMETHOXY)DECYLDIMETHYLMETHOXY-SILANE C ₁₅ H ₃₂ O ₃ 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	50g
	SIC2067.6 10-(CARBOMETHOXY)DECYLTRICHLOROSILANE C ₁₂ H ₂₃ Cl ₃ O ₂ Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	333.75	133-6 / 0.3	1.10	
		[4211-29-4]	HMIS: 3-2-1-X	10g	
	SIC2068.0 2-(CARBOMETHOXY)ETHYLMETHYLDICHLORO-SILANE, tech-96 C ₅ H ₁₀ Cl ₂ O ₂ Si Contains ~ 20% 1-(carbomethoxy)ethylmethyldichlorosilane isomer HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents	201.12	98-9 / 25 Flashpoint: 52°C (126°F)	1.187 ²⁵	1.4439 ²⁵
		[18163-42-3]	TSCA	HMIS: 3-2-1-X	25g
	SIC2070.0 2-(CARBOMETHOXY)ETHYLTRICHLOROSILANE METHYL (3-TRICHLOROSILYL)PROPIONATE C ₄ H ₇ Cl ₃ O ₂ 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
		[18147-81-4]	TSCA	EC 242-036-1	HMIS: 3-3-1-X
				25g	100g
	SIC2072.0 2-(CARBOMETHOXY)ETHYLTRIMETHOXYSILANE METHYL (3-TRIMETHOXYSILYL)PROPIONATE C ₇ H ₁₆ O ₅ 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
		[76301-00-3]	HMIS: 3-3-1-X	10g	

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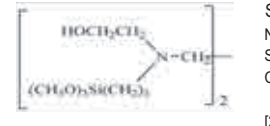

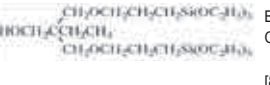

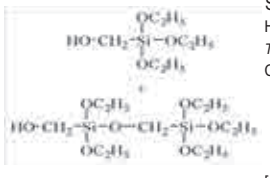

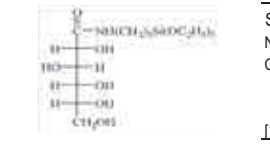

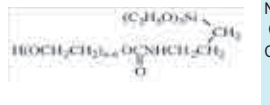
	name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
	SID4465.0 N,N-DIOCTYL-N'-TRIETHOXSILYLPROPYLUREA C ₂₆ H ₅₆ N ₂ O ₄ Si	488.83		0.924 ²⁵	1.4521 ²⁵
	Forms hydrophobic phases with embedded hydrophilicity Forms organic-inorganic vesicles (cerasomers). ¹ 1. Hashizume, M. et al. <i>J. Thin Solid Films</i> 2003 , 438, 20. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [259727-10-1] HMIS: 2-2-1-X 25g				
	SID4472.0 4,7-DIOXAOCYTADECYLTRICHLOROSILANE, 95% C ₁₆ H ₃₃ Cl ₃ O ₂ Si	391.88	165 / 0.7	1.028	
	Forms C ₁₈ bonded phases with embedded hydrophilicity HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 3-1-1-X 10g				
	SIM6491.5 METHOXYETHOXYUNDECYLTRICHLOROSILANE C ₁₄ H ₂₉ Cl ₃ O ₂ 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				
	SIM6492.58 2-[METHOXPOLY(ETHYLENEOXY) _{6,9} PROPYL]- DIMETHYLMETHOXSILANE CH ₃ O(C ₂ H ₄ O) _{6,9} (CH ₂) ₃ (CH ₃) ₂ Si(OCH ₃) ₂	427-559			
	HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 2-2-1-X 5g				
	SIM6492.66 2-[METHOXY(POLYETHYLENEOXY)PROPYL]- TRICHLOROSILANE, tech-90 CH ₃ O(C ₂ H ₄ O) _{6,9} (CH ₂) ₃ Cl ₃ Si	472-604		1.13	
	Forms hydrophilic surfaces Provides protein antifouling surface. ¹ 1. Cecchet, F. et al. <i>Langmuir</i> 2006 , 22, 1173 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [36493-41-1] TSCA HMIS: 3-2-1-X 10g				
	SIM6492.7 2-[METHOXY(POLYETHYLENEOXY)PROPYL]- TRIMETHOXSILANE, tech-90 CH ₃ (C ₂ H ₄ O) _{6,9} (CH ₂) ₃ OSi(OCH ₃) ₃	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. ¹ 1. Parak, W. et al. <i>Chem. Mater.</i> 2002 , 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 100g				
	SIM6492.72 2-[METHOXY(POLYETHYLENEOXY)PROPYL]- TRIMETHOXSILANE, tech-90 CH ₃ (C ₂ H ₄ O) _{9,12} (CH ₂) ₃ OSi(OCH ₃) ₃	591-719		1.071	1.451 ²⁵
	Flashpoint: 88°C (190°F) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [65994-07-2] TSCA HMIS: 2-2-1-X 25g 100g				
	SIM6492.73 2-[METHOXY(POLYETHYLENEOXY)PROPYL]- TRIMETHOXSILANE, tech-90 CH ₃ O(CH ₂ CH ₂ O) ₂₁₋₂₄ (CH ₂) ₃ Si(OCH ₃) ₃	900-1,200			
	HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [65994-07-2] HMIS: 2-2-1-X 1.0g				

