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Silico SILICONES

Silico Organosilicon

SILICO SILICONE
GLOBAL-ORIENTED CHEMICAL SUPPLIER

SILICO ORGANOSILICON

Shandong Silico Silicone Materials Co., Ltd., established in 2007, is a leading high-tech enterprise specializing in the research, development, production, and sales of silicone materials. Our core products include silicone rubber, silicone oil, silicone resin, fumed silica, and silicone intermediates. We have a fully integrated production capacity, covering everything from silicon metal powder processing to silicone monomers, intermediates, and downstream products, ensuring a complete industrial chain.

Leading Manufacturer in China's Organosilicon Industry

With over 15 years of continuous growth, Shandong Silico has become one of China's largest organosilicon enterprises. The company operates three organosilicon monomer production units, with a methyl chlorosilane monomer production capacity of 600,000 tons per year. As a key supplier of silicone deep-processing products, we offer more than 300 grades of silicone rubber, silicone oil, fumed silica, and other advanced materials.

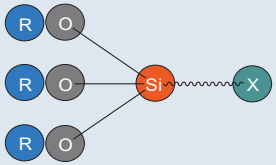
Why select Silico Organosilicon?

- Strong silane and silicone manufacturing capabilities built over 30+ years history.
- Flexible manufacturing facility able to handle kilograms to thousands of tons per years.
- Rapid and professional process development and scale-up capabilities.
- Offer tailored options while adhering to high quality and safety standards.

Silane Coupling Agents

Introduction

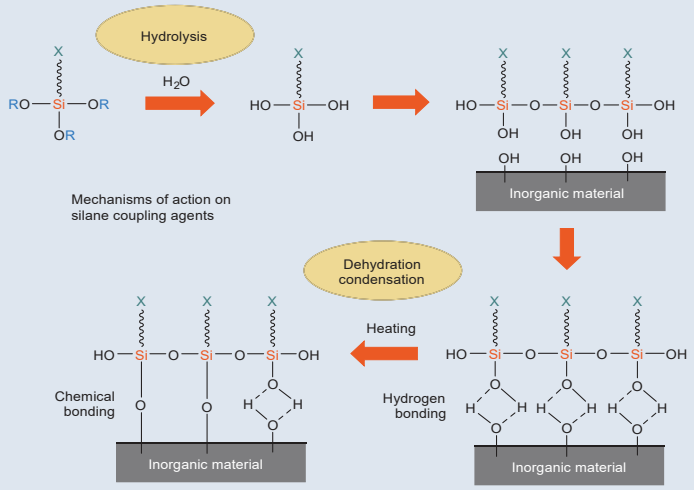
Silane coupling agents are generally illustrated:



Silicone (Si) is the center of the silane molecule which contains an organic functional group (X) [ex: vinyl, amino, chloro, epoxy, mercapto, etc.], with a second functional group (R) [ex: methoxy, ethoxy, etc.]. The functional group (R) will attach to an organic resin while the functional group (R) attaches to an inorganic material or substrate to achieve a "coupling" effect.

Silane coupling agents are predominately used as mediators, binding organic materials to inorganic materials. As a result silanes will improve the electrical and mechanical strength properties of materials in wet or dry conditions.

Mechanisms of Silane Coupling Agents



The inorganic group (R) of the silane molecule will hydrolyze to produce silanol, which forms a metal hydroxide or siloxane bond with the inorganic material. The organic group (X) of the silane molecule will react with the organic material to produce a covalent bond. As a result the organic material and the inorganic material are tightly bound together after heating.

This unique property of silane coupling agents is utilized widely in the application of the silane coupling agents for the surface treatment of glass fiber products, performance improvement of fiber-reinforced plastics by the direct admixture to the synthetic resin, improvement of paints and other coating materials and adhesives, modification of surface properties of inorganic fillers, surface priming of various substrate materials, etc.

When a silane coupling agent is used in a thermosetting resin-based fiber-reinforced material, remarkable improvements are obtained in the mechanical and electrical properties of the material and the effect is more remarkable when the material is used in a wet or humid condition.

Application of silane coupling agents to thermoplastic resin-based fiber-reinforced materials is also actively performed along with the efforts to develop a silane coupling agent having further enhanced coupling effects.

METHOD

Basic methods for using silane coupling agents

There are three basic approaches for using silane coupling agents. The silane can be used to treat the surface of the inorganic materials before mixing with the organic resin or it can be added directly to the organic resin or holistic mixing (in organic-inorganic mixture).

Method I: The Surface Treatment of Inorganic Materials

- *Glass fiber*

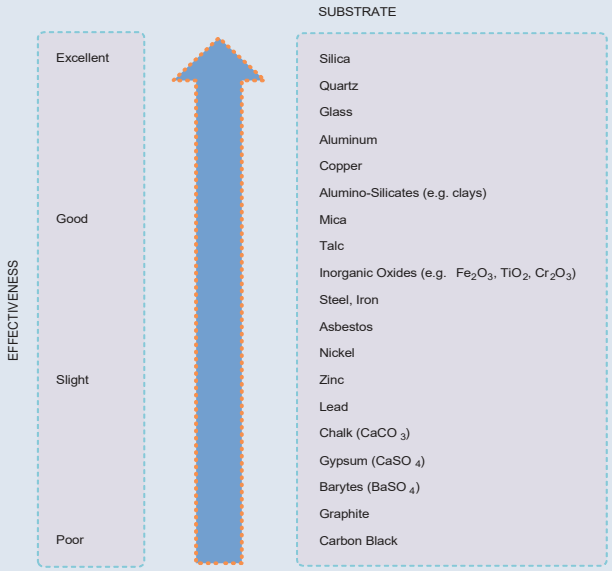
  Dip glass fiber into 0.1-0.5% silane coupling agent – water solution(or water-ethanol solution) and air-dry, at last dealing in desiccatore with 110-120°C for 5-10 minutes.

- *Inorganic filler*

  Filler which contains an excess of hydroxyl groups on the surface is especially effective.

The effect with different kinds of fillers

Excellent Effect	Silica, alumina, glass, quartz, porcelain clay
Good Effect	Mica, talc, clay, water and alumina, grammiteiron dust, potassium titanic acid
Slight Effect	Asbestos, ferric oxide, zinc oxide, carborundum, silicon nitride
Poor Effect	calcium carbonate, carbon, barium sulphate,boron



There are three general methods for treating the surfaces of inorganic filler materials before they are added to the organic resins.

a) Wet Method

By mixing slurry of the inorganic materials in a dilute solution of the silane coupling agent, a highly uniform and precise surface treatment of the inorganic material can be obtained.

b) Dry Method

A high shear, high speed, mixer is used to disperse the silane coupling agent into the inorganic materials. The silane is generally applied either neat or as a concentrated solution. When compared to the Wet Method, the Dry Method is most often preferred for large-scale production, treating a large amount of filler in a relatively short time and generating relatively little mixed waste; however, it is more difficult to obtain uniform treatment with this method.

c) Spray Method

Spray the silane coupling agent on high temperature filler that was just taken out from furnace. The method may omit dry procedure and make the process simplify, but pay attention to perflation and ignite.

