

silicon innovations



Silicon Innovations for Cosmetics

New and innovative silicon technologies will continue to deliver performance and aesthetic advantages for evolving cosmetic industry requirements. Gelest PCS applies fundamental science and applied development in silicon chemistry and polymer technology to assist cosmetic chemists in meeting these demands. The results of these efforts have led to a commercial product line of truly unique cosmetic raw materials as well as custom materials developed jointly with individual customers.

Gelest PCS combines R&D, pilot plant operations and commercial production at its state of the art Morrisville, PA facility to rapidly commercialize new innovative materials and to maintain a solid inventory of commercial products. With a technical staff experienced in silicon chemistry, silicone polymers and application technology Gelest PCS is well positioned to be your preferred partner for Silicon Innovations.

DIETHICONE

DE-12, DE-15, DE-23

Although polydimethylsiloxanes (Dimethicones) and their many organic derivatives have been used extensively in the cosmetic industry, no polysiloxanes without methyl substitution have been developed for personal care. The Dimethicones are characterized by their ability to improve slip, increase lubricity, reduce tack, and impart water repellency in all types of cosmetic formulations. The insolubility of many surfactants, emollient oils, and waxes in Dimethicone causes formulation difficulties and restricts the amount of Dimethicone that can be incorporated into a product.

Polydiethylsiloxanes (Diethicones) are the first series of hybrid silicone polymers with other than methyl substitution. Analogous in structure to Dimethicones, the flexible polymer backbone of Diethicones allows the manufacture of a wide range of fluid viscosities. Dimethicone's beneficial properties of excellent spreading, gas permeability, and waterproofness are maintained due to the similarity of physical properties.

Low surface tension enables the Diethicones to spread easily on skin and hair, acting as lubricants and detackifying agents. Tactile properties include a "dry feel" with increased "cushion". Most significantly, Diethicones have a much broader organic compatibility, allowing formulation with common cosmetic raw materials, including many hydrocarbons, esters, waxes, and surfactants. Unlike Dimethicones, Diethicones wet pigments well, a useful property when formulating color cosmetics and sunscreens containing pigments.

ALKYL-ARYLALKYL SILICONES

PM-212 is a viscous, high refractive index C₁₂ / phenylpropyl modified silicone that gives high luster and shine to lip products. Films formed using PM-212 resist feathering and creeping, allowing the formulation of emollient lip glosses and lipsticks. PM-212 can also be used in skin and sun care products to improve skin adhesion and film forming capability.

BIOMOLECULE SILICONE

TM-VE1 is a unique hybrid organo-silicon compound formed by grafting tocopherol to a siloxane backbone. The tocopheryl substituent adds skin treatment properties to the siloxane backbone while the siloxane component improves the slip and skin feel of the tocopherol. This unique structure enables the Tocopheryloxypropyl Trisiloxane to act as a solvent for a number of mineral and vegetable waxes. TM-VE1 is recommended for use in skin care and lip products to provide softening, emolliency and moisturization.

TRISILOXANES

The alkyl trisiloxanes are light, dry, emollient oils with good organic compatibility, even greater than that of phenyl trimethicone. They are used to enhance slip and reduce tack in hair care, skin care and color cosmetics. Organic and inorganic pigments can be easily wetted and dispersed in the alkyl trisiloxanes for use in foundations, eyeshadows, blushes and lip color.

TM-081 Caprylyl Methicone offers an exceptionally light, dry feel, combined with excellent spreading properties. TM 081 is an excellent vehicle for long wearing foundations and eyeshadows.

TM-121 Lauryl Methicone is similar to TM 081 with reduced volatility and increased pigment wetting properties.

TM-181 Stearyl Methicone is slightly more lubricious than TM-081 and TM-121 but leaves a smooth weightless feeling on the skin. TM 181 can be used to reduce tack and lend a lighter feel to skin treatment products and liquid foundations.

FLUOROCARBON SILICONE

FCS-331 is a highly lubricious gel consisting of submicron particles of a tetrafluoroethylene/ hexafluoropropylene copolymer dispersed in a fluorinated dimethyl fluid. The gel has the unusual property of increasing slip as higher amounts of shear force are applied.

The fluorinated dimethyl fluid, the base for FCS-331, is insoluble in other polydimethylsiloxane fluids and common organic oils, but can be dispersed in cyclic siloxanes for incorporation into emulsions and anhydrous systems. Skin care products containing FCS-331 deposit a persistent soft, pleasant-feeling film that is resistant to washing off.

Incorporated into color cosmetics, FCS-331 not only imparts excellent slip and spreading characteristics, but improves wear by resisting wetting by sebum. FCS-331 can be used alone or in combination with oily binders in pressed powders to formulate creaseproof eyeshadows and powder foundations that are resistant to oil breakthrough. In liquid foundations, FCS-331 aids spreading and blending, improves residual feel, and extends wear.

Physical Properties

INCI name Product Code	Viscosity cSt.	Refractive Index	Specific Gravity	Pour- Point, °C
DE-12	20	1.438	0.93	-
DE-15 / Polydiethylsiloxane	45	1.442	0.96	-
DE-23	350	1.447	0.99	-
TM-081 / Caprylyl Methicone	3	1.413	0.82	-
TM-121 / Lauryl Methicone	5.5	1.431	0.84	-
TM-181 / Stearyl Methicone	13	0.433	0.83	-
PM-212 / Lauryl Phenylpropyl Methicone	1500	1.464	0.91	-
FCS-331 / Trifluoropropyl Dimethicone (and) Hexafluoropropylene/ Tetrafluoroethylene Copolymer	8000	1.387	1.41	-
TM-VE1 / Tocopheryloxypropyl Trisiloxane	700	1.472	0.92	-

Solubility

	PDMS 10cs	DE-12	DE-15	DE-23	TM-081	TM-121	TM-181	PM-212	TM-VE1
Dimethicone/10cs	S	S	S	S	S	S	S	S	S
Ethylhexyl Palmitate	S	S	S	S	S	S	S	S	S
Octyldodecyl Stearate	I	S	S	S	S	S	S	S	S
Castor Oil	I	I	I	I	I	D	D	D	S
Octyldodecanol	I	S	S	S	S	S	S	S	S
Triisostearyl Citrate	I	S	S	S	PS	PS	PS	S	S
Hydrogenated Polydecene	PS	S	S	S	S	S	S	S	S
Cyclopentasiloxane	S	S	S	S	S	S	S	S	S
Stearyl Methicone	I	S	S	PS					S _{hot}
10% Microcrystalline Wax	I	S	S	PS					S _{hot}
10% Ceresin	I	S	S	PS					S _{hot}

S=Soluble PS=Partially Soluble I=Insoluble D=Dispersible

1) Up to 60% 2) Up to 50% 3) 10% soft gel, 50% translucent solid 4) 10% gel, 50% solid