	name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
	SIM6493.0 3-METHOXYPROPYLTRIMETHOXY-SILANE C ₇ H ₁₈ O ₄ Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [33580-59-5] HMIS: 3-2-1-X	194.30	98-9 / 40 Flashpoint: 53°C (127°F)	0.995	
			25g	100g	
	SIM6493.2 METHOXYTRIETHYLENEOXYPROPYLTRICHLORO-SILANE C ₁₀ H ₂₁ Cl ₃ O ₄ Si HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents [228700-87-6] TSCA-L HMIS: 3-2-1-X	339.71	148 / 0.3	1.034	
			10g		
	SIM6493.4 METHOXYTRIETHYLENEOXYPROPYLTRIMETHOXY-SILANE C ₁₃ H ₃₀ O ₇ Si Forms polymeric proton-conducting electrolytes. ¹ 1. Ritchie, J. et al. <i>Chem. Mater.</i> 2006 , <i>18</i> , 504. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [132388-45-5] HMIS: 3-2-1-X	326.46	140 / 0.2	1.163	1.4321
			10g		
	SIM6493.7 METHOXYTRIETHYLENEOXYUNDECYLTRIMETHOXY-SILANE PEG3C11 Silane C ₂₁ H ₄₆ O ₇ Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 3-2-1-X	438.68			
			1.0g		
	SIT7122.6 TETRAHYDROFURFURYOXYPROPYL-TRIETHOXY-SILANE C ₁₄ H ₃₀ O ₅ Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 1-2-1-X	306.47	130 / 0.3	0.990	
			10g		
	SIT8186.0 (2-TRIETHOXY-SILYLPROPOXY)ETHOXY-SULFOLANE C ₁₅ H ₃₂ O ₇ SSi 95% Forms hydrophilic surfaces HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [502925-40-8] HMIS: 2-2-1-X	384.56	190-4 / 0.4	1.122	
			10g		
	SIT8186.3 TRIETHOXY-SILYLPROPOXY(POLYETHYLENEOXY)-DODECANOATE (3 EO units) C ₂₇ H ₅₆ O ₈ 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. ¹ 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 [1041420-54-5] HMIS: 2-1-1-X	536.82		0.977	1.4479 ²⁵
			10g		
	SIT8717.0 TRIS(3-TRIMETHOXY-SILYLPROPYL)ISOCYANURATE C ₂₁ H ₄₅ N ₃ O ₁₂ Si ₃ tech-95 Viscosity: 325-350 cSt. Adhesion promoter for hotmelt adhesives Coupling agent for polyimides to silicon metal Forms periodic mesoporous silicas. ¹ 1. Zhang, W. et al. <i>Chem. Mater.</i> 2007 , <i>19</i> , 2663. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water [26115-70-8] TSCA EC 247-465-8 HMIS: 2-1-1-X	615.86	Flashpoint: 102°C (216°F)	1.170	1.4610
			25g	100g	2kg

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Hydrophilic Silane Properties

Hydroxylic

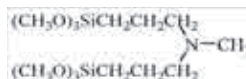
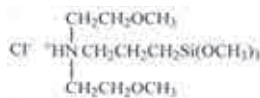
	name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
	SIA0126.0 3-(N-ACETYL-4-HYDROXYPROPYL)PROPYL- TRIETHOXSILANE, 25% in ethanol C ₁₆ H ₃₁ NO ₇ Si Hydrophilic reagent for biomimetic surface modification HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water HMIS: 2-3-0-X	377.51	5g	0.872	
	SIB1140.0 BIS(2-HYDROXYETHYL)-3-AMINOPROPYLTRIETHOXY- SILANE, 62% in ethanol C ₁₃ H ₃₁ NO ₅ Si Contains 2-3% hydroxyethylaminopropyltriethoxysilane Urethane polymer coupling agent Employed in surface modification for preparation of oligonucleotide arrays. ¹ 1. McGall, G. et al. <i>Proc. Natl. Acad. Sci.</i> 1996 , 93, 1355. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	309.48 Flashpoint: 24°C (75°F) Specific wetting surface: 252 m ² /g		0.92	1.4090 ²⁵
	SIB1142.0 N,N'-BIS(HYDROXYETHYL)-N,N'-BIS(TRIMETHOXY- SILYLPROPYL)ETHYLENEDIAMINE, 66-68% in methanol C ₁₈ H ₄₄ N ₂ O ₈ Si ₂ HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	472.73 Flashpoint: 11°C (52°F)		0.98	
	SIB1824.2 BIS-[3-(TRIETHOXSILYLPROPOXY)-2-HYDROXY- PROPOXY]POLYETHYLENE OXIDE, 65% in ethanol C ₂₄ H ₅₄ O ₁₇ Si ₂ (C ₂ H ₄ O) ₅₋₈ HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	800 - 900 Flashpoint: 24°C (75°F)		0.959	1.421
	SIB1824.4 2,2-BIS(3-TRIETHOXSILYLPROPOXYMETHYL)- BUTANOL, 50% in ethanol C ₂₄ H ₅₄ O ₉ Si ₂ For solid-state synthesis of oligonucleotides	542.86		0.899	
	SIH6172.0 N-(HYDROXYETHYL)-N-METHYLAMINOPROPYL- TRIMETHOXSILANE, 75% in methanol C ₉ H ₂₃ NO ₄ Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	237.37 Flashpoint: 16°C (61°F)		0.99	1.417
	SIH6175.0 HYDROXYMETHYLTRIETHOXSILANE, 50% in ethanol TRIETHOXSILYLMETHANOL C ₇ H ₁₈ O ₄ Si Contains equilibrium condensation oligomers Hydrolysis yields analogs of silica-hydroxymethylsilanetriol polymers. ¹ 1. Arkles, B. US Patent 5,371,262, 1994. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	194.31		0.866	
	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
	SIT8189.0 N-(3-TRIETHOXSILYLPROPYL)GLUCONAMIDE C ₁₅ H ₃₃ NO ₉ 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	
	SIT8189.5 N-(3-TRIETHOXSILYLPROPYL)-4-HYDROXY- BUTYRAMIDE C ₁₃ H ₂₉ NO ₅ Si Anchoring reagent for light directed synthesis of DNA on glass. ¹ 1. McGall, G. et al. <i>J. Am. Chem. Soc.</i> 1997 , 119, 5081. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	307.47		1.02	1.4533
	SIT8192.0 N-(TRIETHOXSILYLPROPYL)-O-POLYETHYLENE - OXIDE URETHANE, 95% C ₁₀ H ₂₂ NO ₄ SiO(CH ₂ CH ₂ O) ₄₋₆ H Contains some bis(urethane) analog Viscosity: 75-125 cSt Hydrophilic surface modifier Forms PEGylated glass surfaces suitable for capillary electrophoresis. ¹ 1. Razunguzwa, T. et al. <i>Anal. Chem.</i> 2006 , 78, 4326. See also SIB1824.82 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water	400-500		1.09	1.4540 ²⁵
	[74695-91-3] TSCA HMIS: 2-1-1-X	25g	100g	2kg	