Method II: Addition To Organic Materials

Compared to the methods for the surface treatment of inorganic materials, adding the silane to the organic resin is more widely used in industries because of its excellent process efficiency, although curing may be more difficult. There are two general methods.

a) Integral Blending

This method involves simple blending of the silane coupling agent into the composite formula as the inorganic and organic materials are mixed together.

b) Master Batch

In this method, the silane coupling agent is first added to a small amount of the organic resin material to form what is referred to as a "master batch". In general, the silane coupling agent dosage is 0.2-2% or so. Usually in the form of pellets or large granules, the master batch can be easily added along with the pellets of the organic resin when producing the composite materials. Pay attention to bodying and generate gelatin phenomena by silane coupling agent.

Method III: Holistic mixing (in Organic-Inorganic mixture)

Directly add the diluent of silane coupling agent and organic solvent when mixing organic resins and inorganic fillers. The silane coupling agent dosage is 0.2-2% or so.

CALCULATING THE QUANTITY OF SILANE REQUIRED:

The silicone molecule is preferably attached to the surface of the inorganic material as a primer to form a mono-layer. Applying a silane as a primer will produce optimum coupling results between the substrate and the resin to be applied. When used as a primer the required amount of silane can be calculated by the following:

METHOD

$$\text{Amount of silane (g)} = \frac{\textit{Amount of filler (g) x Surface area } (m^2/g)}{\textit{Minimum coating area of silane coupling agent } \ (m^2/g)}$$

Filler	Surface Area of Filler (m2/g)
E-glass	0.1 - 0.12
Quartz	1 - 2
Kolin	7
Clay	7
Talc	7
Aluminum polysilicate	1
Calcium carbonate	5
Calcium silicate	2.6

Product	Minimum Coverage Area(m2/g)
Silico® PC1110	436
Silico® PC1100	353
Silico® PC3100	330
Silico® PC4100	314
Silico® PC2300	398
Silico® PC1220	380
Silico® PC1200	351

The actual values may deviate from the calculated value depending on the surface condition of the filler or the silane treating process. The following values may be used as guidelines when the value is unknown. A dilution of 1% silane to filler may be considered as standard. Generally 0.3% to 0.5% is recommended.

REACTIVITY:

The alkoxy groups of the coupling agents react with water to form silanol groups which immediately form covalent bonds by dehydration and condensation:

$$XSi(OR)_3 + 3H_2O \xrightarrow{-3\ ROH} XSi(OH)_3 \xrightarrow{-3/2\ H_2O} XSiO_{3/2}$$

Handling

Handling

Silane coupling agents are subject to hydrolysis when in contact with water. Hydrolysis of a Silane Coupling Agent is accompanied by the formation of hydrogen chloride, methyl alcohol, ethyl alcohol, aklyl ethers of ethyleneglycol and other hydrolysis products so that carefulness is essential in handling and using silane coupling agents.

1. Silane coupling agents must be kept away from fire and moisture and should not be kept standing in an open condition as far as possible.
2. Work rooms for handling silane coupling agents should be well ventilated. Avoid inhalation of the vapor and contact with the vapor.
3. Skin and eyes must be protected from silane coupling agents by use of protective glove and eyeglasses. If silane coupling agents get on the skin or in the eye immediately wash in running water. Subsequent consultation with a doctor is recommended.
4. Care should be taken not to put a Silane Coupling Agent on clothes. Clothes which come in contact with silane coupling agents should be immediately washed in running water.
5. Workers are recommended to thoroughly wash their hands after handling a Silane Coupling Agent, particularly, before eating, drinking or smoking.
6. Split Silane Coupling Agent must be removed by washing away with a large volume of water or absorbed by rags or sand followed by disposal by burning.

STORAGE

Storage

1. Care is required in storage of silane coupling agents to avoid denaturation by the reaction with water or moisture.
2. Once the container is opened, replace the stopper tightly as soon as possible to prevent intrusion of moisture.
3. The storage room must be dark and cool. High temperature and high humidity are absolutely undesirable for storage of silane coupling agents.

APPLICATION

Typical Application

Applications	Benefits
Adhesives	Moisture initiated crosslinking of resins, improved wet adhesion, improved chemical resistance, weather ability and filler/resin coupling.
Coatings	Moisture initiated crosslinking of resins, improved wet adhesion, chemical and corrosion resistance, weather ability, pigment dispersion and scrub resistance.
Crude Oil Extraction	Consolidation of down-hole fines
Glass Fibers	Coupling of resins with fiber for improved resiliency of insulation batts; better wet strength retention and electrical properties of FRP composites, and improved fiber strand integrity, protection and handling.
Filler Treatment	Improved coupling of resins with fillers and better filler dispersion in thermoset and thermoplastic resins.
Foundry	Coupling of resins with sand for improved foundry core strength.
Polymer Modification	Moisture-cure crosslinking to give improved environmental and chemical resistance.
Printing Inks	Improved adhesion, release and wetting.
Rubber and Elastomers	Coupling of resins with minerals for improved composite strength, toughness, abrasion resistance, rolling resistance, wet electrical properties and rheology control.
Sealants	Moisture initiated crosslinking of resins, improved wet adhesion, chemical resistance, filler dispersion, weather ability and rheology.
Textiles	Altered textile hand and water repellency, and improved dye receptivity.
Thermoplastics	Moisture curable XLPE for Wire & Cable and Pipe, Mineral and Pigment treatment for dispersibility and coupling and reinforcement coupling for high performance thermoplastics.

Polyester Resins Application

Best results are obtained in an unsaturated polyester-based FRP by using a vinyl – or methacryloxy-containing silane as the silane coupling agent. Remarkable improvements are made in the mechanical strengths and electrical characteristics as well as in the appearance of FRP of an unsaturated polyester resin by using the silane coupling agent, especially when the FRP is used in a wet or humid condition.

Polyester Resin Concrete Application

Resin concretes are advantageous over ordinary cement concrete in respect of lighter weight, better resistance adjoins chemicals, higher electric insulation, more rapid curing, etc. and accepted as a useful material in oceanic technology and others

Epoxy Resins Application

Epoxy resin laminated plates are manufactured by wet lay-up lamination or dry-up lamination. The latter method is performed as the major current of modern technology for the reasons in the manufacturing process and the characteristics of the products. A variety of curing agents are used including aliphatic amines, aromatic amines and acid anhydrides while the properties of the laminated plate product largely depend on the type of the curing agent.

Best results are obtained in the improvements of glass cloth reinforced epoxy resin plates by the use of an epoxy or amino-containing silane as the silane coupling agent.

Phenolic Resins Application

Phenolic resins are used in laminated products, brake shoes, grinding stones, shell molding, etc.

Shell Molding Application

The amount of a phenolic resin or furan resin as binder of silica sand for casting mold can be reduced by using a silane coupling agent by virtue of the great increase in the strength of the mold. Saving of the binder resin is also advantageous by the decrease in the volume of the decomposition gas contributing to the increase on the yield of acceptable products. Aminosilanes are recommended for this purpose. Usually, the silane coupling agent is admixed with the binder resin or with the curing catalyst of the resin. When blending with the resin is desired, Silico PC1220, a di-functional aminosilane, is the recommended silane coupling agent for storage.

