Titanate / Silicone Crosspolymer :
A New Coating for Cosmetic Powders

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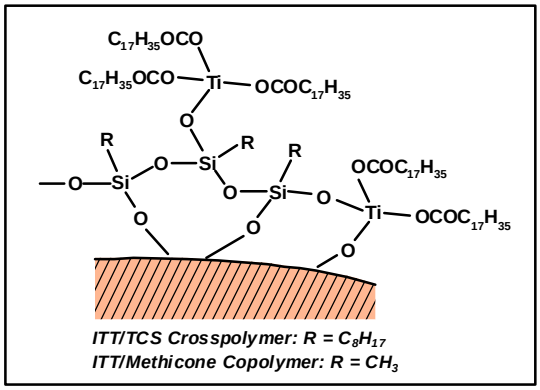
Silicone and titanate treatments of pigments and powders are commonly used to improve their hydrophobicity and lipophilicity, respectively.
Kobo is introducing a new chemistry for treatments, called Crosspolymer Treatment, where titanate is used to react silicone compounds to the surface of pigments or powders. This treatment captures the advantages of both coatings in one single treatment and minimizes their drawbacks.
Due to its chemistry, a broader range of materials can be coated with Kobo Crosspolymer Treatments than with previous treatments. Crosspolymer Treatments also allow better color retention for pigments and particle size control.
ITT/TCS Crosspolymer (TTS) and ITT/Methicone Crosspolymer (TTM) are the first two treatments of this new series available.



ITT/TCS Crosspolymer: R = C_8H_{17}
ITT/Methicone Copolymer: R = CH_3

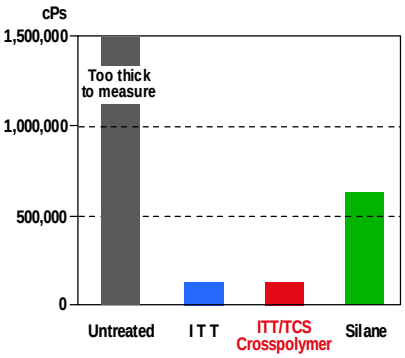
Patent : US Provisional patent application No. 60,472,527

ITT + { Alkoxysilane / Perfluoro Alkoxysilane / Methicone / Dimethicone } → pigment → Crosslinked coating on pigment

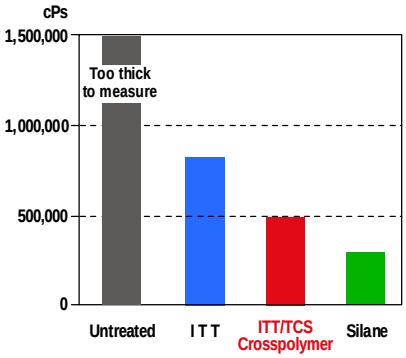
INCI names :
TTS = ITT/TCS Crosspolymer
TTM = ITT/Methicone Crosspolymer

Super Dispersible & Multimedia

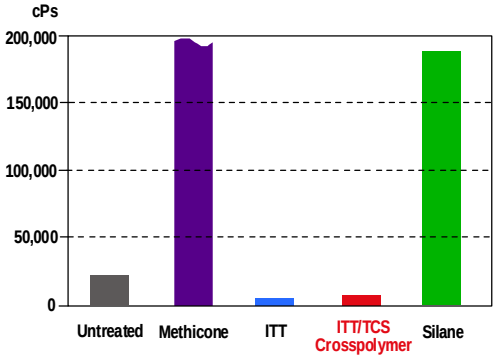
Viscosity of Iron Oxides Premixes in mineral oil (75% solids)



Viscosity of Iron Oxides Premixes in D5 (73% solids)



Viscosity of Titanium Dioxides Premixes in C12-15 Alkyl Benzoate (75% solids) with Polyhydroxystearic acid as Dispersant (1.5%)



TTS and TTM Crosspolymer treatments are both hydrophobic and lipophilic and make treated pigments and powders compatible with esters and hydrocarbons as well as with silicones.

pH Stability

Crosspolymer treatments are very stable over a wide range of pHs : flotation tests show that ITT/TCS-treated Pigmentary Titanium Dioxide remain hydrophobic even after 2 weeks at pH 2 or pH 9.

Skin Affinity

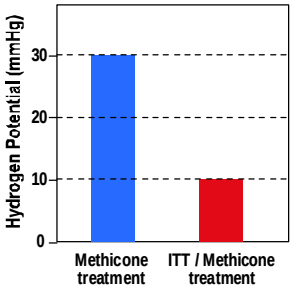
Due to the presence of fatty groups, Crosspolymer treated pigments and powders have a better affinity for the skin than silicone treated equivalents.

Hydrogen Potential

ITT / Methicone Crosspolymer treatments are hydrophobic with lower hydrogen potential Hydrogen potential reduction is even more significant on micronized TiO_2

Treatment of TiO_2 CR-837

	Methicone	ITT/Methicone	Hydrophobicity
A	2%	-	good
B	1%	1%	poor
C	-	2%	good



Color Stability

The color shifts because it is difficult to react silane completely during production. The continuation of the reaction causes the pigment to agglomerate on storage.

