Technical Data Sheet

DOWSIL™ Z-9805 Silane

Arylalkoxy silane used to make inorganic surfaces hydrophobic

Features & Benefits

- Inorganic reactivity
- Phenyl triethoxysilane, high purity

Composition

- Phenyl triethoxysilane supplied as a low-viscosity liquid

Applications

- Making inorganic surfaces hydrophobic
- Pigment treatment
- Silane coupling agent blends

Typical Properties

Specification Writers: These values are not intended for use in preparing specifications.

Property	Unit	Result
Purity, Minimum	%	96
Specific Gravity		1.1
Flash Point, Closed Cup	°C °F	35 95
Kinematic Viscosity, @ 25°C/77°F	cSt	1.66
Color and Appearance		Colorless to pale yellow liquid

Description

DOWSIL™ Z-9805 Silane a chemical monomer that reacts with water to form a silanetriol and ethanol. Following hydrolysis, reactive silanol groups are formed, which can condense with other silanol groups, i.e., those on the surface of siliceous fillers, to form siloxane linkages.

Stable condensation products are also formed with other oxides such as those of aluminum, zirconium, tin, titanium and nickel. Less stable bonds are formed with oxides of boron, iron and carbon. Alkali metal oxides and carbonate do not form stable bonds with Si-O. Sufficient water for hydrolysis may be available from atmospheric moisture, or on the substrate surface. In some cases, it may be necessary to add water to increase the degree of hydrolysis.

The tendency toward self-condensation can be controlled by using fresh solutions, alcoholic solvents, dilution and careful selection on pH ranges. Silanetriols are most stable at pH 3–4 but condense rapidly at pH 7–9.

How to Use

There are 3 basic methods of utilizing DOWSIL™ Z-9805 Silane in a coatings application:

1. Surface treatment, which includes treatment of particles, e.g., pigments and fillers, or formulation into primers and water repellents
2. Additive into paints, inks, and adhesives
3. Reactive intermediate for silicone resin synthesis or organic resin modification. Each of these methods requires special consideration. For pigment and filler treatment, the typical concentration is 0.5 to 1.0 percent.

Surface Treatment

The most straightforward method of silylating a surface with DOWSIL™ Z-9805 Silane is from an alcohol solution. A 2 percent silane solution can be prepared in the alcohol of choice (methanol, ethanol or isopropanol are typical choices). The solution can be wiped, dipped or sprayed onto the surface. When dipping a large object, e.g., a glass plate, allow 1 to 2 minutes of submersion to allow silane migration to the surface. After the surface dries, excess material can be gently wiped or briefly rinsed with alcohol. Particles, e.g., pigments and fillers, can be silylated by stirring them in a solution for 2 to 3 minutes and then decanting the solution. The particles can then be rinsed with alcohol. Cure of the silane layer occurs in 5 to 10 minutes at 110°C (230°F) or 24 hours at ambient conditions.

As a coating primer, improved flow and adhesion performance have been noted by applying silanes from aqueous alcohol solutions. A 95 percent ethanol-5 percent water solution is adjusted to pH 3.5 to 4.0 with acetic acid. Add the DOWSIL™ Z-9805 Silane with stirring to yield a 0.5 to 2.0 percent final concentration. Generally, 6 hours should be allowed for hydrolysis, silanol formation and equilibration.

Low-VOC aqueous solutions can be prepared by dissolving 0.5 to 2.0 percent of DOWSIL™ Z-9805 Silane in pH-adjusted water (3.5 to 4.0 pH with acetic or formic acid).

Filler and pigment treatment is usually accomplished by a spray-on method. It assumes that the total amount of silane needed is known and that sufficient hydroxyl moieties are present on the filler to allow reaction with the silane. The powder is placed in a high intensity solids mixer, e.g., a twin-cone mixer with intensifier. DOWSIL™ Z-9805 Silane is pumped into the agitated powder as a fine spray. Dynamic drying methods are the most effective.

Additive

DOWSIL™ Z-9805 Silane or blends with other silanes can also be utilized as an additive (0.1 to 3.0 weight percent solid). The silane becomes a component of a coating from which it diffuses or migrates to inorganic substrates and reacts. Benefits include improved pigment dispersion, decreased pigment floating improved adhesion and film hardness.

Reactive Intermediate

Owing to the highly reactive ethoxy sites, organic compatibility and unique silicone chemistry, DOWSIL™ Z-9805 Silane provides the coating formulator with a myriad of straightforward synthesis solutions to high-performance application requirements.

Silicon-organic blends or 100 percent novel silicone resin polymers can easily be synthesized by hydrolysis of silane blends in slightly acidic solution. Low VOC materials can be produced by balancing the composition linearity, the degree of hydrolysis and the removal of the ethanol produced during hydrolysis.

Materials of this type may be utilized in paints, primers, inks and adhesives where excellent adhesion, weathering resistance and high-temperature stability are required.

Handling Precautions

PRODUCT SAFETY INFORMATION REQUIRED FOR SAFE USE IS NOT INCLUDED IN THIS DOCUMENT. BEFORE HANDLING, READ PRODUCT AND SAFETY DATA SHEETS AND CONTAINER LABELS FOR SAFE USE, PHYSICAL AND HEALTH HAZARD INFORMATION. THE SAFETY DATA SHEET IS AVAILABLE ON THE DOW WEBSITE AT DOW.COM, OR FROM YOUR DOW SALES APPLICATION ENGINEER, OR DISTRIBUTOR, OR BY CALLING DOW CUSTOMER SERVICE.

Usable Life and Storage

Keep away from heat and open flame. When stored at or below 25°C in the original unopened containers, this product has a usable life of 1080 days from the date of production.

Limitations

This product is neither tested nor represented as suitable for medical or pharmaceutical uses.

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For further information, please see our website, dow.com or consult your local Dow representative.

Disposal Considerations

Dispose in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

It is the user's responsibility to verify that treatment and disposal procedures comply with local, state (provincial) and federal regulations. Contact your Dow Technical Representative for more information.

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