

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.

silicon innovations

Enabling your Technology

Gelest
PCS

Silicon Innovations for Cosmetics

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.

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.

ALKYL-ARYLALKYL SILICONES

AM-108 is a C₈ modified silicone that provides a rich, emollient feel in skin treatment products. AM-108 spreads to form a non-tacky protective layer, leaving the skin feeling softer with improved flexibility. In lipsticks, AM-108 softens and smooths the lips and has good compatibility with other ingredients.

AM-114 is a C₁₄ modified silicone wax having a melting point close to that of skin temperature. Incorporated into creams and lotions, AM-114 forms a non-tacky protective layer on the skin with a rich emollient feel. In lipsticks, AM 114 provides excellent slip with conditioning, softening, and smoothing properties.

AM-118 is a C₁₈ modified silicone wax used to provide structure to powdercream products while maintaining slip and spreading properties. AM-118 is also used to gel combinations of silicones and conventional oils.

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.

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	–
AM-108 / Caprylyl Methicone	800	1.445	0.91	-44°C
AM-114 / Myristyl Methicone	1000	1.455	0.89	25°C
AM-118 / Stearyl Methicone	275 (50°C)	1.443	0.89	45°C
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 (proposed)	700	1.472	0.92	–

Solubility

	PDMS 10cs	DE-12	DE-15	DE-23	TM-081	TM-121	TM-181	AM-108	AM-114	AM-118	PM-212	TM-VE1
Dimethicone/10cs		S	S	S	S	S	S	S	PS	PS	S	S
Ethylhexyl Palmitate	S	S	S	S	S	S	S	S	S ¹	S ³	S	S
Octyldodecyl Stearate	I	S	S	S	S	S	S	S	S ²	S ³	S	S
Castor Oil	I	I	I	I	I	D	D	D	D	D _{hot}	D	S
Octyldodecanol	I	S	S	S	S	S	S	S	S	S	S	S
Triisostearyl Citrate	I	S	S	S	PS	PS	PS	S	S	S ³	S	S
Hydrogenated Polydecene	PS	S	S	S	S	S	S	S	S	S ⁴	S	S
Cyclopentasiloxane	S	S	S	S	S	S	S	S	I	I	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

Recommended Applications

	DE-12	DE-15	DE-23	TM-081	TM-121	TM-181	AM-108	AM-114	AM-118	PM-212	FCS-331	TM-VE1
Suncreens		•	•				•	•	•	•		•
Creams & Lotions		•	•		•	•	•	•	•	•		•
Lip Products		•	•		•	•	•	•	•	•	•	•
Powder Creams	•			•	•				•			
Liquid Foundations	•	•		•	•	•	•	•	•	•		•
Pressed Powders		•	•			•				•	•	

formulations

Lipstick with TM-VE1 /GJH2-24-3

Unlike many silicones and silicone derivatives, TM-VE1 is easily incorporated into lip products due to its solubility in a range of polar compounds, including castor oil. Benefits of TM-VE1 in lip products are lip conditioning, lip softening, and protection against the drying effects of the environment.

Ingredient (Supplier)	INCI name	%
Crystal O, (Caschem)	Castor Oil	13.45
Schercemol TISC, (Noveon)	Triisostearyl Citrate	30.00
Eutanol G	Octyldoecanol	5.00
TM-VE1, (GelestPCS)	Tocopheryloxypropyl Trisiloxane*	2.50
Ceraphyl ODS	Octyldodecyl Stearate	7.50
Methylparaben		0.20
Propylparaben		0.10
Candelilla		6.00
Carnauba		1.00
Microwax SP 19, (Strahl & Pitsch)	Microcrystalline Wax	3.00
Ozokerite 170D, (Ross Wax)	Ozokerite	2.00
Color Grind		
Crystal O, (Caschem)		10.00
A-1206, (Color Techniques)	Iron Oxides	6.50
AHP-200, (Kemira)	Titanium Dioxide	2.50
c39-4433, (Sun Chemical)	Blue 1 Lake	0.10
c19-7711, (Sun Chemical)	Red 7 Lake	0.75
c19-7712, (Sun Chemical)	Red 6 Lake	1.35
Timiron Splendid Red, (EMD Chemicals, Rona div.)	Mica, Titanium Dioxide, Silica	8.00
Ascorbyl Palmitate, (DSM)		0.05
*INCI NAME APPLICATION PENDING		100.00

Super Shine Lipgloss w/PM-212 & AM-118 /GJH2-48-1

PM-212 provides high shine and comfortable wear. AM-118 gels the oil to suspend the pigments.

