DOW Personal Care
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# SolTerra™ Boost: a UV Protection Booster for Inorganic Suncreen Actives

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# SolTerra™ Boost:

UV Protection Booster for Inorganic SunScreen Actives

| Features | Benefits |
|---|---|
| Improves dispersion of ZnO and$TiO_2$ | Increases the UVA/UVB protection levels achieved with inorganic sunscreen actives |
| Reduces amount of inorganic filters needed | Avoids risk of skin whitening, improves skin feel |
| Requires a low use level (1 to 2%) | Lowers formulation cost |
| Derives from cellulose | Links to consumer preference for bio-based materials |

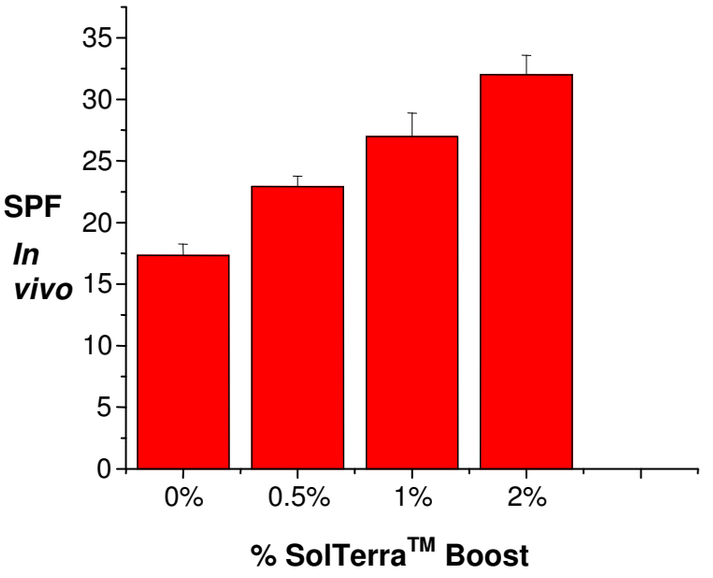
**INCI Name:** Methylcellulose

**Typical Properties:**

| | |
|---|---|
| Appearance | White to Off-White Powder |
| Active, Percent | 100% |
| pH (2% dispersion in water) | 5 to 8 |
| Specific gravity | 1.39 |

**Performance in Typical Formulations**

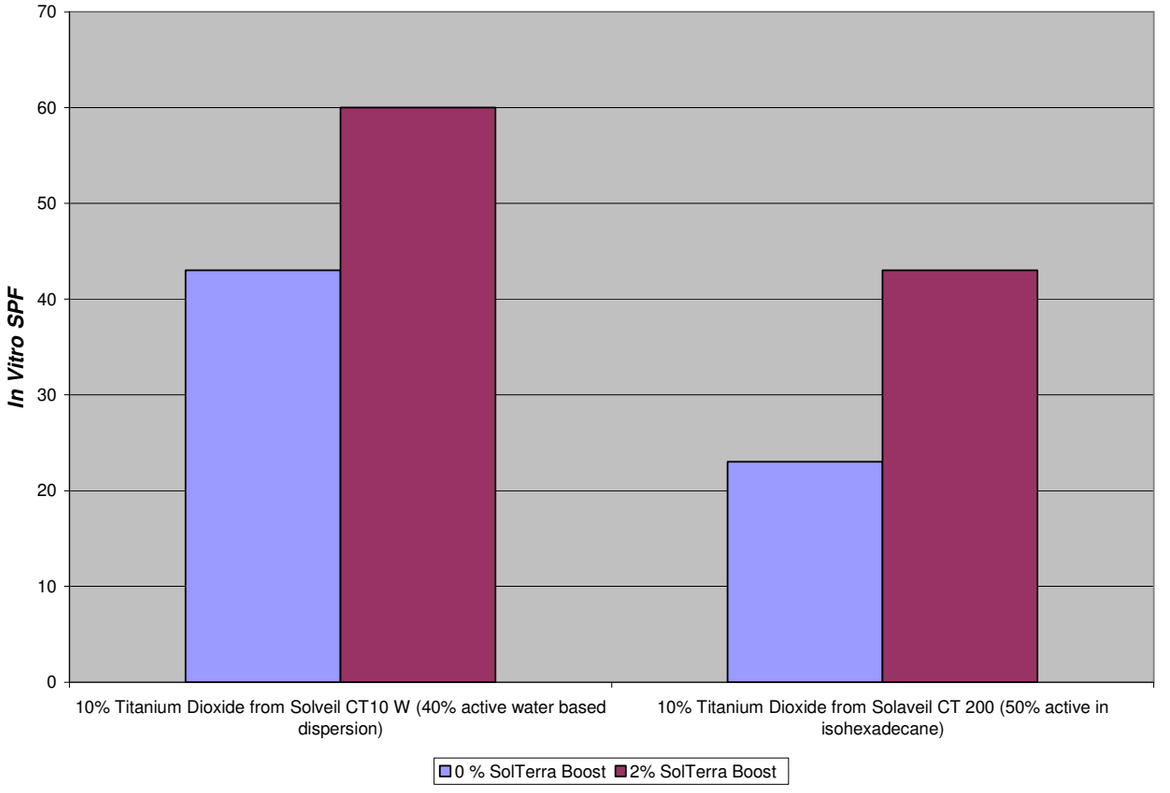
Figure 1. Impact of SolTerra™ Boost on Zinc Oxide