APPLICATION

Elastomers Formulated with White Fillers Application

White fillers compounded with elastomers include finely divided silica fillers, calcium carbonate, clays, and alumina. Usually, no chemical bond is formed between the surfaces of these white fillers and the elastomer molecules. This is the reason for the poorer dispersibility and reinforcing performance of these fillers in elastomers than in carbon blacks.

The reinforcing performance of white fillers in an organic elastomer can be greatly improved by the addition of a silane coupling agent.

Thermoplastic Resins Application

Although the mechanism of the activity exhibited by a silane coupling agent has not yet been understood for thermoplastic resins having no organic functional groups, silane coupling agents are indeed effective on thermoplastic resins as reported by Sterman, et al., who determined the flexural strength of various kinds of FRTP (fiber-reinforced thermoplastics) prepared using glass cloths treated with a variety of silanes.

The application of silane coupling agents to polyolefins such as polyethylene and polypropylene is also under active investigation and Sterman et al. have reported that the combined use of an organic peroxide and a double bond-containing silane such as vinyl silanes and methacrylic silanes is effective on polypropylene in remarkably improving the properties of the FRTP of the polymer.

Hartlein has reported that a good coupling agent for polypropylene is 3-mercaptopropyl trimethoxysilane and a synergistic effect can be obtained by the combined use of an aminoalkyl silane and a highly chlorinated compound such as a chlorinated xylene.

It is also reported that the strength of FRTP is remarkably improved by the combined use of an aminoalkyl silane and a highly chlorinated compound such as a chlorinated xylene.

Plueddemann has reported that the hydrochloride of a vinyl benzyl aminoakyl silane is an excellent coupling agent for thermoplastic resins.

Glass Fiber-reinforced Thermoplastic Resins Application

Glass fiber-reinforced resins prepared by impregnating a thermoplastic resin such as nylon, polyester, etc., with glass fibers have excellent mechanical characteristics, heat resistance, dimensional stability and other properties and are widely used as parts in automobiles and electric instruments.

Filler-formulated Thermoplastic Resins Application

Addition of a silane coupling agent is effective in improving the mechanical properties of thermoplastic resins impregnated with inorganic filler, though not so remarkably as in the case of glass cloth-laminated plates.

Synthetic Resin Modification Application

Following effects are expected when an organic synthetic resin is modified by a silane coupling agent with a chemical reaction taking place between them.

(1) The adhesive bonding is improved between the resin and an inorganic substrate material.

(2) Crosslinkable groups having reactivity can be introduced into the resin.

(3) Heat resistance and weathering resistance of the resin can be improved depending upon the extent of modification.

As an example case (2), the hydrolysis and silanol condensation reaction of alkoxysilyl groups in the presence of water to form a stable siloxane linkage is utilized in crosslinking polyethylene, sealing materials, thermosetting acrylic resins, etc.

Primer Application

The use of a silane coupling agent as a primer is a widely practiced technique for the improvement of the adhesive bonding between a sealing material such as a polyurethane-or polysulfide-based sealant and the surface of an inorganic substrate such as metal or glass, since otherwise the adhesive bonding strength between them is rather poor. In particular, aminosilanes are recommended for this purpose although they are not always quite satisfactory with respect to water resistance.

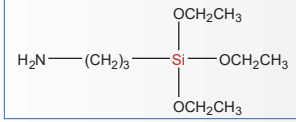
Silane coupling agents are generally effective as a primer for the polysulfide- and polyurethane-based sealing materials.

SILICO ORGANOSILICON

Amino Silanes

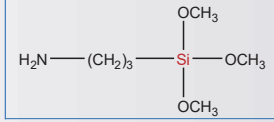
Silico® PC1100 [CAS 919-30-2]

3-Aminopropyltriethoxysilane



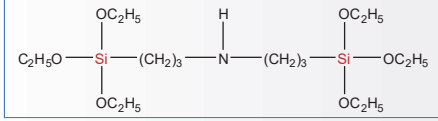
Silico® PC1110 [CAS 13822-56-5]

3-Aminopropyltrimethoxysilane



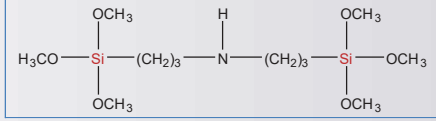
Silico® PC1108 [CAS 13497-18-2]

Bis[(3-triethoxysilyl)propyl]amine



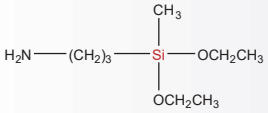
Silico® PC1118 [CAS 82985-35-1]

Bis[(3-trimethoxysilyl)propyl]amine



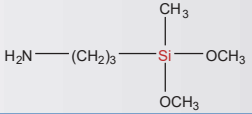
Silico® PC1120 [3179-76-8]

3-Aminopropylmethyldiethoxysilane



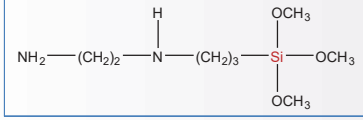
Silico® PC1130 [CAS 3663-44-3]

3-Aminopropylmethyldimethoxysilane



Silico® PC1200 [CAS 1760-24-3]

N-(2-Aminoethyl)-3-Aminopropyltrimethoxysilane



Silico® PC1210 [CAS 5089-72-5]

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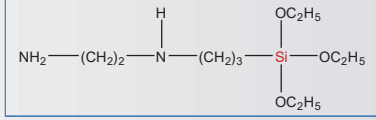
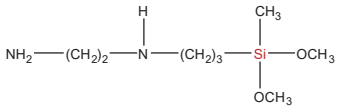


Amino Silanes

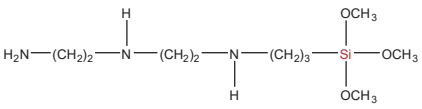
Silico® PC1220 [CAS 3069-29-2]

N-(2-Aminoethyl)-3-Aminopropylmethyldimethoxysilane



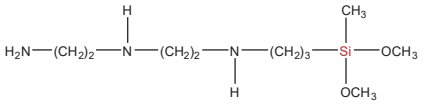
Silico® PC1300 [CAS 35141-30-1]

N-(3-trimethoxysilylpropyl)diethylenetriamine



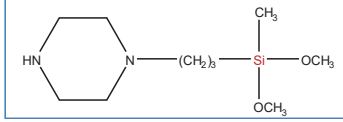
Silico® PC1320

N-(3-methyldimethoxysilylpropyl)diethylenetriamine



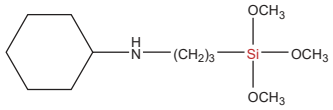
Silico® PC1412 [CAS 128996-12-3]

3-Piperazinylpropylmethyldimethoxysilane



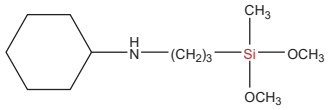
Silico® PC1600 [CAS 3068-78-8]

3-(N-Cyclohexylamino)propyltrimethoxysilane



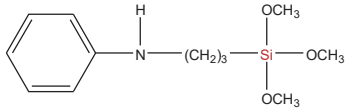
Silico® PC1620 [CAS 120218-28-2]

3-(N-Cyclohexylamino)propylmethyldimethoxysilane



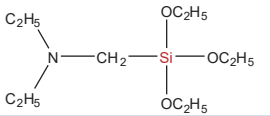
Silico® PC1730 [CAS 3068-76-6]