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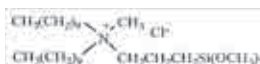
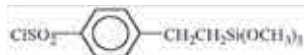
Hydrophilic Silane Properties

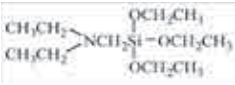


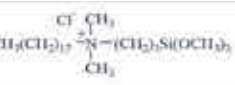


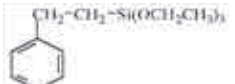


Ionic-Charge Inducible

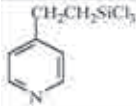

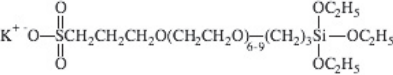


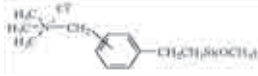
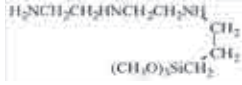

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
<p>(2-N-BENZYLAMINOETHYL)-3-AMINOPROPYL-TRIMETHOXYSILANE hydrochloride, 90% $C_{15}H_{28}N_2O_3Si \cdot HCl$ 50% in methanol Amber liquid HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	348.95	Flashpoint: 9°C (48°F)	0.942	1.4104
[623938-90-9] TSCA HMIS: 3-3-1-X		25g	100g	
SIB1500.0				
<p>BIS(METHOXYETHYL)-3-TRIMETHOXYSILYLPROPYL-AMMONIUM CHLORIDE, 60% in methanol $C_{12}H_{26}NO_5Si \cdot HCl$ Hydrophilic ammonium salt; forms anti-fog surface films HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	331.91	Flashpoint: 11°C (52°F)		
		25g		
SIB1835.0				
<p>BIS(3-TRIMETHOXYSILYLPROPYL)-N-METHYLAMINE $C_{13}H_{33}NO_5Si_2$ See also SIB1828.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	355.58	175 / 10 Flashpoint: 106°C (223°F)	1.023	1.430
[31024-70-1] HMIS: 2-1-0-X		25g	100g	
SIC2263.0				
<p>CARBOXYETHYLSILANETRIOL, SODIUM SALT $C_3H_6Na_2O_5Si$ 25% in water pH: 12 - 12.5 In combination w/ aminofunctional silanes forms amphoteric silicas.¹ 1. Han, L. et al. <i>Chem. Mater.</i> 2007, 19, 2860. HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions</p>	196.14		1.170 ²⁵	
[18191-40-7] HMIS: 2-0-0-X		25g	100g	
SIC2415.0				
<p>2-(4-CHLOROSULFONYLPHENYL)ETHYLTRICHLORO-SILANE, 50% in methylene chloride $C_8H_9Cl_3O_2Si$ 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</p>	338.11		1.37	
[79793-00-3] TSCA EC 279-267-2 HMIS: 4-2-2-X		25g	100g	
SIC2415.4				
<p>2-(4-CHLOROSULFONYLPHENYL)ETHYLTRICHLORO-SILANE, 50% in toluene $C_8H_9Cl_3O_2Si$ 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</p>	338.11		1.08	
[79793-00-3] TSCA EC 279-267-2 HMIS: 4-4-2-X		25g	100g	
SIC2417.0				
<p>2-(4-CHLOROSULFONYLPHENYL)ETHYLTRIMETHOXY-SILANE, 50% in methylene chloride $C_{11}H_{17}ClO_5Si$ Amber color Contains free sulfonic acid Treated silica acts as etherification catalyst.¹ Reagent for surface initiated ATRP.² Employed in mesostructured fuel-cell membranes.³ 1. Sow, B. et al. <i>Microporous and Mesoporous Mat'ls.</i> 2005, 79, 129. 2. Fukuda, J. et al. <i>Macromolecules</i> 2000, 33, 2870. 3. Pereira, F. et al. <i>Chem. Mater.</i> 2008, 20, 1710. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	324.85		1.30 ²⁵	
[126519-89-9] HMIS: 3-2-1-X		25g	100g	
SID3392.0				
<p>N,N-DIDECYL-N-METHYL-N-(3-TRIMETHOXYSILYL-PROPYL)AMMONIUM CHLORIDE, 40-42% in methanol $C_{27}H_{59}ClNO_3Si$ Contains 3-5% $Cl(CH_2)_3Si(OCH_3)_3$ In combination with TEOS forms high pore volume xerogels w/ adsorptive capacity.¹ 1. Markovitz, M. et al. <i>Langmuir</i> 2001, 17, 7085. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	510.32	Flashpoint: 13°C (55°F)	0.863	1.4085
[68959-20-6] TSCA EC 273-403-4 HMIS: 3-4-0-X		25g		



