

Attenuation Grade Volatile Non-D5 TiO₂ & ZnO Dispersions

There is a current trend in the market to move away from volatile cyclic silicone products, namely Cyclopentasiloxane. Kobo is a global leader in pigment dispersions including attenuation grade and pigmentary grade Titanium Dioxide, Zinc Oxide, Iron Oxides, and Organic Pigments. In addition to offering these pigments in cyclic silicones, several **Volatile Non-D5** options are available that have properties that are similar to cyclic silicones.

Based on many years of experience, Kobo has carefully selected carriers and dispersants that mimic the volatility of cyclic silicones. These dispersions continue to provide minimal whitening and protection from UVA/UVB light.

Kobo also specializes in creating custom dispersion formulations.

| Carriers | INCI |
|----------|--|
| CAP | Coconut Alkanes |
| IDD | Isododecane |
| PM9 | Isododecane |
| DM2 | Dimethicone (And) Trisiloxane |
| DIM | Dimethicone (2 Cts.) |
| DM5 | Dimethicone (5 Cts.) |
| DMTM | Dimethicone (And) Methyl Trimethicone |
| MTM | Methyl Trimethicone |
| DTFSF | C12-15 Alkyl Benzoate (And) Methyl Trimethicone (And) Dimethicone (And) Trisiloxane (And) Caprylyl Methicone |



Volatile Non-D5 Sunscreen

Formula KSL-156

Part 1

- **MTM3K50XZ4** - Kobo Products: Zinc Oxide (And) Methyl Trimethicone (And) PEG-10 Dimethicone (And) Methicone 43.90%
- **MTM3F40T7** - Kobo Products: Methyl Trimethicone (And) Titanium Dioxide (And) Alumina (And) Hydrogen Dimethicone (And) Lauryl PEG-9 Polydimethylsiloxylethyl Dimethicone 5.80%
- ABIL® WE 09 - Evonik: Polyglyceryl-4 Isostearate (And) Cetyl PEG/PPG-10/1 Dimethicone (And) Hexyl Laurate 5.00%
- Crill 3 NF - Croda: Sorbitan Isostearate 0.50%

Part 2

- Deionized Water: Water 38.80%
- Aculyn™ 44 - Rohm & Haas: PEG-150/Decyl Alcohol/SMDI Copolymer 3.50%
- Sodium Chloride - Morton Salt : Sodium Chloride 1.00%
- Germaben® II - ISP: Propylene Glycol (And) Diazolidinyl Urea (And) Methylparaben (And) Propylparaben 1.00%

SPF 28
UVA-PF 8

- Polysorbate 20 - Ruger Chemical Co., Inc.: Polysorbate 20 0.50%

Manufacturing Procedure

1. In main kettle, combine Part 1 ingredients and heat to 60-65°C.
2. Mix Part 2 ingredients until uniform and add Part 1 under propeller. Mix until uniform. While at 65°C, homogenize for 2 minutes at 3500 rpm.
3. Cool to 28°C (room temperature) with water bath.

Description

This transparent, daily-use sunscreen uses Kobo's Volatile Non-D5 Dispersions, MTM3K50XZ4 and MTM3F40T7 to achieve both a D5-free sunscreen and an SPF 28/PFA 8.