3-(N-Cyclohexylamino)propyltrimethoxysilane



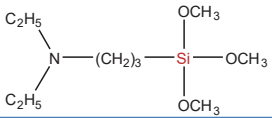
Silico® PC1800 [CAS 15180-47-9]

Diethylaminomethyltriethoxysilane



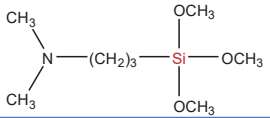
Silico® PC1830 [CAS 41051-80-3]

Diethylaminopropyltrimethoxysilane



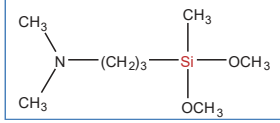
Silico® PC1860 [CAS 2530-86-1]

Dimethylaminopropyltrimethoxysilane



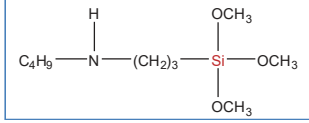
Silico® PC1862 [CAS 67353-42-8]

Dimethylaminopropylmethyldimethoxysilane



Silico® PC1951 [CAS 31024-56-3]

N-(n-butyl)-3-aminopropyltrimethoxysilane

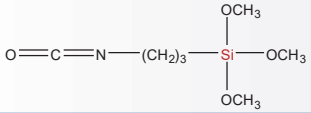


SILICO ORGANOSILICON

Isocyanate Silanes

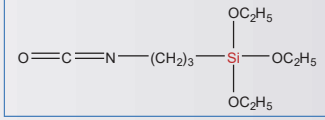
Silico® PC2710 [CAS 15396-00-6]

3-Isocyanatepropyltrimethoxysilane



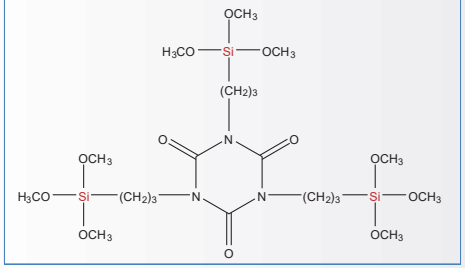
Silico® PC2720 [CAS 24801-88-5]

3-Isocyanatepropyltriethoxysilane



Silico® PC2780 [CAS 26115-70-8]

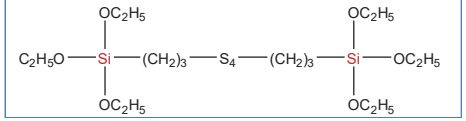
Tris-(3-(trimethoxysilyl)propyl)isocyanurate



Sulfur / Mercapto / Thiocyanato Silanes

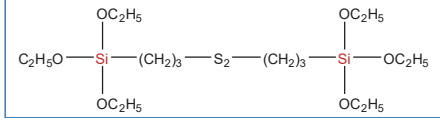
Silico® PC2000 [CAS 40372-72-3]

Bis(triethoxysilylpropyl)tetrasulfide



Silico® PC2200 [CAS 56706-10-6]

Bis(triethoxysilylpropyl)disulfide



Silico® PC2001

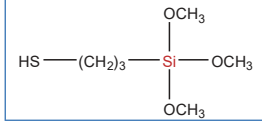
Mixture of PC2000 and Carbon Black N330

Silico® PC2201

Mixture of PC2200 and Carbon Black N330

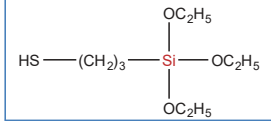
Silico® PC2300 [CAS 4420-74-0]

3-Mercaptopropyltrimethoxysilane



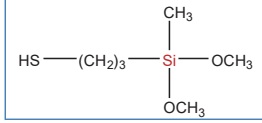
Silico® PC2310 [CAS 14814-09-6]

3-Mercaptopropyltriethoxysilane



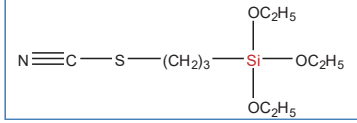
Silico® PC2320 [CAS 31001-77-1]

3-Mercaptopropylmethyldimethoxysilane



Silico® PC2640 [CAS 34708-08-2]

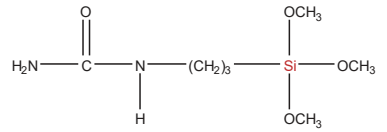
3-Thiocyanatopropyltriethoxysilane



Ureido Silanes

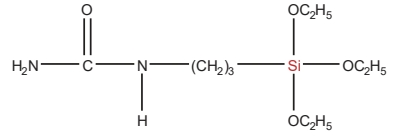
Silico® PC2510 [CAS 23843-64-3]

3-Ureidopropyltrimethoxysilane



Silico® PC2520 [CAS 23779-32-0]

3-Ureidopropyltriethoxysilane



Silico® PC2521 [CAS 116912-64-2]

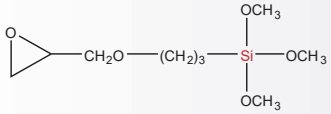
3-Ureidopropyltriethoxysilane (50% in methanol)

SILICO ORGANOSILICON

Epoxy Silanes

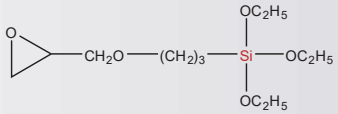
Silico® PC3100 [CAS 2530-83-8]

3-Glycidoxypropyltrimethoxysilane



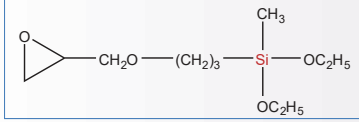
Silico® PC3200 [CAS 2602-34-8]

3-Glycidoxypropyltriethoxysilane



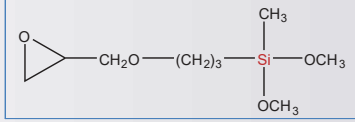
Silico® PC3300 [CAS 2897-60-1]

3-Glycidoxypropylmethyldiethoxysilane



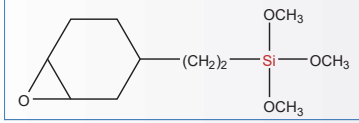
Silico® PC3400 [CAS 65799-47-5]

3-Glycidoxypropylmethyldimethoxysilane



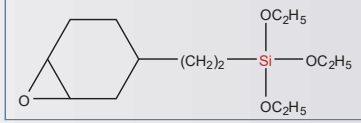
Silico® PC3500 [CAS 3388-04-3]

2-(3,4-Epoxycyclohexyl)-ethyltrimethoxysilane



Silico® PC3510 [CAS 10217-34-2]

2-(3,4-Epoxycyclohexyl)-ethyltriethoxysilane



Silico® OP3160

Epoxy silane hydrolysate

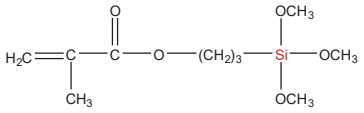
Silico® OP3000

Epoxy functional silane oligomer

Acyl Silanes

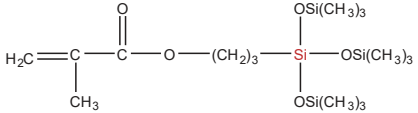
Silico® PC4100 [CAS 2530-85-0]