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



name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SID3395.4 (DIETHYLAMINOMETHYL)TRIETHOXSILANE C₁₁H₂₇NO₃Si Catalyst for neutral cure 1-part RTVs HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	249.43	74-6 / 3	0.9336 ²⁵	1.4142 ²⁵
[15180-47-9] TSCA-L HMIS: 2-2-1-X		25g		
 <p>SID3395.6 (N,N-DIETHYLAMINOMETHYL)TRIMETHOXSILANE C₈H₂₁NO₃Si Charge control agent for toner particles Crosslinker for moisture-cure silicone RTVs HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	207.40			
[67475-66-5] TSCA-L HMIS: 3-2-1-X		25g		
 <p>SID3396.0 (N,N-DIETHYL-3-AMINOPROPYL)TRIMETHOXSILANE C₁₀H₂₃NO₃Si Provides silica-supported catalyst for 1,4-addition reactions.¹ 1. Mutokura, K. et al. <i>Chem.-Eur. J.</i> 2009, <i>15</i>, 10871. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	235.40	120 / 20	0.934	1.425
[41051-80-3] TSCA EC 255-192-0 HMIS: 2-1-1-X		25g	100g	
 <p>SIO6620.0 OCTADECYLDIMETHYL(3-TRIMETHOXSILYL- PROPYL)AMMONIUM CHLORIDE, 60% in methanol C₂₈H₅₈ClNO₃Si Contains 3-5% Cl(CH₂)₃Si(OMe)₃ Orients liquid crystals Employed as a glass lubricant Provides an antistatic surface coating Dispersion/coupling agent for high density magnetic recording media.¹ Application as immobilizable antimicrobial reported.² 1. Vincent, H. In <i>Chemically Modified Oxide Surfaces</i>; D. Leyden, D., Ed.; Gordon & Breach: 1990; p.305. 2. White, W. et al. In <i>Silanes, Surfaces & Interfaces</i>; Leyden, D., Ed.; Gordon & Breach: 1986; p.107. See also SID3392.0, SIO6606.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	496.29		0.89	
[27668-52-6] TSCA EC 248-595-8 HMIS: 3-4-0-X		25g	2kg	
 <p>SIP6926.2 2-(2-PYRIDYLETHYL)THIOPROPYLTRIMETHOXY- SILANE C₁₃H₂₃NO₃SSi HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	301.48	156-7 / 0.25	1.089	1.498
[29098-72-4] HMIS: 3-2-1-X		10g		
 <p>SIP6926.4 2-(4-PYRIDYLETHYL)THIOPROPYLTRIMETHOXY- SILANE C₁₃H₂₃NO₃SSi pKa: 4.8 Immobilizable ligand for immunoglobulin IgG separation using hydrophobic charge induction chromatography (HCIC) HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	301.48	160-2 / 0.2	1.09	1.5037
[198567-47-4] HMIS: 3-2-1-X		10g		
 <p>SIP6928.0 2-(4-PYRIDYLETHYL)TRIETHOXSILANE C₁₃H₂₃NO₃Si Amber liquid Forms self-assembled layers which can be "nano-shaved" by scanning AFM.¹ 1. Rosa, L. et al. <i>Mater. Lett.</i> 2009, <i>63</i>, 961. See also SIP6930.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	269.43	105 / 0.9	1.00	1.4624 ²⁴
[98299-74-2] HMIS: 3-2-1-X		10g		
 <p>SIP6930.0 2-(2-PYRIDYLETHYL)TRIMETHOXSILANE 2-(TRIMETHOXSILYLETHYL)PYRIDINE C₁₀H₁₇NO₃Si See also SIP6928.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	227.33	105 / 0.3	1.06	1.4755
[27326-65-4] HMIS: 3-1-1-X		10g	50g	
 <p>SIT8157.0 2-[2-(TRICHLOROSILYL)ETHYL]PYRIDINE C₇H₈Cl₃NSi Fuming solid, moisture sensitive See also SIP6930.0 HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	240.59	280-decomposes (207)		
[17082-69-8] TSCA EC 241-137-8 HMIS: 3-2-1-X		25g		

name	MW	bp/mm (mp)	D ₄ ²⁰	n _D ²⁰
 <p>SIT8158.0 4-[2-(TRICHLOROSILYL)ETHYL]PYRIDINE C₇H₈Cl₃NSi 15-20% in toluene Flashpoint: 4°C (39°F) Hazy liquid; extremely moisture sensitive Employed in polypyridine self-assembled monolayers.¹ 1. Paulson, S. et al. <i>J. Chem. Soc., Chem. Commun.</i> 1992, 21, 1615. See also SIP6930.0.0 2-(TRIMETHOXYSILYLETHYL)PYRIDINE HYDROLYTIC SENSITIVITY: 8: reacts rapidly with moisture, water, protic solvents</p>	240.59		0.93	
[17082-70-1] TSCA EC 241-138-3 HMIS: 3-4-1-X		25g	100g	
 <p>SIT8187.5 N-(3-TRIETHOXYSILYLPROPYL)-4,5-DIHYDRO- IMIDAZOLE C₁₂H₂₆N₂O₃Si Flashpoint: >110°C (>230°F) 3-(2-IMIDAZOLIN-1-YL)PROPYLTRIETHOXYSILANE, IMEO Viscosity: 5 cSt. Coupling agent for elevated temperature-cure epoxies Utilized in HPLC of metal chelates.¹ Forms proton vacancy conducting polymers w/sulfonamides by sol-gel.² Ligand for molecular imprinting of silica with chymotrypsin transition state analog.³ 1. Suzuki, T. et al. <i>Chem. Lett.</i> 1994, 881. 2. De Zea Bermudez, V. et al. <i>Sol-Gel Optics II, SPIE Proc.</i> 1992, 1728, 180. 3. Markowitz, M. et al. <i>Langmuir</i> 2000, 16, 1759. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	274.43	134 / 2	1.005	1.452
[58068-97-6] TSCA EC 261-093-3 HMIS: 2-1-1-X		25g	100g	2kg
 <p>SIT8192.2 TRIETHOXYSILYLPROPYL(POLYETHYLENE- OXY)PROPYLPOTASSIUM SULFATE, 50% in ethanol C₃₂H₆₇KO₁₇SSi Flashpoint: 823.01 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	823.01			
		2.5g		
 <p>SIT8378.3 3-(TRIHYDROXYSILYL)-1-PROPANESULFONIC ACID C₃H₁₀O₆SSi 30-35% in water pH: <1 Employed in preparation of nanoscale ionic silicas.¹ 1. Giannelis, E. et al. <i>Appl. Organomet. Chem.</i> 2010, 24, 581. HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions</p>	202.26		1.12	
[70942-24-4] TSCA HMIS: 3-0-0-X		25g	100g	
 <p>SIT8378.5 3-TRIHYDROXYSILYLPROPYLMETHYLPHOSPHATE, - SODIUM SALT, 42% in water C₄H₁₂NaO₈PSi Flashpoint: 79°C (174°F) Contains 4-5% methanol, sodium methylphosphonate HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions</p>	238.18		1.25	
[84962-98-1] TSCA EC 284-799-3 HMIS: 1-2-0-X		100g	500g	
 <p>SIT8395.0 N-(TRIMETHOXYSILYLETHYL)BENZYL-N,N,N- TRIMETHYLAMMONIUM CHLORIDE, 60% in methanol C₁₃H₂₈ClNO₃Si Flashpoint: 25°C (77°F) Candidate for exchange resins and extraction phases HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	333.93		0.966	
		25g		
 <p>SIT8398.0 (3-TRIMETHOXYSILYLPROPYL)DIETHYLENE- TRIAMINE, 95% C₁₀H₂₇N₃O₃Si Flashpoint: 137°C (279°F) TOXICITY: oral rat, LD50: >2,000 mg/kg γc of treated surface: 37.5 mN/m Hardener, coupling agent for epoxies HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	265.43	114-8 / 2	1.030	1.4590
[35141-30-1] TSCA EC 252-390-9 HMIS: 3-1-1-X		100g	2kg	
 <p>SIT8402.0 N-(TRIMETHOXYSILYLPROPYL)ETHYLENEDIAMINE, - TRIACETIC ACID, TRISODIUM SALT, 35% in water C₁₄H₂₈N₂Na₃O₃Si Flashpoint: 462.42 Essentially silanetriol, contains NaCl Chelates metal ions HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions</p>	462.42		1.26	
[128850-89-5] TSCA HMIS: 2-0-0-X		25g	100g	

