Non-Nano Titanium Dioxide

Sunscreen Technologies

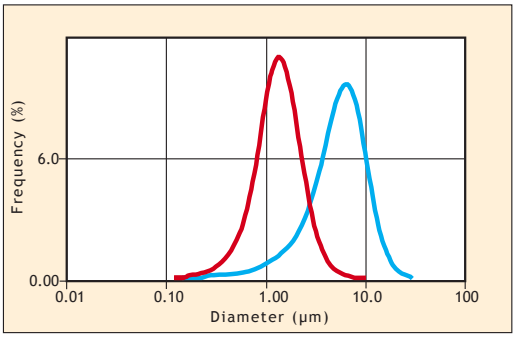
Europe Program

Inorganic UV filters have been manufactured during the past forty years for use in sunscreen products. They are preferred over organic UV filters because of their physical and chemical stability, as well as their non-irritating properties. In order to optimize the protection against UV light, and to minimize the scattering of visible light, Titanium Dioxide with particle sizes less than 100nm, or "nanoparticles," have become increasingly popular. However, there are recent safety concerns surrounding "nanoparticles," particularly skin penetration, risk of inhalation, eco-toxicity, and bioaccumulation in the human body.

In light of perceived health risks associated with "nanoparticles," pigment producers have been challenged to develop grades with a mean particle size greater than 100nm, while maintaining adequate UV-protection and cosmetic acceptability.

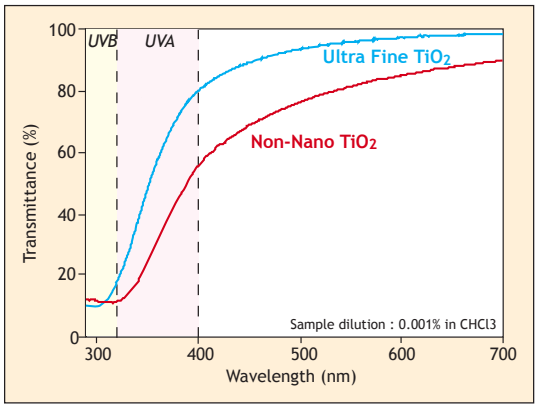
Kobo offers a range of Titanium Dioxide products, where the particle sizes are greater than 100nm when measured by light scattering sizing. These non-nano TiO_2 are available coated with inorganic and organic surface treatments, and dispersed in various vehicles for easier use in formulating sunscreens. These products have been designed to help formulators develop sunscreen products with high SPF/PFA and minimal whitening without nanoparticles.

Particle Size of Dispersion (Non-Nano TiO_2 in an Ester)



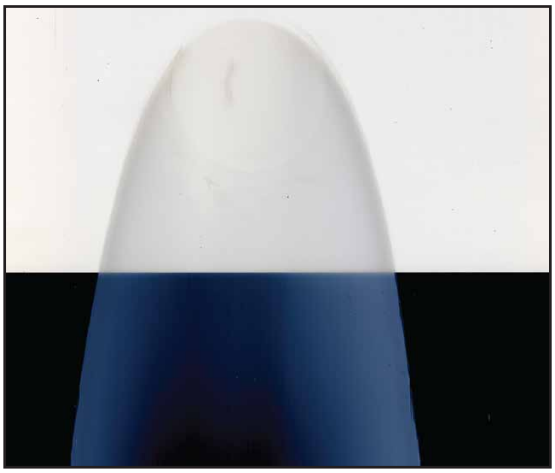
Particle size measurements of Non-Nano Titanium Dioxide (dispersed in polar-blue curves- or apolar-red curves- solvents) showing that all of the particles are above the 100nm limit.

Note: These products are considered to be non-nano materials according to Cosmetics Europe's interpretation of the definition given in Regulation (EC) No. 1223/2009.



Comparison of the transmittance curves of a Non-Nano TiO_2 (red curve) and an ultra fine grade TiO_2 (blue curve) dispersed in the same ester.

