

Abstract:

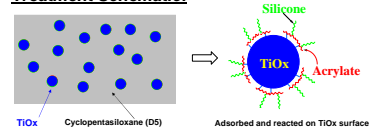
Inorganic UV filters such as TiO₂ are increasingly being used in skin care and color cosmetics. These materials provide broad spectrum UV protection however, could suffer from instability in addition to visual and tactile deficiencies. A new fine titanium dioxide powder dispersion based on a novel patented silicone-acrylate copolymer dispersant technology offers superior transparency and elegant skin feel. The particle size is optimized to maximize the UVA and UVB attenuations; the silicone-acrylate dispersant helps to stabilize the TiO₂ particles to prevent agglomeration with high TiO₂ content and low dispersion viscosity. Additionally, the dispersant has been treated with a proprietary process that affords an essentially odor-free product. The product is easily formulated into water-in-silicone (oil) broad spectrum sunscreens with light silky skin feel along with high SPF and water-resistance.

Technology and Chemistry:

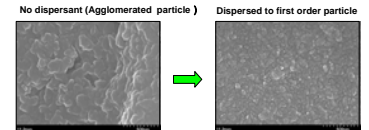
Proposed INCI Name:

Cyclopentasiloxane (and) Titanium Dioxide (and) Acrylates/Ethylhexyl Acrylate/Dimethicone Methacrylate Copolymer (and) Alumina (and) Stearic Acid

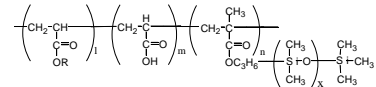
Treatment Schematic:



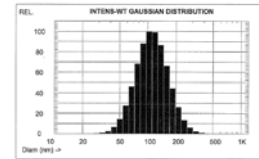
Representative SEM picture of TiO₂ pigment:



Novel Silicone-Acrylate Copolymer Dispersant:

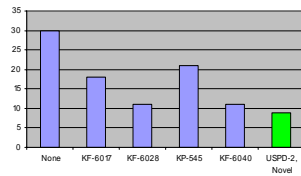


Particle Size Distribution

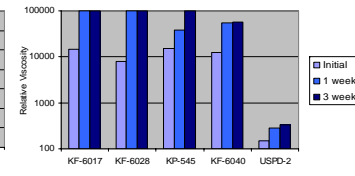


Dispersion Stability: effects of dispersant type

TiO₂ dispersion settling, rel. amount, 18 hours

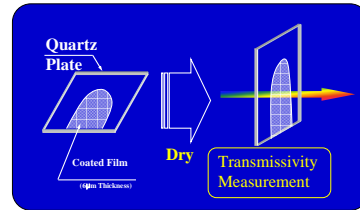


TiO₂ dispersion viscosity stability

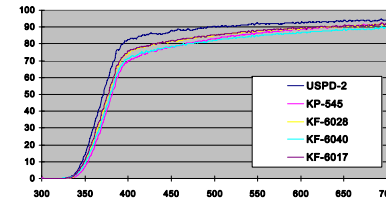


Transmissivity Measurement: relates UV protection

Test Method



Transmissivity Data: USPD-2



Sunscreen Model Formulation:

Five Subjects In-Vivo Results

Ingredient	Function	Wt%	Wt%
PEG-10/15 Dimethicone Crosspolymer (KSG-210)	Emulsifier	3	3
Cyclopentasiloxane & Dimethicone/Vinyl Dimethicone Crosspolymer (KSG-15)	Thickener, Sensory modifier	2	2
PEG-9 Polydimethylsiloxyethyl dimethicone (KF-6028)	Co-Emulsifier	1	1
Dimethicone (DM-Fluid A-6cs)	Silicone Diluent	5	5
Cyclopentasiloxane (KF-995)	Silicone Diluent	5	5
Isotridecyl Isnonanoate	Diluent	4	4
USPD-2	UV filter	21.2	10.6
SPD-25	UV filter	35	0
Dipropylene Glycol	Humectant	2	2
Sodium Citrate	Stabilizer	0.2	0.2
Sodium Chloride	Stabilizer	1	1
Water		20.6	66.2
In-Vivo SPF		50+	15
In-Vivo SPF (PA)		++	-

Summary:

What Makes USPD-2 Unique?

- High TiO₂ content (33% metal)
- Low viscosity
- Novel silicone-acrylate dispersant
- Enhanced suspension and emulsion stability, minimal settling
- Superior TiO₂ dispersion stability, minimal viscosity built
- Silky feel
- Hydrophobic, superb wash-off resistance
- Transparent
- Non-whitening
- Complexation modification