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	<p>SIT8405.0 N-(TRIMETHOXSILYLPROPYL)ISOTHIOURONIUM - CHLORIDE, 50% in water <i>TRIHYDROXYPROPYLCARBAMIDOTHIOIC ACID HYDROCHLORIDE</i> C₇H₁₉ClN₂O₃Si Antimicrobial activity reported Essentially silanetriol HYDROLYTIC SENSITIVITY: 0: forms stable aqueous solutions</p>	274.84	1.190	1.441	25g
	<p>SIT8412.0 N-TRIMETHOXSILYLPROPYL-N,N,N-TRI-n-BUTYL- AMMONIUM BROMIDE, 50% in methanol C₁₈H₄₂BrNO₃Si Immobilizable phase transfer catalyst HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	428.52	0.92		25g
	<p>SIT8414.0 N-TRIMETHOXSILYLPROPYL-N,N,N-TRI-n-BUTYL- AMMONIUM CHLORIDE, 50% in methanol C₁₈H₄₂ClNO₃Si Contains 3-5% chloropropyltrimethoxysilane and Bu₃NH⁺Cl⁻ HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	384.08	0.88		25g
	<p>SIT8415.0 N-TRIMETHOXSILYLPROPYL-N,N,N-TRIMETHYL- AMMONIUM CHLORIDE, 50% in methanol <i>N,N,N-TRIMETHYL-3-(TRIMETHOXSILYL)-1-PROPANAMINIUM CHLORIDE</i> C₉H₂₄ClNO₃Si Employed for bonded chromatographic phases Anti-static agent Used to treat glass substrates employed in electroblotting Prevents contact electrification.¹ 1. Thomas, S. et al. <i>J. Am. Chem. Soc.</i> 2009, <i>131</i>, 8746. See also SIT8395.0 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	257.83	0.927	1.3966	25g
	<p>SIT8422.0 N-TRIMETHOXSILYLUNDECYL-N,N,N-TRI-n-BUTYL- AMMONIUM BROMIDE, 25% in dimethylformamide C₂₈H₅₈BrNO₃Si Immobilizable phase transfer catalyst HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	540.74	0.965 ²⁵	1.443	25g

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Polymeric Hydrophilic Silanes
Polymeric Amine

Name	MW	bp °C/mm (mp)	D ₄ ²⁰	n _D ²⁰
	1,500-1,800		0.92	
<p>SSP-060 TRIMETHOXSILYLPROPYL MODIFIED - (POLYETHYLENIMINE), 50% in isopropanol Viscosity: 125-175 cSt ~20% of nitrogens substituted Employed as a coupling agent for polyamides.¹ In combination with glutaraldehyde immobilizes enzymes.² 1. Arkles, B. et al. SPI 42nd Composite Inst. Proc., 21-C, 1987 2. Cramer, S. et al. <i>Biotechnol. Bioeng.</i> 1989, <i>33</i>(3), 344.</p>	100g	2kg		
	1,500-1,800		0.92	
<p>SSP-065 DIMETHOXSILYLMETHYLPROPYL MODIFIED - (POLYETHYLENIMINE), 50% in isopropanol Viscosity: 100-200 cSt ~20% of nitrogens substituted Primer for brass</p>	100g	2kg		

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Water-borne Aminoalkyl Silsesquioxane Oligomers

TSCA




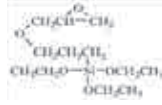
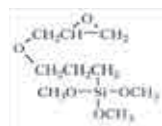

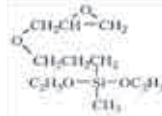

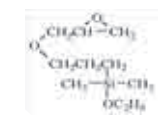
Code	Functional Group	Molecular		Weight % in solution	Specific Gravity	Viscosity	pH	Price/100g	3kg
		Mole %	Weight						
WSA-7011	Aminopropyl	65-75	250-500	25-28	1.10	5-15	10-10.5		
WSA-991*	Aminopropyl	100	270-550	22-25	1.06	5-15	10-10.5		
WSA-7021	Aminoethylaminopropyl	65-75	370-650	25-28	1.10	5-10	10-11		
WSAV-6511**	Aminopropyl, vinyl	60-65	250-500	25-28	1.11	3-10	10-11		