Active Ingredients : Titanium Dioxide = 1.84%
Zinc Oxide = 21.10%

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Volatile Non-D5 Dispersions

| | Product Name | INCI Name | Primary Part. Size | Particle Size** | Active % | Viscosity |
|------------------|-------------------|--|--------------------|-----------------|----------|-----------|
| Titanium Dioxide | PM9P50VM-AL* | Titanium Dioxide (And) Isododecane (And) Alumina (And) Hydrogen Dimethicone (And) Polyhydroxystearic Acid | 10 nm | 103 nm | 39 | pourable |
| | MTM3F25VM-AL* | Methyl Trimethicone (And) Titanium Dioxide (And) Alumina (And) Lauryl PEG-9 Polydimethylsiloxyethyl Dimethicone (And) Hydrogen Dimethicone | 10 nm | 115 nm | 19 | pourable |
| | DTFSF40VBAS | Titanium Dioxide (And) C12-15 Alkyl Benzoate (And) Methyl Trimethicone (And) Dimethicone (And) Trisiloxane (And) Caprylyl Methicone (And) Alumina (And) Triethoxysilyl ethyl Polydimethylsiloxyethyl Hexyl Dimethicone (And) PEG-9 Polydimethylsiloxyethyl Dimethicone (And) Polyhydroxystearic Acid | 10 nm | 130 nm | 30 | pourable |
| | DM2F35VM-AL* | Dimethicone (And) Trisiloxane (And) Titanium Dioxide (And) Alumina (And) Hydrogen Dimethicone (And) PEG-9 Polydimethylsiloxyethyl Dimethicone | 10 nm | 133 nm | 27 | pourable |
| | PM9P50M170* | Titanium Dioxide (And) Isododecane (And) Alumina (And) Hydrogen Dimethicone (And) Polyhydroxystearic Acid | 14 nm | 110 nm | 40 | pourable |
| | CAP50M170* | Titanium Dioxide (And) Coconut Alkanes (And) Alumina (And) Hydrogen Dimethicone (And) Polyhydroxystearic Acid | 14 nm | 125 nm | 39.5 | pourable |
| | DIM2KG40TU9* | Dimethicone (And) Titanium Dioxide (And) Silica (And) PEG-10 Dimethicone (And) Lauryl Polyglyceryl-3 Polydimethylsiloxyethyl Dimethicone (And) Hydrogen Dimethicone | 14 nm | 148 nm | 32 | pourable |
| | DM2F40T7* | Dimethicone (And) Trisiloxane (And) Titanium Dioxide (And) Alumina (And) Hydrogen Dimethicone (And) PEG-9 Polydimethylsiloxyethyl Dimethicone | 15 nm | 125 nm | 32 | paste |
| | MTM3F40T7* | Methyl Trimethicone (And) Titanium Dioxide (And) Alumina (And) Hydrogen Dimethicone (And) Lauryl PEG-9 Polydimethylsiloxyethyl Dimethicone | 15 nm | 128 nm | 32 | pourable |
| | New PT1HLP50M160* | Titanium Dioxide (And) Phenyl Trimethicone (And) Hexyl Laurate (And) Stearic Acid (And) Alumina (And) Polyhydroxystearic Acid | 15 nm | 151 nm | 40 | pourable |
| | DM2X45TIS | Titanium Dioxide (And) Trisiloxane (And) Dimethicone (And) PEG/PPG-18/18 Dimethicone (And) Polyglyceryl-6 Polycinoleate (And) Isostearic Acid (And) Aluminum Hydroxide | 15 nm | 159 nm | 36 | paste |
| | DMTMF40T7* | Titanium Dioxide (And) Dimethicone (And) Methyl Trimethicone (And) PEG-9 Polydimethylsiloxyethyl Dimethicone (And) Alumina (And) Hydrogen Dimethicone | 15 nm | 163 nm | 32 | pourable |
| | WEIDDF45TIS | Titanium Dioxide (And) Isododecane (And) Polyglyceryl-4 Isostearate (And) Cetyl PEG/PPG-10/1 Dimethicone (And) Hexyl Laurate (And) Aluminum Hydroxide (And) Isostearic Acid (And) PEG-9 Polydimethylsiloxyethyl Dimethicone | 15 nm | 164 nm | 36 | paste |
| Zinc Oxide | New CAQP60ZSI* | Zinc Oxide (And) Coconut Alkanes (And) Triethoxycaprylylsilane (And) Polyhydroxystearic Acid (And) Coco-Caprylate/Caprate | 20 nm | 133 nm | 58 | pourable |
| | New PM9QP60ZSI* | Zinc Oxide (And) Isododecane (And) Polyhydroxystearic Acid (And) Triethoxycaprylylsilane | 20 nm | 145 nm | 58 | pourable |
| | New DIM2F660ZSI* | Zinc Oxide (And) Dimethicone (And) Polyglyceryl-3 Polydimethylsiloxyethyl Dimethicone (And) Triethoxycaprylylsilane | 20 nm | 158 nm | 58 | pourable |
| | MTM3K50XZ4 | Zinc Oxide (And) Methyl Trimethicone (And) PEG-10 Dimethicone (And) Methicone | 20 nm | 170 nm | 48 | pourable |
| | DM2F50XZ4 | Zinc Oxide (And) Dimethicone (And) Trisiloxane (And) Methicone (And) PEG-9 Polydimethylsiloxyethyl Dimethicone | 20 nm | 171 nm | 48 | pourable |
| | New DMTMF50ZSI* | Zinc Oxide (And) Dimethicone (And) PEG-9 Polydimethylsiloxyethyl Dimethicone (And) Triethoxycaprylylsilane | 20 nm | 180 nm | 48 | pourable |
| | DIM2X65HP1* | Zinc Oxide (And) Dimethicone (And) PEG/PPG-18/18 Dimethicone (And) Triethoxycaprylylsilane (And) Tocopheryl Acetate | 60-100 nm | 236 nm | 62 | paste |
| | WEIDDF65HP1* | Zinc Oxide (And) Isododecane (And) Polyglyceryl-4 Isostearate (And) Cetyl PEG/PPG-10/1 Dimethicone (And) Hexyl Laurate (And) Triethoxycaprylylsilane (And) PEG-9 Polydimethylsiloxyethyl Dimethicone | 60-100 nm | 236 nm | 62 | paste |
| | DM565HP1* | Zinc Oxide (And) Dimethicone (And) Lauryl PEG-9 Polydimethylsiloxyethyl Dimethicone (And) Triethoxycaprylylsilane | 60-100 nm | 227 nm | 64 | paste |
| | MTM3K65HP1* | Zinc Oxide (And) Methyl Trimethicone (And) PEG-10 Dimethicone (And) Triethoxycaprylylsilane | 60-100 nm | 239 nm | 64 | paste |

This table was prepared to assist in formulating with Volatile Non-D5 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 and TiO₂ products comply with the conditions for Zinc Oxide (nano) and for Titanium Dioxide (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 particle sizer

Our dispersions are often divided into two general categories:

- High Solids® Dispersions:** These are usually in paste form and have a high active ZnO or TiO₂ loading and efficacy.
- High Speed™ Dispersions:** These are usually pourable and easy to incorporate into a formulation. They have a narrower particle size distribution, and are highly transparent.

Formulation guidelines Zinc Oxide

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 % |

Formulation guidelines Titanium Dioxide

Estimation of use level for SPF

10 - 15 nm TiO₂ Dispersions

- | | |
|---------------|-------------------------------------|
| 1. SPF < 20 : | 2.0 - 2.5 SPF / TiO ₂ % |
| 2. SPF > 25 : | 2.5 - 3.0+ SPF / TiO ₂ % |

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