Ingredient (Supplier)	INCI Name	%
Schercemol TISC, (Noveon)	Triisostearyl Citrate	74.19
PM-212, (GelestPCS)	Laurylphenylpropyl Methicone	20.00
AM-118, (GelestPCS)	Stearyl Methicone	5.00
Methylparaben		0.20
Propylparaben		0.10
AS Timiron Splendid Red, (Rona div. EMD Chemicals)	Mica, TiO ₂ , SiO ₂ treated w/triethoxycaprylsilane	0.50
40% Red 7 Lake in DE-15		0.01
		100.00

Water in Silicone Foundation with DE-12 and AM-118 GJH2-24-3

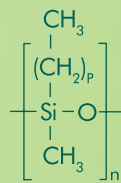
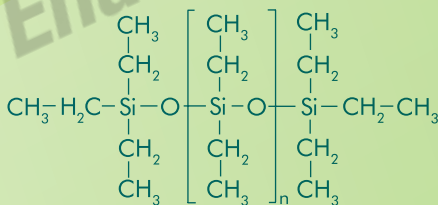
Ingredient (Supplier)	INCI name	%
Water Phase		
Deionized water		48.90
Magnesium Sulfate		0.20
Butylene Glycol		6.00
Methylparaben		0.20
Benzoic Acid		0.10
Silicone Phase		
Cyclopentasiloxane		15.00
KF 6028, (Shin-Etsu)	PEG-9 Polydimethylsiloxyethyl Dimethicone	2.00
DE-12, (GelestPCS)	Polydiethylsiloxane	5.00
AM-118, (GelestPCS)	Stearyl Methicone	1.00
Rhodasurf L-790, (Rhodia)	Laureth-7	0.50
Propylparaben		0.10
Pigment Grind (add to silicone phase after milling)		
D 9812/I, (Color Techniques)	Titanium Dioxide, Methicone	8.00
D 9131/I, (Color Techniques)	Iron Oxides, Methicone	1.20
D 9126/ , (Color Techniques)	Iron Oxides, Methicone	0.50
D 9146/I, (Color Techniques)	Iron Oxides, Methicone	0.20
D 10707/I, (Color Techniques)	Talc, Methicone	4.10
DE-12, (GelestPCS)	Polydiethylsiloxane	7.00
		100.00

Water in Oil Lotion with TM-181 & AM-118 /GJH1-62-1

TM-181 provides slip and light emolliency to this moisturizing lotion. AM-118 gels the oil phase to control viscosity.

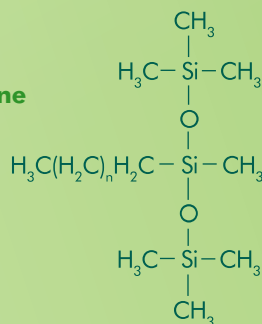
Ingredient (Supplier)	INCI Name	%
Phase A		
Deionized Water		62.15
NaCl	Sodium Chloride	1.00
Butylene Glycol		6.00
Methylparaben		0.20
Benzoic Acid		0.20
Phase B		
Abil® EM-90, (Degussa)	Cetyl PEG/PPG 10/1 Dimethicone	2.00
Abil® WE-09, (Degussa)	Polyglyceryl-4 Isostearate, Cetyl PEG/PPG 10/1 Dimethicone, Hexyl Laurate	0.90
Ceraphyl® ODS, (ISP)	Octyldodecyl Stearate	9.70
TM-181, (GelestPCS)	Stearyl Methicone	15.80
AM-118, (GelestPCS)	Stearyl Methicone	2.00
Propylparaben		0.05
		100.00