*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 ₄ ²⁰	n _D ²⁰	
 <p>SIE4668.0 2-(3,4-EPOXYCYCLOHEXYL)ETHYLTRIETHOXYSILANE C₁₄H₂₈O₅Si Adhesion promoter for water-borne coatings on alkaline substrates HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	288.46	114-7 / 0.4 Flashpoint: 104°C (219°F)	1.015	1.4455	
[10217-34-2] TSCA		25g	100g	2kg	
 <p>SIE4670.0 2-(3,4-EPOXYCYCLOHEXYL)ETHYLTRIMETHOXY-SILANE C₁₁H₂₂O₄Si Viscosity: 5.2 cSt Coefficient of thermal expansion: 0.8 x 10⁻³ 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.¹ Used to make epoxy-organosilica particles w/ high positive Zeta potential.² 1. Just, O. et al. <i>Mater. Res. Soc. Symp. Proc.</i> 1996, 415, 111. 2. Nakamura, M. and Ishimura, K. <i>Langmuir</i> 2008, 24, 12228. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	246.38	95-7 / 0.25 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 ² /g	1.065	1.4490	
[3388-04-3] TSCA	EC 222-217-1	HMIS: 2-1-1-X	100g	2kg	18kg \$
 <p>SIE4675.0 5,6-EPOXYHEXYLTRIETHOXYSILANE C₁₂H₂₆O₅Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	262.42	115-9 / 1.5 Flashpoint: 99°C (210°F)	0.960 ²⁵	1.4254 ²⁵	
[86138-01-4]		HMIS: 3-2-1-X	10g		
 <p>SIG5839.0 (3-GLYCIDOXYPROPYL)TRIETHOXYSILANE C₁₂H₂₆O₅Si Coupling agent for latex polymers HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	278.42	124 / 3 Flashpoint: 144°C (291°F)	1.00	1.425	
[2602-34-8] TSCA	EC 220-011-6	HMIS: 3-1-1-X	25g	100g	2kg
 <p>SIG5840.0 (3-GLYCIDOXYPROPYL)TRIMETHOXYSILANE 3-(2,3-EPOXYPROPOXY)PROPYLTRIMETHOXYSILANE GLYMO, GPTMS, A-187 C₉H₂₀O₅Si 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.¹ 1. Innocenzi, P. et al. <i>Chem. Mater.</i> 1999, 11, 1672. HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	236.34	120 / 2 (<-70) Flashpoint: 135°C (276°F) TOXICITY: oral rat, LD50: 8,400 mg/kg Surface tension: 38.5 mN/m Specific wetting surface: 331 m ² /g	1.070	1.4290	
[2530-83-8] TSCA	EC 219-784-2	HMIS: 3-1-1-X	100g	2kg	18kg
 <p>SIG5840.1 (3-GLYCIDOXYPROPYL)TRIMETHOXYSILANE 99+% C₉H₂₀O₅Si Low fluorescence grade for high-throughput screening HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	236.34	120 / 2 (<-70) Flashpoint: 135°C (276°F)	1.070	1.4290	
[2530-83-8] TSCA	EC 219-784-2	HMIS: 3-1-1-X	25g		in fluoropolymer bottle
Epoxy Functional Silanes - Dialkoxy					
 <p>SIG5832.0 (3-GLYCIDOXYPROPYL)METHYLDIETHOXYSILANE C₁₁H₂₂O₄Si 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 Flashpoint: 122°C (252°F) TOXICITY: oral rat, LD50: >2,000 mg/kg	0.978 ²⁵	1.431	
[2897-60-1] TSCA	EC 220-780-8	HMIS: 2-1-1-X	25g	100g	2kg
 <p>SIG5836.0 (3-GLYCIDOXYPROPYL)METHYLDIMETHOXYSILANE C₉H₂₀O₄Si Relative hydrolysis rate vs. SIG5840.0: 7.5:1 HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	220.34	100 / 4 Flashpoint: 105°C (221°F)	1.02	1.431 ²⁵	
[65799-47-5] TSCA	EC 265-929-8	HMIS: 3-1-1-X	25g	100g	
Epoxy Functional Silanes - Monoalkoxy					
 <p>SIG5825.0 (3-GLYCIDOXYPROPYL)DIMETHYLETHOXYSILANE C₁₀H₂₂O₄Si HYDROLYTIC SENSITIVITY: 7: reacts slowly with moisture/water</p>	218.37	100 / 3 Flashpoint: 87°C (189°F)	0.950	1.4337 ²⁵	
[17963-04-1] TSCA	EC 241-889-7	HMIS: 3-2-1-X	10g	50g	

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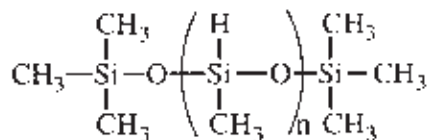
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Silyl Hydrides

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 ₄ ²⁰	n _D ²⁰
$\text{CH}_3(\text{CH}_2)_{10}\text{CH}_2\text{SiH}_3$	SID4629.6 DODECYLSILANE C ₁₂ H ₂₆ 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	200.44	80 / 7	0.7753	1.4380 ²⁵
	SIO6635.0 n-OCTADECYLSILANE C ₁₈ H ₄₀ Si Contains 4-6% C ₁₈ isomers Flashpoint: >110°C (>230°F) Forms self-assembled monolayers on titanium. ¹ Reacts onto a gold surface to form monolayers of long alkyl chains. ² 1. Fadea, A. et al. <i>J. Am. Chem. Soc.</i> 1989 , 121, 12184. 2. Owens, T. M. et al. <i>J. Am. Chem. Soc.</i> 2002 , 124, 6800. HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base [18623-11-5] TSCA EC 242-453-9 HMIS: 2-1-1-X 25g 100g	284.60	195 / 15 (29)	0.794	
$\text{CH}_3(\text{CH}_2)_{16}\text{CH}_2\text{SiH}_3$	SIT8173.0 TRIDECAFLUORO-1,1,2,2-TETRAHYDROOCTYL)SILANE C ₈ H ₇ F ₁₃ 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	378.21	75 / 25	1.446	1.318
	SIU9048.0 10-UNDECENYLSILANE C ₁₁ H ₂₄ Si Forms self-assembled monolayers on gold HYDROLYTIC SENSITIVITY: 3: reacts with aqueous base HMIS: 2-3-1-X 2.5g	184.40		0.768 ²⁵	1.4415 ²⁵

