

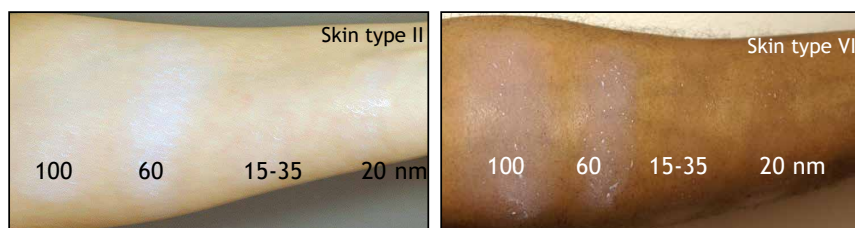
# Attenuation Grade ZnO Dispersions



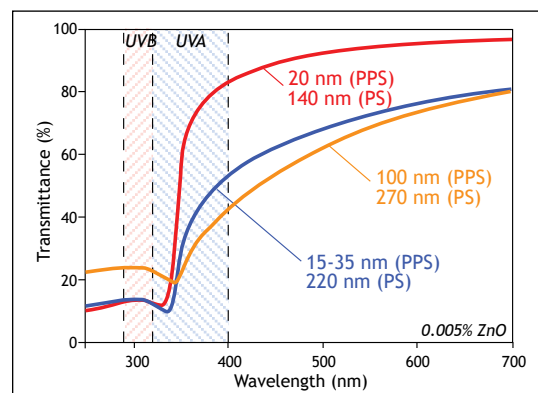
Zinc Oxide is used in cosmetics primarily as a skin protectant and for UV attenuation.

It is ideal for formulating mild or hypoallergenic sun care products for UVA/UVB protection for babies and people with sensitive skin. Zinc Oxide is available in a wide range of primary particle sizes and varying optical properties. Notwithstanding, zinc oxide is not supplied as individual grains, but as aggregates of primary particles. The degree of aggregation is a function of the primary particle size and manufacturing process, similar to the case with TiO<sub>2</sub>. These large aggregates may reduce the protection of the formula against UV light, and likewise scatter visible light, increasing whitening when sun care products are applied on skin. Kobo specializes in the custom formulation and dispersion of zinc oxide. We offer a wide selection of ZnO dispersions that

include various particle sizes, surface treatments, and a wide range of carriers, including volatile solvent bases. Kobo can also provide formulation assistance based on our extensive experience formulating and testing sunscreen products containing inorganic UV filters.



The primary particle size available on the market ranges from 20 to 120 nm. Dispersions with various particle sizes can be made. These pictures compare the transparency of ZnO dispersions of various PPS when applied on two different skin types.



This figure shows transmittance curves. The curves indicate the relationship between particle size, transparency and UVA/B attenuation. As the particle size becomes very small, ZnO can be effective in UVB attenuation (up to 2 SPF / ZnO%) but it can lose some UVA protection. Like TiO<sub>2</sub>, the particle size should be optimized when balanced protection of UVA and UVB light is required.

Patent # US 9949905 Zinc Oxide powder blends, their production and use.

Patent # US 9949904 Method of Formulating ZnO powder blends for balanced UVA/UVB attenuation.



KSL-177C-CH

## Economical O/W Sunscreen with SunBoost ATB & TNP Dispersions



### Part 1

- Deionized Water 61.20%
- Germaben® II - ISP: Propylene Glycol (And) Diazolidinyl Urea (And) Methylparaben (And) Propylparaben 1.00%

### Part 2

- Glycerin U.S.P. Natural 96% - Cognis Corp.: Glycerin 4.00%
- Keltrol® CG - CP Kelco: Xanthan Gum 0.20%