3-Methacryloxypropyltrimethoxysilane



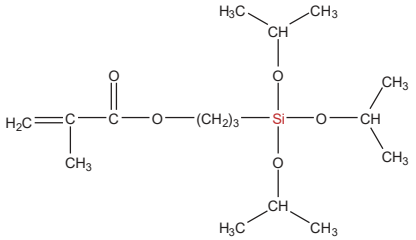
Silico® PC4108 [CAS 17096-07-0]

Methacryloxypropyltris(trimethylsiloxy)silane



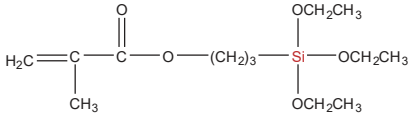
Silico® PC4150 [CAS 80750-05-6]

3-Methacryloxypropyltriisopropoxysilane



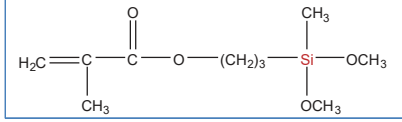
Silico® PC4200 [CAS 21142-29-0]

3-Methacryloxypropyltriethoxysilane



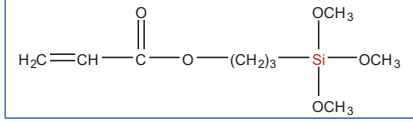
Silico® PC4300 [CAS 14513-34-9]

3-Methacryloxypropylmethyldimethoxysilane



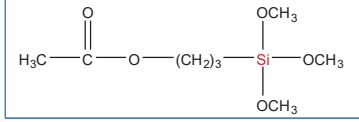
Silico® PC4600 [CAS 4369-14-6]

3-Acryloxypropyltrimethoxysilane



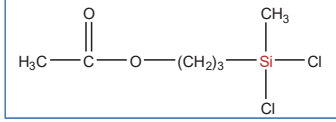
Silico® PC4700 [CAS 59004-18-1]

3-Acetoxypropyltrimethoxysilane



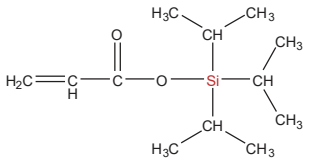
Silico® PC4702 [CAS 5290-24-4]

Acetoxypropylmethyldichlorosilane



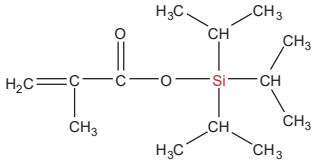
Silico® PC4810 [CAS 157859-20-6]

Triisopropylsilyl Acrylate



Silico® PC4820 [CAS 134652-60-1]

Triisopropylsilyl Methacrylate

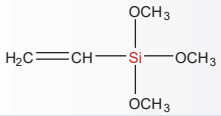


SILICO ORGANOSILICON

Vinyl Silanes

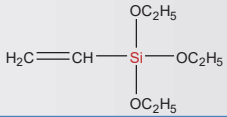
Silico® PC6110 [CAS 2768-02-7]

Vinyltrimethoxysilane



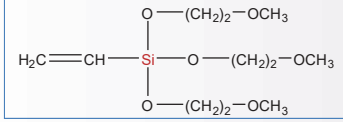
Silico® PC6120 [CAS 78-08-0]

Vinyltriethoxysilane



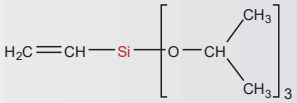
Silico® PC6130 [CAS 1067-53-4]

Vinyltris(2-methoxyethoxy)silane



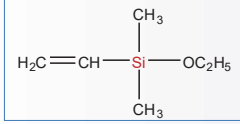
Silico® PC6150 [CAS 18023-33-1]

Vinyltrisisopropoxysilane



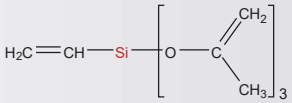
Silico® PC6220 [CAS 5356-83-2]

Vinyldimethylethoxysilane



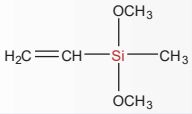
Silico® PC6151 [CAS 15332-99-7]

Vinyltris(isopropenyloxy)silane



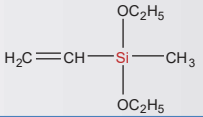
Silico® PC6310 [CAS 16753-62-1]

Vinylmethyldimethoxysilane



Silico® PC6320 [CAS 5507-44-8]

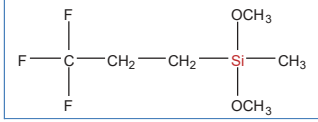
Vinylmethyldiethoxysilane



Fluoro Silanes

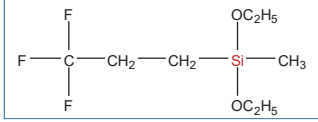
Silico® PC9711 [CAS 358-67-8]

(3,3,3-Trifluoropropyl)methyldimethoxysilane



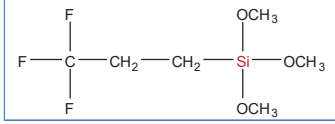
Silico® PC9712 [CAS 118162-95-1]

(3,3,3-Trifluoropropyl)methyldiethoxysilane



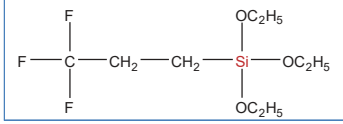
Silico® PC9731 [CAS 429-60-7]

(3,3,3-Trifluoropropyl)trimethoxysilane



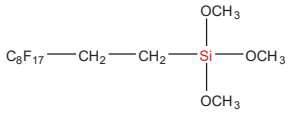
Silico® PC9732

(3,3,3-Trifluoropropyl)triethoxysilane



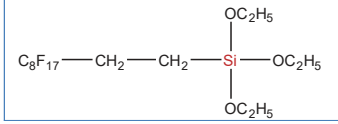
Silico® PC9751 [CAS 83048-65-1]

1H,1H,2H,2H-Perfluorodecyltrimethoxysilane



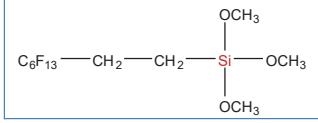
Silico® PC9752 [CAS 101947-16-4]

1H,1H,2H,2H-Perfluorodecyltriethoxysilane



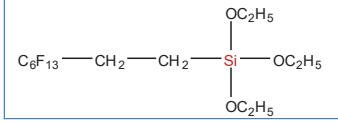
Silico® PC9756 [CAS 85857-16-5]

1H,1H,2H,2H-Perfluorooctyltrimethoxysilane



Silico® PC9757 [CAS 51851-37-7]

1H,1H,2H,2H-Perfluorooctyltriethoxysilane

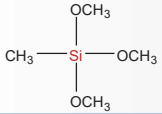


SILICO ORGANOSILICON

Alkyl & Alkoxy Silanes

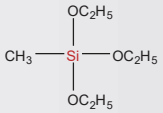
Silico® PC5131 [CAS 1185-55-3]

Methyltrimethoxysilane



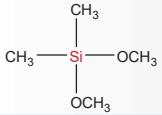
Silico® PC5132 [CAS 2031-67-6]

Methyltriethoxysilane



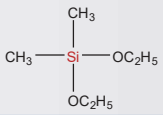
Silico® PC5221 [CAS 1112-39-6]