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

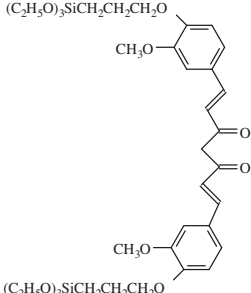
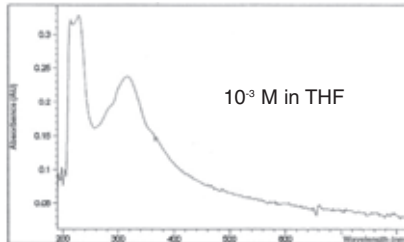
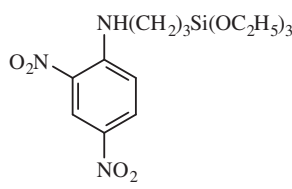
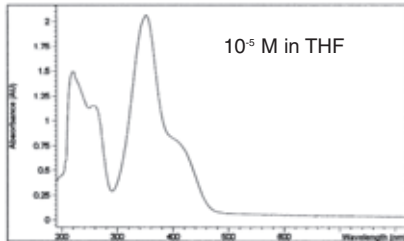
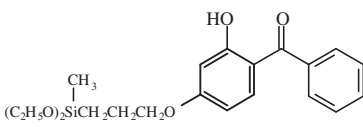
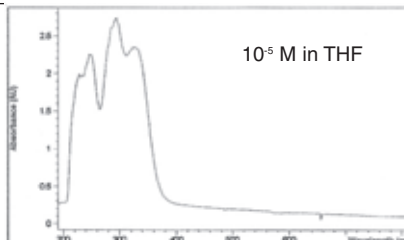
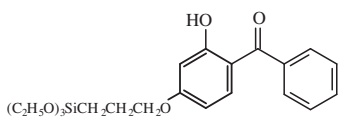
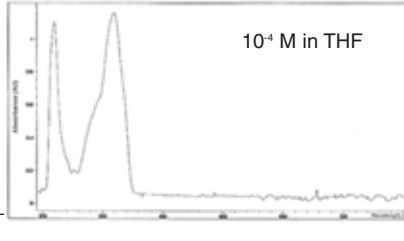
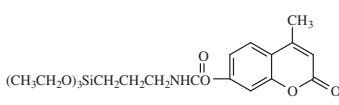
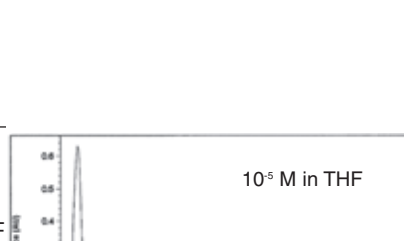
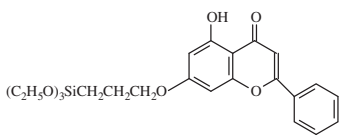
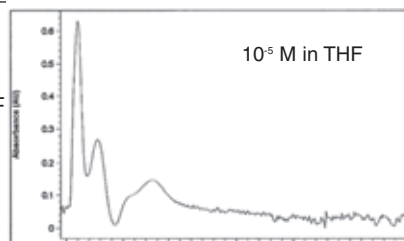
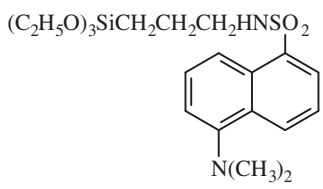
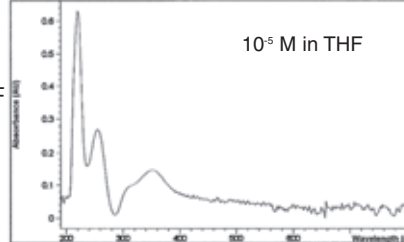
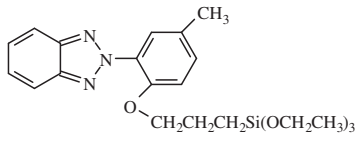



polyMethylHydrosiloxanes, Trimethylsiloxy terminated Tg: -119° V.T.C: 0.50 CAS: [63148-57-2] TSCA

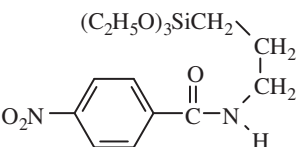
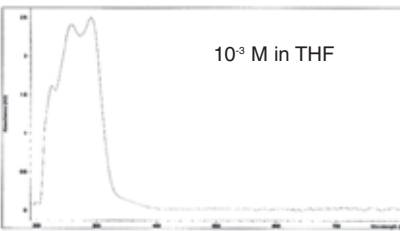
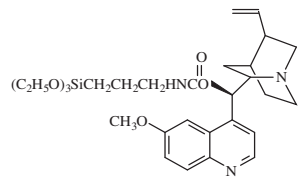
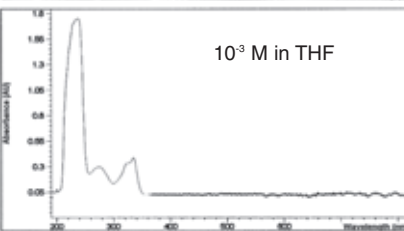
Code	Viscosity	Molecular Weight	Mole % (MeHSiO)	Equivalent Weight	Specific Gravity	Refractive Index	Price/100g	Price/3 kg
HMS-991	15-25	1400-1800	100	67	0.98	1.395		
HMS-992	25-35	1800-2100	100	65	0.99	1.396		
HMS-993	35-45	2100-2400	100	64	0.99	1.396		