Diethicone

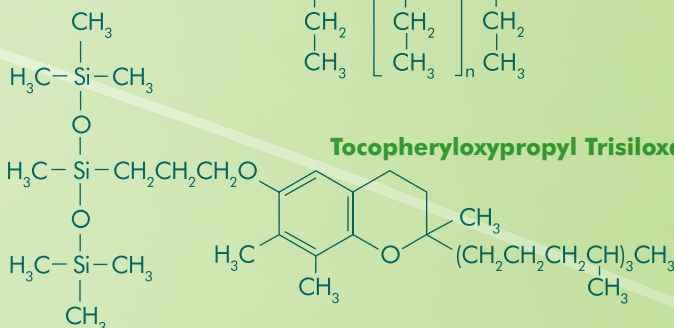


Alkyl Methicone

Alkyl Methicone



Tocopheryloxypropyl Trisiloxane



formulations

Powdercream Makeup w/ AM-118 & DE-12 /GJH1-70-1

DE-12 has the characteristic light, dry feel of a Dimethicone, yet can act as the sole solvent for the formula waxes. AM-118 is a silicone wax that provides structure to the product without the tack associated with most conventional waxes.

Ingredient (Supplier)	INCI Name	%
Phase A		
Syncrowax HRC, (Croda)	Tribehenin	5.70
AM-118, (GelestPCS)	Stearyl Methicone	6.60
DE-12, (GelestPCS)	Polydiethylsiloxane	39.69
Emerest 2452, (Cognis)	Polyglyceryl-3 Diisostearate	0.70
Methylparaben		0.20
Propylparaben		0.10
BHT		0.01

Phase B		
AS 5812 Titanium Dioxide, (Color Techniques)	Titanium Dioxide, Triethoxycaprylylsilane	15.00
AS 5137 Yellow Iron Oxide, (Color Techniques)	Iron Oxides, Triethoxycaprylylsilane	2.80
AS 5126 Red Iron Oxide, (Color Techniques)	Iron Oxides, Triethoxycaprylylsilane	1.20
AS 5146 Black Iron Oxide, (Color Techniques)	Iron Oxides, Triethoxycaprylylsilane	0.25
AS 50707 Talc, (Color Techniques)	Talc, Triethoxycaprylylsilane	9.75
AS 5061 Sericite, (Color Techniques)	Mica, Triethoxycaprylylsilane	12.00
AS 5071 Nylon	Nylon-12, Triethoxycaprylylsilane	6.00
		100.00

Pressed Powder with FCS-331 /GJH1-71-1

FCS-331 provides exceptional slip, smooth skin feel, and improved wear.

Ingredient (Supplier)	INCI Name	%
Phase A		
Talc 10707, (Color Techniques)	Talc	56.10
Zinc Stearate		3.00
D-9051, (Color Techniques)	Mica, Methicone	20.00
A-8112, (Color Techniques)	Titanium Dioxide	8.00
A-1301, (Color Techniques)	(Yellow) Iron Oxides	2.00
A-1226, (Color Techniques)	(Red) Iron Oxides	1.25
A-1404, (Color Techniques)	(Black) Iron Oxides	0.35
Methylparaben		0.20
Propylparaben		0.10

Phase B		
Cromollient DP3A, (Croda)	di-PPG-3 Myristyl Ether Adipate	4.00
FCS-331, (GelestPCS)	Trifluoropropyl Dimethicone (and) Hexafluoropropylene/ Tetrafluoroethylene Copolymer	5.00
		100.00

Pressed Powder with DE-15 /JHP2-36-1

The Diethicone wets the powder sufficiently to provide compaction equal to many esters but with the dry slippery feel of silicone.

Ingredient (Supplier)	INCI Name	%
Phase A		
Talc 10707, (Color Techniques)	Talc	82.60
Zn Stearate 921-G, (MPSI)		3.00
PFD Titanium Dioxide, (Color Techniques)	Titanium Dioxide, Fluoropropyl Methicone	8.00
PFD Yellow Iron Oxide, (Color Techniques)	Iron Oxides, Fluoropropyl Methicone	1.30
PFD Red Iron Oxide, (Color Techniques)	Iron Oxides, Fluoropropyl Methicone	0.60
PFD Black Iron Oxide, (Color Techniques)	Iron Oxides, Fluoropropyl Methicone	0.20
Methylparaben		0.20
Propylparaben		0.10

Phase B		
Diethicone DE-15, (GelestPCS)	Polydiethylsiloxane	4.00
		100.00

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1.800.669.3890

11 East Steel Road
Morrisville, PA 19067

www.gelestpcs.com