Drawdown of Dispersion (Non-Nano TiO_2 in an Ester)



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Non-Nano TiO_2

Dispersions

Carrier/ Solvent	Product Name	INCI Name	Active %	Viscosity
Esters/Oils (New)	HBP50TMD	Butyloctyl Salicylate (And) Titanium Dioxide (And) Polyhydroxystearic Acid (And) Dimethicone (And) Hydrogen Dimethicone	47	Pourable
Silicones (New)	CMF640WPS	Cyclopentasiloxane (And) Titanium Dioxide (And) Polyglyceryl-3 Polydimethylsiloxyethyl Dimethicone (And) Hydrated Silica (And) Dimethicone (And) Hydrogen Dimethicone	37	Pourable

The method of measurement used to classify these products as Non-Nano is the Light Scattering Sizer testing method.

Anhydrous Sunscreen

in vivo SPF 56

Formula KSL-339

Part 1

- **INQP70TMD** - Kobo Products: *Titanium Dioxide (And) Isononyl Isononanoate (And) Polyhydroxystearic Acid (And) Hydrogen Dimethicone (And) Dimethicone* 35.85%
- SALACOS® 99 - Ikeda Corporation: *Isononyl Isononanoate* 14.15%
- Dermol 25B - Alzo International Inc.: *C12-15 Alkyl Benzoate* 8.00%
- **HBTNP60ZSI** - Kobo Products: *Zinc Oxide (And) Triethoxycaprylylsilane (And) Butyloctyl Salicylate (And) C12-15 Alkyl Benzoate (And) Polyhydroxystearic Acid* 7.00%
- **BPD-500W** - Kobo Products: *HDI/Trimethylol Hexyllactone Crosspolymer (And) Silica* 5.00%
- **HBP50TMD** - Kobo Products: *Butyloctyl Salicylate (And) Titanium Dioxide (And) Polyhydroxystearic Acid (And) Dimethicone (And) Hydrogen Dimethicone* 5.00%
- **MSS-500W** - Kobo Products: *Silica* 5.00%
- **SunBoost ATB™** - Kobo Products: *Argania Spinosa Kernel Oil (And) Tocopheryl Acetate (And) Bisabolol* 3.00%
- Lipo Polyglycol® 400 - Vantage: *PEG-8* 1.00%
- Wickenol 155 - Vertellus Performance Materials Inc.: *Ethylhexyl Palmitate* 0.50%

Part 2

- SR1000 - Momentive: *Trimethylsiloxysilicate* 1.50%

Part 3

- **CXG-1104** - Avantor/Kobo Products: *Dimethicone (And) Dimethicone/Vinyl Dimethicone Crosspolymer* 8.90%
- **SUMECTON SAN-P** - Kobo Products: *Quaternium-18 Hectorite* 2.25%
- **DSPCS/H-I2** - Kobo Products: *Silica (And) Ethylene/Methacrylate Copolymer (And) Isopropyl Titanium Triisostearate* 1.75%
- PROPYLENE CARBONATE - Spectrum Chemical Mfg Corp.: *Propylene Carbonate* 1.10%

Manufacturing Procedure

1. Dissolve and disperse each Part uniformly.
2. Combine Part 2 with propeller mixing for 1 hour until homogenous.
3. While mixing Part 1 with homogenizer at 2500rpm, add Part 2 to Part 1 gradually.
4. Combine Part 3 until homogenous.
5. Slowly add Part 3 to Parts 1 and 2 at 4000rpm for 5 minutes with homogenizer.

Description

This Anhydrous Sunscreen features Kobo INQP70TMD and HBP50TMD, TiO_2 sunscreen dispersions. HBTN60ZSI, ZnO sunscreen dispersion helps achieve SPF. Kobo Microsphere, BPD-500W, creates a natural blurring effect that minimizes the look of lines and wrinkles and illuminates the skin. MSS-500W is a silica microsphere responsible for enhanced feel. SunBoost ATB™, which contains a proprietary ratio of anti-oxidant, anti-irritant and anti-inflammatory agents, helps boost SPF and PFA. CXG-1104 is a silicone elastomer that provides a silky, powdery feel without cyclics. DSPCS/H-I2 gives a lightweight feel and helps the formula go immediately into a powder on the skin. SUMECTON SAN-P thickens and stabilizes the emulsion.

Broad Spectrum Protection

Formulation Guidelines

Estimation of Use Level for SPF/UVA-PF
SPF Units: 2.5-3.0 SPF / % TiO_2
SPF/UVA-PF <3
Critical Wavelength > 370nm