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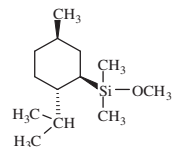
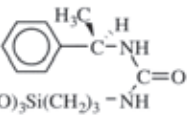
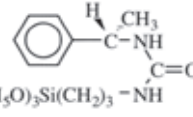
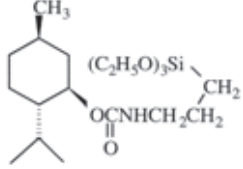
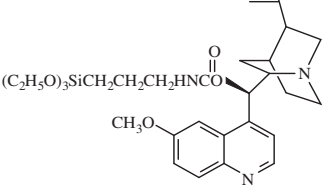
UV Active and Fluorescent Silanes

	name	MW	bp/mm (mp)	n_D^{20}	
	SIB1824.8 BIS(4-TRIETHOXSILYLPROPYL-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-TRIETHOXSILANE, 95% $C_{15}H_{25}N_3O_7Si$ viscous liquid or solid UV: 222, 258, 350(max), 410 forms χ^2 non-linear optical sol-gel materials by corona poling ^{1,2} . 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	1.5665	
	SIH6198.0 2-HYDROXY-4-(3-METHYLDIETHOXSILYL-PROPOXY)DIPHENYLKETONE, 95% $C_{21}H_{28}O_5Si$ monomer for UV opaque fluids HMIS: 2-1-1-X	388.54			
	SIH6200.0 2-HYDROXY-4-(3-TRIETHOXSILYLPROPOXY)-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 ¹ . B. Anthony, US Pat. 4,495,360, 1985 [79876-59-8] TSCA HMIS: 2-1-1-X	418.56		1.545 ²⁵	
	SIM6502.0 0-4-METHYLCOUMARINYL-N-[3-(TRIETHOXSILYL)PROPYL]CARBAMATE $C_{20}H_{29}NO_7Si$ immobilizeable fluorescent compound ¹ . 1. B. Arkles, US Pat. 4,918,200, 1990 [129119-78-4] HMIS: 2-2-1-X	423.54	(88-90°)mp		
	SIT8186.2 7-TRIETHOXSILYLPROPOXY-5-HYDROXY-FLAVONE $C_{24}H_{30}O_7Si$ HMIS: 2-1-1-X	458.58			
	SIT8187.0 N-(TRIETHOXSILYLPROPYL)DANSYLAMIDE 5-DIMETHYLAMINO-N-(3-TRIETHOXSILYLPROPYL)-NAPHTHALENE-1-SULFONAMIDE $C_{21}H_{34}N_2O_5Si$ density: 1.12 fluorescent- employed as a tracer in UV cure composites fluorescence probe for crosslinking in silicones ¹ . 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-TRIETHOXSILYLPROPOXY-5-METHYL-PHENYL)BENZOTRIAZOLE $C_{22}H_{31}N_3O_4Si$ UV blocking agent/stabilizer HMIS: 2-1-1-X	429.59			

PLEASE INQUIRE ABOUT BULK QUANTITIES

	name	MW	bp/mm (mp)	n_D^{20}
	SIT8191.0 3-(TRIETHOXYSILYLPROPYL)-p-NITRO-BENZAMIDE $C_{16}H_{26}N_2O_6Si$ 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	
	SIT8192.4 N-TRIETHOXYSILYLPROPYL-O-QUININE-URETHANE, 95% $C_{30}H_{45}N_3O_6Si$ 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	

Chiral Silanes

	name	MW	bp/mm (mp)	D_4^{20}	n_D^{20}
	SIM6472.6 (-)-MENTHYLDIMETHYLMETHOXYSILANE $C_{13}H_{28}OSi$ reagent for chiral separations HMIS: 3-2-1-X	228.45			
			5.0g		
	SIP6731.5 (R)-N-1-PHENYLETHYL-N'-TRIETHOXYSILYL-PROPYLUREA $C_{18}H_{32}N_2O_4Si$ 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 ²⁵	
			25g		
	SIP6731.6 (S)-N-1-PHENYLETHYL-N'-TRIETHOXYSILYL-PROPYLUREA $C_{18}H_{32}N_2O_4Si$ 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 ²⁵	
			25g		
	SIT8190.0 (S)-N-TRIETHOXYSILYLPROPYL-O-MENTHO-CARBAMATE $C_{20}H_{41}NO_5Si$ optically active [68479-61-8] TSCA HMIS: 2-1-1-X	406.63	flashpoint: > 110°C(>230°F)	0.985 ²⁵	1.4526
			10g		
	SIT8192.4 N-TRIETHOXYSILYLPROPYL-O-QUININE-URETHANE, 95% $C_{30}H_{45}N_3O_6Si$ 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		

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, "SiO₂ 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.



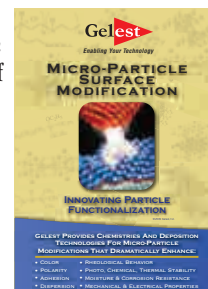
Silane Coupling Agents

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

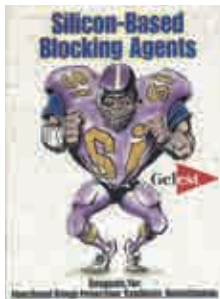
Detailed chemical properties and reference articles for over 1600 compounds. The 590 page catalog of silane and silicone chemistry includes scholarly reviews as well as detailed information on various applications.



For Synthesis:

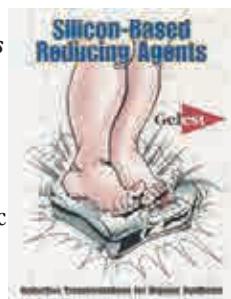
Silicon-Based Blocking Agents

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.*



*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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