As shown in Figure 1, SolTerra™ Boost demonstrates excellent improvement in SPF protection of an oil in water formulation. A 1% use level of SolTerra Boost provided a 50% increase and a 2% use level of SolTerra Boost provided an 85% increase.

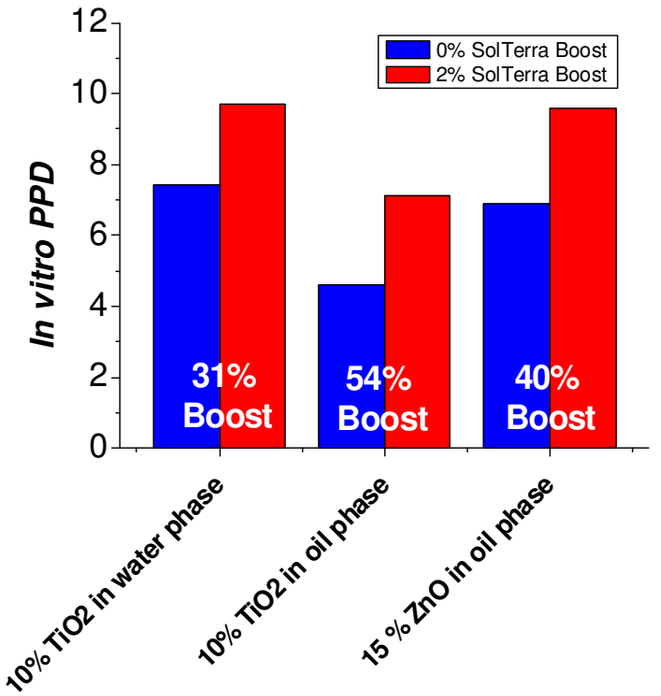
Figure 2 provides *in vitro* SPF measurement of oil in water formulations prepared, with 10% $TiO_2$ and 0 and 2% SolTerra™ Boost.

Figure 2: Impact of SolTerra™ Boost on Titanium Dioxide



Persistent Pigment Darkening is currently the industry's standard *in vivo* method for evaluating UVA protection. Figure 3 details the benefit offered by SolTerra™ Boost in terms of Persistent Pigment Darkening for both Titanium Dioxide and Zinc Oxide.

Figure 3: SolTerra ™ Boost and Persistent Pigment Darkening

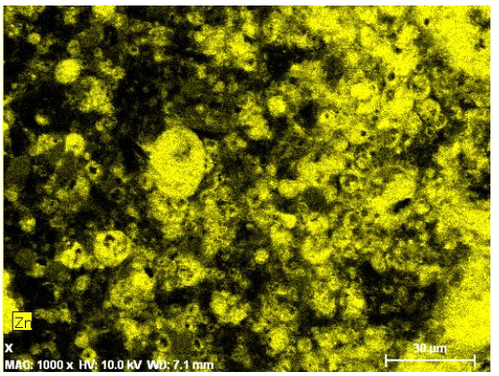



- SolTerra ™ Boost has a dramatic impact on the UVA protection of inorganic sunscreens as measured by Persistent Pigment Darkening.
- Performance enhancement is the same across the whole UV spectrum

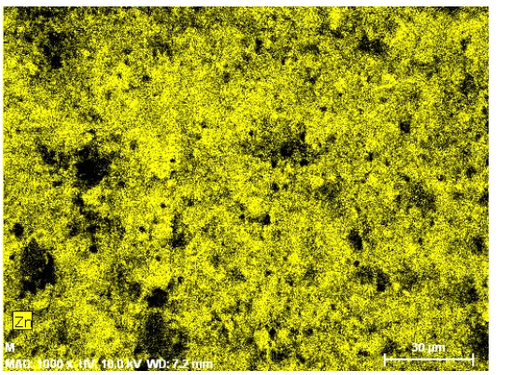
## Mechanism of Inorganic UV filter enhanced performance

The photomicrographs shown below demonstrate how SolTerra™ Boost improves inorganic particle distribution, which is how SolTerra™ Boost helps to increase UV protection.