Dimethyldimethoxysilane



Silico® PC5222 [CAS 78-62-6]

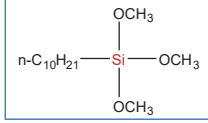
Dimethyldiethoxysilane



Alkyl & Alkoxy Silanes

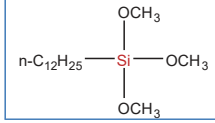
Silico® PC5801 [CAS 5575-48-4]

n-Decyltrimethoxysilane



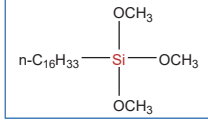
Silico® PC5821 [CAS 3069-21-4]

n-Dodecyltrimethoxysilane



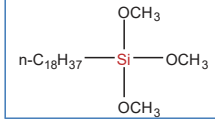
Silico® PC5861 [CAS 16415-12-6]

n-Hexadecyltrimethoxysilane



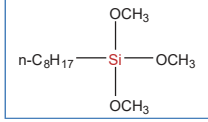
Silico® PC5881 [CAS 3069-42-9]

n-Octodecyltrimethoxysilane



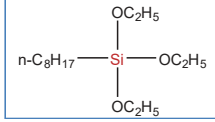
Silico® PC5901 [CAS 3069-40-7]

n-Octyltrimethoxysilane



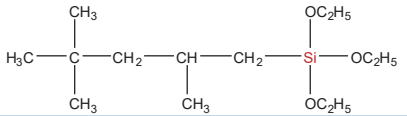
Silico® PC5902 [CAS 2943-75-1]

n-Octyltriethoxysilane



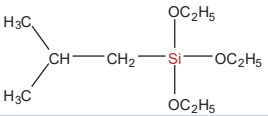
Silico® PC5912 [CAS 35435-21-3]

i-Octyltriethoxysilane



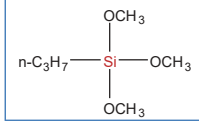
Silico® PC5952 [CAS 17980-47-1]

i-Butyltriethoxysilane



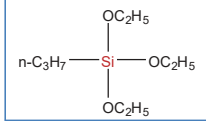
Silico® PC5931 [CAS 1067-25-0]

Propyltrimethoxysilane



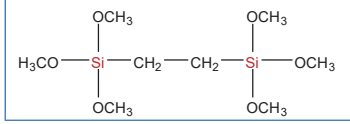
Silico® PC5932 [CAS 2550-02-9]

Propyltriethoxysilane



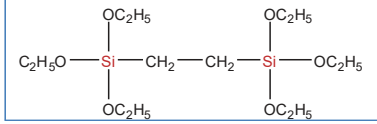
Silico® PC6112 [CAS 18406-41-2]

1,2-Bis(trimethoxysilyl)ethane



Silico® PC6122 [CAS 16068-37-4]

1,2-Bis(triethoxysilyl)ethane

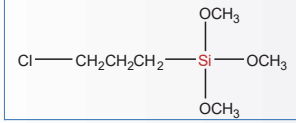


SILICO ORGANOSILICON

Chloro Silanes

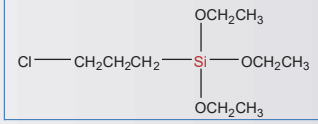
Silico® PC5011 [CAS 2530-87-2]

Chloropropyltrimethoxysilane



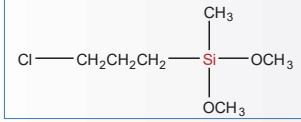
Silico® PC5012 [CAS 5089-70-3]

Chloropropyltriethoxysilane



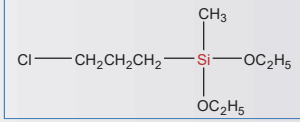
Silico® PC5021 [CAS 18171-19-2]

3-Chloropropylmethyldimethoxysilane



Silico® PC5022 [CAS 13501-76-3]

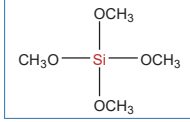
3-Chloropropylmethyldiethoxysilane



Orthosilicates

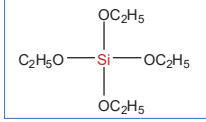
Silico® PC 5410 [CAS 681-84-5]

Tetramethoxysilane



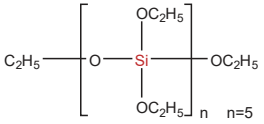
Silico® PC5420 [CAS 78-10-4]

Tetraethoxysilane



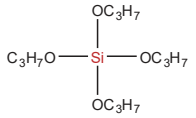
Silico® PC5424 [CAS 11099-06-2]

Ethyl polysilicate 40



Silico® PC5430 [CAS 682-01-9]

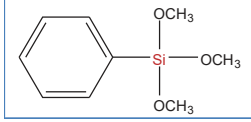
Tetrapropoxysilane



Phenyl Silanes

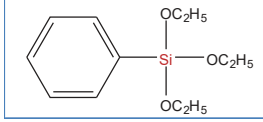
Silico® PC8131 [CAS 2996-92-1]

Phenyltrimethoxysilane



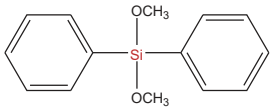
Silico® PC8132 [CAS 780-69-8]

Phenyltriethoxysilane



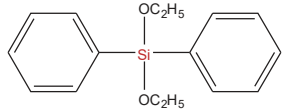
Silico® PC8221 [CAS 6843-66-9]

Diphenyldimethoxysilane



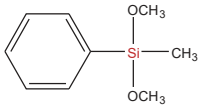
Silico® PC8222 [CAS 2553-19-7]

Diphenyldiethoxysilane



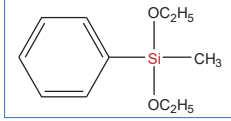
Silico® PC8611 [CAS 3027-21-2]

Methylphenyldimethoxysilane



Silico® PC8612 [CAS 775-56-4]