- Silane-treated TiO_2 becomes darker and redder over time
- ITT/Silane Crosspolymer-treated TiO_2 is more color-stable

	ΔL	Δa	Δb	ΔE
2% Silane	- 2.72	0.34	0.35	**2.76**
2% TTS (ITT/Silane)	- 0.72	0.08	0.29	**0.78**

Formulation Examples

Concealer (Cyclopentasiloxane base)
K2003/180

A cream concealer developed with new crosspolymer pigments permit high levels of pigments and coverage to be readily dispersed into a silicone gel base. Concentrated color helps to mask and hide discolorations and wrinkles under the eyes. A red iridescent pearl, Interval Red, neutralizes dark circles under the eyes. Microspheres, a special silicone polymer, and a botanical wax diffuse light and provide a soft, warm glow that lasts all day.

Pt.	Percent	Ingredients	INCI name	Supplier
1	5.04	SF1202	Cyclopentasiloxane	GE/Kobo Products
	1.00	SF1528	Cyclopentasiloxane (and) PEG/PPG-20/15 Dimethicone	GE/Kobo Products
	1.00	Sorbitan Oleate	Sorbitan Oleate	Lipo Chemicals
	1.00	Sorbitan Isostearate	Sorbitan Isostearate	Uniqema
	0.10	Propylparaben	Propylparaben	ISP Sutton
	3.50	SF96-20	Dimethicone	GE/Kobo Products
2	20.00	BTD-TTS2	Titanium Dioxide (and) ITT/TCS Crosspolymer	Kobo Products
	10.00	GMS-11S2	Mica (and) Triethoxy Caprylylsilane	Kobo Products
	1.05	BGYO-TTS2	Yellow Iron Oxide (and) ITT/TCS Crosspolymer	Kobo Products
	0.42	BGRO-TTS2	Red Iron Oxide (and) ITT/TCS Crosspolymer (Kobo)	Kobo Products
	0.12	BGBO-TTS2	Black Iron Oxide (and) ITT/TCS Crosspolymer	Kobo Products
	0.50	Nylon 2159V	Nylon-12	Kobo Products
	22.50	SF1528	Cyclopentasiloxane (and) PEG/PPG-20/15 Dimethicone	GE/Kobo Products
	1.5	Kobo Pearl Interval Red	Mica (And) Titanium Dioxide (And) Tin Oxide	Taizhu/ Kobo Products
3	5.00	Propylene Glycol	Propylene Glycol	
	0.10	Methylparaben	Methylparaben	Protameen
	0.10	Keltrol F	Xanthan Gum	Kelco
4	1.25	Sodium Chloride	Sodium Chloride	
	17.50	Deionized Water	Water	
5	1.00	Candelilla Wax	Candelilla Wax	Frank B. Ross
	0.85	White Beeswax	White Beeswax	Frank B. Ross
6	7.50	Velvesil 125	Cyclomethicone (And) C30-45 Alkyl Cetearyl Dimethicone Crosspolymer	GE/Kobo Products
	100			

Gel Foundation (Isododecane base)
K2003/92

New crosspolymer pigments are readily incorporated into a base of isododecane and dimethicone providing improvements in wear and skin feel. Nylon and mica combine with the colors to create a soft illusion and glow on the skin. A silicone gel cushions the application of the foundation onto the skin and helps to smooth out tiny wrinkles by diffusing the incoming light.

Pt.	Percent	Ingredients	INCI name	Supplier
1	17.39	Permethyl 99A	Isododecane	Presperse Inc.
	1.30	GE1111-22-401-01P	Isododecane (and) PEG/PPG-20/15 Dimethicone	GE/Kobo Products
	0.75	Sorbitan Oleate	Sorbitan Oleate	Lipo Chemicals
	0.75	Sorbitan Isostearate	Sorbitan Isostearate	Uniqema
	0.10	Propylparaben	Propylparaben	ISP Sutton
	1.75	SF96-20	Dimethicone	GE/Kobo Products
2	10.00	BTD-TTS2	Titanium Dioxide (and) ITT/TCS Crosspolymer	Kobo Products
	6.73	GMS-11S2	Mica (and) Triethoxy Caprylylsilane	Kobo Products
	0.51	BGYO-TTS2	Yellow Iron Oxide (and) ITT/TCS Crosspolymer	Kobo Products
	0.21	BGRO-TTS2	Red Iron Oxide (and) ITT/TCS Crosspolymer (Kobo)	Kobo Products
	0.06	BGBO-TTS2	Black Iron Oxide (and) ITT/TCS Crosspolymer	Kobo Products
	0.50	Nylon 2159V	Nylon-12	Kobo Products
	3.25	GE1111-22-401-01P	Isododecane (and) PEG/PPG-20/15 Dimethicone	GE/Kobo Products
	9.75	Permethyl 99A	Isododecane	Preseperse Inc.
3	5.00	Propylene Glycol	Propylene Glycol	
	0.10	Methylparaben	Methylparaben	Protameen
	0.10	Keltrol F	Xanthan Gum	Kelco
4	1.75	Sodium Chloride	Sodium Chloride	
	24.40	Deionized Water	Water	
5	1.25	Candelilla Wax	Candelilla Wax	Frank B. Ross
	0.85	White Beeswax	White Beeswax	Frank B. Ross
6	13.50	GE1111-22-403-01P	Isododecane (and) C30-45 Alkyl Cetearyl Dimethicone Crosspolymer	GE/Kobo Products
	100			

Crosspoymer treatment use titanate and silicones to improve the dispersability of pigments and powders in a wide range of media. These treatments show good hydrophobic and lipophilic properties, dispersing well in mineral oil, as well as in silicone fluids.

The hydrophobicity remains stable over a wide pH range. When isopropyl titanium triisostearate and methicone are used for coating, the hydrogen potential can be significantly reduced. Crosspolymer treatments also improve color stability.

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