### Part 3

- TNP50T7 - Kobo Products: C12-15 Alkyl Benzoate (And) Titanium Dioxide (And) Alumina (And) Polyhydroxystearic Acid (And) Hydrogen Dimethicone 15.00%
- TNP65FZS - Kobo Products: Zinc Oxide (And) C12-15 Alkyl Benzoate (And) Triethoxycaprylylsilane (And) Polyhydroxystearic Acid 6.00%
- Sunboost ATB- Kobo Products: Argania Spinosa Kernel Oil (And) Tocopheryl Acetate (And) Bisabolol 3.60%
- Lipopeg® 100-S - Vantage: PEG-100 Stearate 2.50%
- Lipo® GMS 450 - Vantage: Glyceryl Stearate 1.50%
- Dermal 25B - Alzo International Inc.: C12-15 Alkyl Benzoate 0.60%
- Shea Butter - BASF: Shea Butter 0.40%

### Part 4

- MSS-500W - Kobo Products: Silica 3.00%
- Sepigel™ 305 - Seppic: Polyacrylamide (And) C13-14 Isoparaffin (And) Laureth-7 1.00%

### Manufacturing Procedure

1. Combine Part 1 and heat to 70°C.
2. Combine Part 2 ingredients into a slurry and add to Part 1 while mixing.
3. Combine Part 3 and heat to 70°C.
4. Combine Parts 1 and 2 with Part 3 under homogenization.
5. Add Part 4 while cooling.

### Description

Economical sunscreen that uses Kobo's Titanium Dioxide Dispersion, TNP50T7, and Kobo's Zinc Oxide Dispersion, TNP65FZS. The proportion of Titanium Dioxide to Zinc Oxide provides SPF 30, with minimal whitening on the skin. MSS-500W spherical silica microsphere provides slip during application and reduces shine on the skin. SunBoost ATB, a proprietary ratio of anti-oxidant, anti-irritant and anti-inflammatory agents, helps boost SPF and PFA.