Methylphenyldiethoxysilane



Silane Coupling Agent Selection Guide

Silane Type	Polymer	Thermosets											Thermopolastics																					Rubber & Elastomer											Sealants		
		Cellulosics	Diallylphthalate	Epoxy	Furan	Melamine	Nitrocellulose	Phenolic	polyester	Polyimide	Polyurethane	Urea-Formaldehyde	Acrylonitrile	Acrylonitrile Butadiene Styrene	Cellulosics	Polyamide	Polyamide-imide	Polybutylene terephthalate PBT	Polyethylene terephthalate PET	Polycarbonate	Polyetherketone copolymer	Polyethylene	Polyphenylene oxide PPO	Polyphenylene sulfide	Polypropylene	Polystyrene	Polysulfone	Polyurethane	Polyvinyl butyral	Polyvinyl chloride PVC	Acrylic	Butyl rubber	Epichlorohydrin	Neoprene rubber	Nitrile	Polyurethane	Polybutadine rubber	Polyisoprene rubber	Silicone	Styrene Butadiene Rubber SBR	Sulfer-crosslinked EPM	Peroxide crosslinked EPDM	Acrylic	Polysulfides	Silicone
Amino	Silico® PC1100	★		★	★	★	★	★	★	★★	★★	★	★	★★	★★	★	★★	★★	★★	★	★★	★★	★★	★★	★★	★	★★	★	★★	★	★★	★★	★★	★★	★★	★★			★★		★★			★★	★★
	Silico® PC1110						★★		★			★	★	★★		★	★★	★★	★★	★	★★	★★			★★	★		★★	★	★★	★	★★	★★	★★	★★	★★			★★		★★			★★	★★
	Silico® PC1120											★																	★★																★★	
	Silico® PC1200	★★		★	★	★★	★★	★	★	★★	★★	★★	★	★★	★	★	★	★★	★★	★★		★★	★	★★	★★	★	★	★★	★★	★	★	★★	★	★★	★★	★★			★		★★			★	★
	Silico® PC1210												★	★★		★		★★	★★	★★		★★			★★	★		★★				★★		★★	★★	★★					★★			★★	
	Silico® PC1220	★★		★	★	★★	★★	★		★★	★★	★★	★★	★★	★	★★	★	★★	★★	★★		★★	★	★★	★★	★★	★	★★	★★	★	★	★★	★	★★	★★	★★			★		★★			★★	★
	Silico® PC1730											★★																	★★		★★															
Sulfur	Silico® PC2000																							★★								★★	★★	★★	★★	★★				★★	★			★★	
	Silico® PC2300			★★		★★		★★			★★			★★				★★	★★			★★		★★	★★	★★		★★			★★	★★	★★	★★	★★	★	★★	★★		★★	★	★★		★	
	Silico® PC2310			★★		★★		★★			★★			★★				★★	★★			★★		★★	★★	★★		★★			★★	★★	★★	★★	★★	★	★★	★★		★★	★	★★		★	
	Silico® PC2320													★★				★★	★★			★★		★	★★	★★		★★				★★	★★	★★	★★	★	★★	★★		★★	★	★★		★	
Ureido	Silico® PC2510											★★																																	
	Silico® PC2521															★					★★																								
	Silico® PC2720 Isocyanato	★★										★★		★★	★★	★★		★★	★★	★★								★			★★					★★									
Epoxy	Silico® PC3100		★★	★	★	★		★	★	★★	★	★★	★★	★		★★		★	★	★★		★★			★★	★★		★			★	★★	★★		★★	★			★	★★		★★	★	★
	Silico® PC3200												★★	★		★★		★	★	★★		★★			★★	★★		★				★★	★★		★★	★				★★			★★	★★	
	Silico® PC3300																															★													
	Silico® PC3400			★★									★★	★★		★★		★★	★★	★★		★★			★★	★★		★★				★★	★★		★★	★★				★★			★★	★★	
	Silico® PC3500		★★	★	★	★★		★★	★	★★	★★	★★	★★	★★		★★		★★	★★	★★		★★			★★	★★		★★			★★	★★	★★			★★							★★	★★	
	Silico® PC3510																																												
Methacryloxy	Silico® PC4100		★						★★				★★	★						★★		★			★	★		★★			★★	★							★		★★	★	★★		★
	Silico® PC4200												★★	★						★★		★			★	★		★★																	
	Silico® PC4300												★★	★						★★		★			★	★		★★																	
	Silico® PC4400												★★	★						★★		★			★	★		★★																	
	Silico® PC4600												★★	★						★★		★★			★★	★★		★★																	
Chloro	Silico® PC5011			★★				★★			★★			★★		★★																													
	Silico® PC5021			★★												★★																													
Vinyl	Silico® PC6100																																												
	Silico® PC6110		★★						★★													★			★													★★		★★	★★			
	Silico® PC6120		★★						★													★★			★★													★★		★★	★★			
	Silico® PC6130																																					★★							
	Silico® PC6310	★★																																											

Silane Cross-reference Guide

Silico SILANE	Chemical Name	CAS No.	Momentive	Dow	Wacker	Evonik	ShinEtsu
Silico® PC1100	3-Aminopropyltriethoxysilane	919-30-2	A-1100	Z-6011	GENIOSIL GF93	Dynasylan AMEO	KBE-903
Silico® PC1106	Hydrolysateof3-Aminopropyltriethoxysilane	58160-99-9	A-1106			Dynasylan 1151	
Silico® PC1108	Bis[(3-triethoxysilyl)propylamine	13497-18-2				Dynasylan 1122	
Silico® PC1110	3-Aminopropyltrimethoxysilane	13822-56-5	A-1110	Z-6610	GENIOSIL GF96	Dynasylan AMMO	KBM-903
Silico® PC1118	Bis[(3-trimethoxysilyl)propylamine	82985-35-1	A-1170			Dynasylan 1124	
Silico® PC1120	Aminopropylmethyldiethoxysilane	3179-76-8		Z-6015		Dynasylan 1505	
Silico® PC1200	Aminoethylaminopropyltrimethoxysilane	1760-24-3	A-1120	Z-6020	GENIOSIL GF91	Dynasylan DAMO	KBM-603
Silico® PC1210	Aminoethylaminopropyltriethoxysilane	5089-72-5		Z-6021	GENIOSIL GF94		KBE-603
Silico® PC1220	Aminoethylaminopropylmethyldimethoxysilane	3069-29-2	A-2120	1-6436	GENIOSIL GF95	Dynasylan 1411	KBM-602
Silico® PC1300	Diethylenetriaminopropyltrimethoxysilane	35141-30-1	A-1130	AY43-009		Dynasylan TRIAMO	
Silico® PC1600	3-(N-Cyclohexylamino)propyltrimethoxysilane	3068-78-8			GENIOSIL GF92		
Silico® PC1710	Phenylaminomethyltrimethoxysilane	77855-73-3			GENIOSIL XL973		
Silico® PC1730	3-(N-Phenylamino)propyltrimethoxysilane	3068-76-6	Y-9669	SZ-6083			KBM-573
Silico® PC1951	N-(n-butyl)-3-aminopropyltrimethoxysilane	31024-56-3				Dynasylan 1189	
Silico® PC2000	Bis(triethoxysilylpropyl)tetrasulfide	40372-72-3	A-1289	Z-6940		Si-69	KBE-846
Silico® PC2200	Bis(triethoxysilylpropyl)disulfide	56706-10-6	A-1589	Z-6920		Si-75	
Silico® PC2300	3-Mercaptopropyltrimethoxysilane	4420-74-0	A-189	Z-6062	GENIOSIL GF70	Dynasylan MTMO	KBM-803
Silico® PC2310	3-Mercaptopropyltriethoxysilane	14814-09-6	A-1891	Z-6910			
Silico® PC2320	3-Mercaptopropylmethyldimethoxysilane	31001-77-1		AY43-062		Dynasylan 3403	KBM-802
Silico® PC2510	3-Ureidopropyltrimethoxysilane	23843-64-3	A-1524		GENIOSIL GF98		
Silico® PC2520	3-Ureidopropyltriethoxysilane	23779-32-0		Z-6801			
Silico® PC2521	3-Ureidopropyltriethoxysilane(50%inMethanol)	116912-64-2	A-1160	Z-6676		Dynasylan 2201	KBE-585
Silico® PC2640	3-Thiocyanatopropyltriethoxysilane	34708-08-2				Si-264	
Silico® PC2710	3-Isocyanatopropyltrimethoxysilane	15396-00-6	A-Link 35		GENIOSIL GF40		
Silico® PC2720	3-Isocyanatopropyltriethoxysilane	24801-88-5	A-Link 25		GENIOSIL GF41		KBE-9007
Silico® PC2780	Tris-(3-(trimethoxysilyl)propyl)isocyanurate	26115-70-8	Y-11597		GENOSIL GF69		KBM-9659
Silico® PC3100	3-Glycidoxypropyltrimethoxysilane	2530-83-8	A-187	Z-6040	GENIOSIL GF80	Dynasylan GLYMO	KBM-403
Silico® PC3200	3-Glycidoxypropyltriethoxysilane	2602-34-8	A-1871	Z-6041	GENIOSIL GF82	Dynasylan GLYEO	KBE-403
Silico® PC3300	3-Glycidoxypropylmethyldiethoxysilane	2897-60-1	CoatOSil 2287	Z-6042			KBE-402
Silico® PC3400	3-Glycidoxypropylmethyldimethoxysilane	65799-47-5		Z-6044			
Silico® PC3500	2-(3,4-epoxycyclohexyl)-ethyltrimethoxysilane	3388-04-3	A-186	Z-6043			KBM-303
Silico® PC3510	2-(3,4-epoxycyclohexyl)-ethyltriethoxysilane	10217-34-2	CoatOSil 1770				
Silico® PC4100	3-Methacryloxypropyltrimethoxysilane	2530-85-0	A-174	Z-6030	GENIOSIL GF31	Dynasylan MEMO	KBM-503
Silico® PC4150	3-Methacryloxypropyl-tris-(2-propoxy)silane	80750-05-6	CoatOSil 1757				
Silico® PC4200	3-Methacryloxypropyltriethoxysilane	21142-29-0	Y-11878	Z-6036	GENIOSIL GF32		KBE-503
Silico® PC4300	3-Methacryloxypropylmethyldimethoxysilane	14513-34-9		Z-6033			KBM-502
Silico® PC4400	3-Methacryloxypropylmethyldiethoxysilane	65100-04-1					KBE-502
Silico® PC4510	Methacryloxymethyltriethoxysilane	5577-72-0			GENIOSIL XL36		
Silico® PC4600	3-Acryloxypropyltrimethoxysilane	4369-14-6		AY43-310M			KBM-5103