### SolTerra™ Boost And Particle Dispersion




ZnO "bubbles" in a conventional formulation, lower dispersion leads to lower SPF




Adding SolTerra ™ Boost (2%) shows a homogeneous distribution of zinc oxide, higher dispersion leads to higher SPF

## Formulation Guidelines for SolTerra™ Boost

SolTerra™ Boost may be added to the oil phase or the water phase. The oil phase is recommended because it provides for the best incorporation and distribution of SolTerra™ Boost.

**Recommendations for incorporating SolTerra™ Boost into the oil phase:**

- Prepare phase A and heat to approximately 80° C under agitation
- Include all ingredients in phase B except for SolTerra™ Boost and heat to approximately 80° C under agitation until all solids are well dissolved. **Then add Solterra™ Boost into phase B slowly and mix well.**
- Combine phase B into phase A and homogenize A and B until the desired particle size is achieved.
- Cool to about 40° C while stirring.
- Adjust pH to desired level.

See sample formulation below:

| | | Ingredient | INCI Name | Supplier | Weight (%) |
|---|---|---|---|---|---|
| A | 1 | Deionized Water | Water | | 57.9 |
| | 2 | Ritacam E-10 | Methyl Gluceth-10 | Rita Co. | 1.00 |
| | 3 | Propylene Glycol (99%) | Propylene Glycol | Dow Chemical Co. | 1.00 |
| | 4 | LiquaPar Optima | Phenoxyethanol (and) Methylparaben (and) Isopropylparaben (and) Isobutylparaben (and) Butylparaben | ISP | 0.90 |
| | 5 | Keltrol CGT | Xanthan Gum | CP Kelco | 0.20 |
| B | 1 | Rita 52 | PEG 40 Stearate | Rita Co. | 1.00 |
| | 2 | Cerasynt | Glyceryl Stearate | ISP | 1.00 |
| | 3 | Procol CS-20-D | Cetearyl Alcohol & Ceteareth-20 | Protameen Chemicals, INC | 3.00 |
| | 4 | Dow Corning 200 Fluid | Dimethicone | Dow Corning Co. | 2.00 |
| | 5 | ZinClear™ IM AB (50% ZnO) | Zinc Oxide and C12-15 Alkyl Bensoate and Isotearic Acid and Polyhydroxystearic Acid | Dow Chemical Co. | 30.00 |
| | 6 | SolTerra™ Boost | Methylcellulose | Dow Chemical Co. | 2.00 |
| C | 1 | Citric Acid (99%) | Citric Acid | Acros Organic | q.s. |

**Recommendations for incorporating SolTerra Boost into the water phase:**

- Heat ~ 1/3 of water required for the water phase to 80° C.
- Add SolTerra™ Boost under agitation and continue to stir until all particles are wetted
- Add the remainder of the water required in the water phase as room temperature water (this increases the cooling rate).
- Add the remainder of the water phase ingredients and process as dictated by those ingredients.
- Prepare phase B and heat to approximately 80° C under agitation until all solids are well dissolved.
- Combine phase B into phase A and homogenize A and B until the desired particle size is achieved.
- Cool to about 40° C while stirring.
- Adjust pH to desired level.

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| | 6 | SolTerra™ Boost | Methylcellulose | Dow Chemical Co. | 2.00 |
| C | 1 | Citric Acid (99%) | Citric Acid | Acros Organic | q.s. |

**Conclusions:**

SolTerra™ is an excellent tool for formulators using inorganic UV actives because it provides:

- Higher UV protection levels (both UVB and UVA)
- Reduced amount of inorganic UV actives needed, resulting in improved formulation aesthetics and lower formulation costs
- Formulation flexibility with addition either to oil or water phases

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## Interested in Learning More?

For more information on SolTerra™ Boost or other products offered by Dow Personal Care, please contact us at the numbers listed below:

**From the United States and Canada**
Call: 1-800-367-3534
Fax: 1-989-832-1465

**From Europe, India, the Middle East and Africa**
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Toll-free from South Africa: +800 99 5078
Call: +32 3 450 2240
Fax: +32 3 450 2815

**From Latin America**
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Fax: +55 11 5188 9749

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Toll-free fax: 800 7779 7779++
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Fax: +60 3 7958 5598

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