### Active Ingredients

- Titanium Dioxide 5.78%
- Zinc Oxide 3.74%

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Carrier / Solvent	Product Name	INCI Name	Primary Part. Size (nm)	Particle Size** (nm)	Active %	Viscosity
Silicones	<b>CMF650ZSI*</b>	Zinc Oxide (And) Cyclopentasiloxane (And) Polyglyceryl-3 Polydimethylsiloxyethyl Dimethicone (And) Triethoxycaprylylsilane	20	157	48	Pourable
	<b>CM3K65FZS*</b>	Zinc Oxide (And) Cyclopentasiloxane (And) PEG-10 Dimethicone (And) Triethoxycaprylylsilane	60	228	60	Paste
Mixed Solvents	<b>KES50ZSM</b>	Zinc Oxide (And) Ethyl Trisiloxane (And) Cyclopentasiloxane (And) Methicone (And) Lauryl PEG-9 Polydimethylsiloxyethyl Dimethicone	25	190	48	Pourable
Esters/Oils	<b>TNP70MZ</b>	Zinc Oxide (And) C12-15 Alkyl Benzoate (And) Polyhydroxystearic Acid (And) Isopropyl Titanium Triisostearate	15 - 35	200	68	Pourable
	<b>INH73MZ</b>	Zinc Oxide (And) Isononyl Isononanoate (And) Polyglyceryl-6 Polyricinoleate (And) Isopropyl Titanium Triisostearate	15 - 35	200	71	Paste
	<b>TNP65MZS*</b>	Zinc Oxide (And) C12-15 Alkyl Benzoate (And) Polyhydroxystearic Acid (And) Triethoxycaprylylsilane	15 - 35	221	63	Pourable
	<b>HBTNP60ZSI*</b>	Zinc Oxide (And) Triethoxycaprylylsilane (And) Butyloctyl Salicylate (And) C12-15 Alkyl Benzoate (And) Polyhydroxystearic Acid	20	128	58	Pourable
	<b>TNP70ZSI*</b>	Zinc Oxide (And) C12-15 Alkyl Benzoate (And) Polyhydroxystearic Acid (And) Triethoxycaprylylsilane	20	130	68	Pourable
	<b>OPP60ZSI*</b>	Zinc Oxide (And) Ethylhexyl Palmitate (And) Polyhydroxystearic Acid (And) Triethoxycaprylylsilane	20	173	58	Pourable
	<b>TNSS60MZSI*</b>	Zinc Oxide (And) Ethylhexyl Methoxycrylene (And) C12-15 Alkyl Benzoate (And) Polyhydroxystearic Acid (And) Triethoxycaprylylsilane	35	171	58	Paste
	<b>TNHLP70FZS*</b>	Zinc Oxide (And) Hydrogenated Polyisobutene (And) C12-15 Alkyl Benzoate (And) Triethoxycaprylylsilane (And) Polyhydroxystearic Acid	60	207	67	Pourable
	<b>HBQP75FZS*</b>	Zinc Oxide (And) Butyloctyl Salicylate (And) Polyhydroxystearic Acid (And) Triethoxycaprylylsilane	60	212	72	Pourable
	<b>TNP65FZS*</b>	Zinc Oxide (And) C12-15 Alkyl Benzoate Polyhydroxystearic Acid (And) Triethoxycaprylylsilane	60	238	62	Paste
Natural Esters/Oils	<b>COP50MZ</b>	Zinc Oxide (And) Ricinus Communis (Castor) Seed Oil (And) Polyhydroxystearic Acid (And) Isopropyl Titanium Triisostearate	15 - 35	210	49	Pourable
	<b>CO55MZJ*</b>	Zinc Oxide (And) Ricinus Communis (Castor) Seed Oil (And) Jojoba Esters	15 - 35	292	52	Paste
	<b>SO60MZJ*</b>	Zinc Oxide (And) Helianthus Annuus (Sunflower) Seed Oil (And) Jojoba Esters	15 - 35	371	57	Paste
	<b>JOSP55XZJ*</b>	Zinc Oxide (And) Simmondsia Chinensis (Jojoba) Seed Oil (And) Polyhydroxystearic Acid (And) Jojoba Esters	20	200	52	Paste
	<b>GCP50ZSI*</b>	Zinc Oxide (And) Caprylic/Capric Triglyceride (And) Polyhydroxystearic Acid (And) Triethoxycaprylylsilane	20	130	47	Pourable
	<b>GCP45XZJ*</b>	Caprylic/Capric Triglyceride (And) Zinc Oxide (And) Polyhydroxystearic Acid (And) Jojoba Esters	20	155	43	Pourable
	<b>GCP50XZ4</b>	Zinc Oxide (And) Caprylic/Capric Triglyceride (And) Polyhydroxystearic Acid (And) Methicone	20	155	48	Pourable
	<b>GCP55MZ8SG*</b>	Zinc Oxide (And) Caprylic/Capric Triglyceride (And) Polyhydroxystearic Acid (And) Stearoyl Glutamic Acid	35	180	52	Pourable
Aqueous	<b>W30XZSP*</b>	Water (And) Zinc Oxide (And) Sodium Polyacrylate (And) Cellulose Gum	20	151	30	Pourable

This table was prepared to assist in formulating with Zinc Oxide Dispersions. The information contained herein is believed to be accurate at the time of printing and represent typical values, but should not be used as a substitute for product specification sheets.

\* These ZnO products comply with the conditions for Zinc Oxide (nano) as set forth in the Annex VI to Regulation (EC) No 1223/2009.

\*\* Size in dispersion: intensity-weighted mean size measured on Dynamic Light Scattering particles sizer

**Kobo also offers Dispersions in Volatile Non-D5 Carriers. Please see separate flyer.**

Our dispersions are often divided into two general categories:

- 1. High Solids® Dispersions:** These are usually in paste form and have a high active ZnO loading and efficacy.
- 2. High Speed™ Dispersions:** These are usually pourable and easy to incorporate into a formulation. They are highly transparent.

#### Formulation guidelines

Estimation of use level for SPF

- |                                  |                       |
|----------------------------------|-----------------------|
| 1. PPS : 20 - 30 nm, PS < 150 nm | 1.0 - 2.0 SPF / ZnO % |
| 2. PPS : > 60 nm, PS > 200 nm    | 0.5 - 1.0 SPF / ZnO % |