Silane Cross-reference Guide

Silico SILANE	Chemical Name	CAS No.	Momentive	DowCorning	Wacker	Evonik	ShinEtsu
Silico® PC5011	Chloropropyltrimethoxysilane	2530-87-2		Z-6076			KBM-703
Silico® PC5012	Chloropropyltriethoxysilane	5089-70-3		Z-6376		Si-230	KBM-704
Silico® PC5131	Methyltrimethoxysilane	1185-55-3	A-1630	Z-6070	M1-TRIMETHOXY	Dynasylan MTMS	KBM-13
Silico® PC5132	Methyltriethoxysilane	2031-67-6	A-162	Z-6370	M1-TRIETHOXY	Dynasylan MTES	KBE-13
Silico® PC5220	Dimethyldichlorosilane	75-78-5		Z-1219			KA22
Silico® PC5221	Dimethyldimethoxysilane	1112-39-6		Z-6194	M2-DIMETHOXY		KBM-22
Silico® PC5222	Dimethyldiethoxysilane	78-62-6		1-6509	M2-DIETHOXY		
Silico® PC5410	Tetramethoxysilane	681-84-5				Dynasil M	KBM-04
Silico® PC5420	Tetraethoxysilane	78-10-4	TEOS	Z-6697	SILICATE TES28	Dynasil A	KBE-04
Silico® PC5424	Ethylpolysilicate40	11099-06-2	TEOS-40		SILICATE TES40	Dynasil 40	
Silico® PC5430	Tetrapropoxysilane	682-01-9				Dynasil P	
Silico® PC5801	Decyltrimethoxysilane	5575-48-4		Z-6210			KBM-3103
Silico® PC5861	Hexadecyltrimethoxysilane	16415-12-6			25013 VP	Dynasylan 9116	
Silico® PC5862	Hexadecyltriethoxysilane	16415-13-7				Dynasylan 9216	
Silico® PC5901	n-Octyltrimethoxysilane	3069-40-7		Z-6665		Dynasylan OCTMO	
Silico® PC5902	n-Octyltriethoxysilane	2943-75-1	A-137	Z-6341		Dynasylan OCTEO	
Silico® PC5911	iso-Octyltrimethoxysilane	34396-03-7		Z-6672	IO-TRIMETHOXY		
Silico® PC5912	iso-Octyltriethoxysilane	35435-21-3			SILRES BS1701		
Silico® PC5931	Propyltrimethoxysilane	1067-25-0	Eurenor 5025	Z-6265		Dynasylan PTMO	KBM-3033
Silico® PC5932	Propyltriethoxysilane	2550-02-9		1-6535		Dynasylan PTEO	KBE-3033
Silico® PC5951	isobutyltrimethoxysilane	18395-30-7		Z-2306		Dynasylan IBTMO	
Silico® PC5952	isobutyltriethoxysilane	17980-47-1		Z-6403		Dynasylan IBTEO	
Silico® PC6100	Vinyltrichlorosilane	75-94-5		Z-2380		Dynasylan VTC	KA1003
Silico® PC6110	Vinyltrimethoxysilane	2768-02-7	A-171	Z-6300	GENIOSIL XL10	Dynasylan VTMO	KBM-1003
Silico® PC6120	Vinyltriethoxysilane	78-08-0	A-151	Z-6518	GENIOSIL GF56	Dynasylan VTEO	KBE-1003
Silico® PC6122	1,2-Bis(triethoxysilyl)ethane	16068-37-4		Y-9805	ET13		
Silico® PC6130	Vinyltris(2-methoxyethoxy)silane	1067-53-4	A-172		GENIOSIL GF58	Dynasylan VTMOEO	
Silico® PC6150	Vinyltrisisopropoxysilane	18023-33-1	CoatOSil 1706	Z-6550			
Silico® PC6310	Vinylmethyldimethoxysilane	16753-62-1	A-2171	Z-2349	GENIOSIL XL12		
Silico® PC8131	Phenyltrimethoxysilane	2996-92-1	A-153	Z-6124		Dynasylan 9165	KBM-103
Silico® PC8132	Phenyltriethoxysilane	780-69-8		Z-9805	P-TRIETHOXY	Dynasylan 9265	KBE-103
Silico® PC8221	Diphenyldimethoxysilane	6843-66-9		Z-6047		Dynasylan 6010	KBM-202SS
Silico® PC8222	Diphenyldiethoxysilane	2553-19-7		1-6533			KBE-202
Silico® PC8611	Methylphenyldimethoxysilane	3027-21-2		Z-2588			
Silico® PC9711	(3,3,3-Trifluoropropyl)methyldimethoxysilane	358-67-8		Z-6230			
Silico® PC9731	Trifluoropropyltrimethoxysilane	429-60-7		Z-6333			KBM-7103
Silico® PC9751	1H,1H,2H,2H-Perfluorodecyltrimethoxysilane	83048-65-1					KBM-7803
Silico® PC9757	1H,1H,2H,2H-Perfluorooctyltriethoxysilane	51851-37-7				Dynasylan F8261	