**SunBoost ATB & SunBoost ATB Natural**

SPF Booster with Antioxidant Benefits

The current trend towards increasing SPF values in sunscreens presents a challenge to formulators who have to create products with high concentrations of sunscreen agents while keeping acceptable cosmetic qualities.

Kobo has developed SunBoost ATB, a mixture of antioxidant, anti-irritant and anti-inflammatory agents at a proprietary ratio. When used in sunscreens in combination with organic and/or inorganic UV Filters, SunBoost ATB shows an increase in SPF and PFA scores by more than 30%.

An all natural, Ecocert approved version, SunBoost ATB Natural, is available.

SunBoost ATB is also available coupled with High Speed™ TiO₂ dispersion TNP50T7. TNP50T7-ATB can provide up to 4.5 SPF units for each percent of TiO₂ in sunscreen formulas while delivering all the benefits of the antioxidants contained in SunBoost ATB.

SunBoost ATB and SunBoost ATB Natural can be used in other types of formulas, for their antioxidants and anti-irritant properties.

### Raw material approved by Ecocert in accordance with the Ecocert Standard

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>INCI Name</th>
<th>Product Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SunBoost ATB</td>
<td>Argania Spinosa Kernel Oil (And) Tocopheryl Acetate (And) Bisabolol</td>
<td>Oily Material</td>
</tr>
<tr>
<td>SunBoost ATB Natural</td>
<td>Argania Spinosa Kernel Oil (And) Tocopheryl Acetate (And) Bisabolol</td>
<td>Oily Material</td>
</tr>
<tr>
<td>TNP50T7-ATB</td>
<td>C12-15 Alkyl Benzoate (And) Titanium Dioxide (And) Argania Spinosa Kernel Oil (And) Alumina (And) Hydrogen Dimethicone (And) Tocopheryl Acetate (And) Polyhydroxystearic Acid (And) Bisabolol</td>
<td>TiO₂ Dispersion with SunBoost ATB</td>
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</tbody>
</table>

### Comparison of SPF and PFA of formulas with and without SunBoost ATB

<table>
<thead>
<tr>
<th>Formula Reference</th>
<th>Actives</th>
<th>In Vivo SPF</th>
<th>PFA</th>
<th>% Boost on SPF</th>
<th>% Boost on PFA</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSL-138 O/W Base</td>
<td>Organic 31%</td>
<td>40</td>
<td>13</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td>KSL-138V</td>
<td>Organic 31% SunBoost ATB 5%</td>
<td>54</td>
<td>17</td>
<td>35%</td>
<td>31%</td>
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<tr>
<td>KSL-177-CH W/O Base</td>
<td>TiO₂ 5.78% ZnO 3.74%</td>
<td>19</td>
<td>7</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td>KSL-177C-CH</td>
<td>TiO₂ 5.78% ZnO 3.74% SunBoost ATB 3.6%</td>
<td>30</td>
<td>10</td>
<td>58%</td>
<td>43%</td>
</tr>
<tr>
<td>KSL-188 W/O Base</td>
<td>TNP50T7 18.53% (TiO₂ 7.13%)</td>
<td>22</td>
<td>4</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td>KSL-188E</td>
<td>TNP50T7-ATB 18.53% (TiO₂ 6.85%)</td>
<td>32</td>
<td>7</td>
<td>45%</td>
<td>75%</td>
</tr>
</tbody>
</table>

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Technical Literature ref SB-ATB-001 - February 28, 2020
Part 1
- Deionized Water - Water 45.90%
- Liposorb® L-20 - Vantage: Polysorbate 20 1.00%

Part 2
- Propylene Glycol - Symrise: Propylene Glycol 1.50%
- KELTROL® CG - CP Kelco: Xanthan Gum 0.30%

Part 3
- Neo Heliopan® HMS - Symrise: Homosalate 15.00%
- Neo Heliopan® OS - Symrise: Ethylhexyl Salicylate 10.00%
- Ceraphyl® 368 - ISP: Ethylhexyl Palmitate 7.00%
- SunBoost ATB - Kobo Products: Argania Spinosa Kernel Oil (And) Tocopherol Acetate (And) Bisabolol 5.00%
- Lip® GMS-450 - Vantage: Glyceryl Stearate 3.00%
- Neo Heliopan® 357 - Symrise: Butyl Methoxydibenzoylmethane 3.00%
- Neo Heliopan® BB - Symrise: Benzophenone-3 3.00%
- Lipomulse® 165 - Vantage: Glycerol Stearate (And) PEG-100 Stearate 2.00%
- Covi-ox® T-50 - Cognis Corp.: Tocopherol 0.30%
- Lipowax® 100D - Vantage: Cetearyl Alcohol (And) Ceteareth-20 0.50%
- Liposorb® TS - Vantage: Sorbitol Tristearate 0.30%

Part 4
- Botanistat PF-64 - DD Chemco: Xanthan Gum 0.10%

Part 5
- Acelyn™ 44 - Rohm & Haas: PEG-150/Decyl Alcohol/SMDI Copolymer 1.00%

Manufacturing Procedure
1. In main kettle, combine Part 1 ingredients and heat to 78-80°C.
2. Combine Part 2 ingredients and heat to 80°C. Mix until uniform using propeller mixer.
3. Add Part 2 to Part 1 and mix until uniform.
5. Add Part 4 while cooling.
6. Homogenize for approximately 2 minutes at 4000 rpm.
7. Add Part 5 to batch.
8. Homogenize for approximately 1 minute at 4000 rpm.
9. Cool batch to 30°C.

Description
This sunscreen contains Kobo’s new SunBoost ATB. This product is a proprietary ratio of anti-oxidants, anti-irritant and anti-inflammatory agents. In this sunscreen, SunBoost ATB increased the SPF from 40 to 54. It can also boost PFA values.

**The USA limit of Ethylhexyl Salicylate is 5%. This formula is not for use in USA.

Active Ingredients
Homosalate 15.00%
Ethylhexyl Salicylate 10.00%
Butyl Methoxydibenzoylmethane 3.00%
Benzophenone 3.00%

Testing
SPF & UVA-PF: in vivo on 3 subjects

Part 1
- GCP55MZ8SG - Kobo Products: Zinc Oxide (And) Caprylyl/Capric Triglyceride (And) Polyhydroxystearic Acid (And) Stearoyl Glutamic Acid 22.01%
- NHP55STS - Kobo Products: Titanium Dioxide (And) C13-15 Alkane (And) Stearic Acid (And) Aluminium Hydroxide (And) Polyhydroxystearic Acid 19.20%
- ZnO-C-ASG3J - Kobo Products: Zinc Oxide (And) Stearoyl Glutamic Acid 4.12%
- Dehymuls® PPGH - BASF: Polyglyceryl-2 Dipolyhydroxystearate 4.00%
- SunBoost ATB Natural - Kobo Products: Argania Spinosa Kernel Oil (And) Tocopheryl Acetate (And) Bisabolol 3.65%
- Dehymuls® LE - BASF: PEG-30 Dipolyhydroxystearate 1.00%

Part 2
- Deionized Water - Water 36.37%

Part 3
- Superol Glycerine USP, Kosher Glycerine USP - P&G Chemicals: Glycerin 1.50%
- Keltrin® CG - CP Kelco: Xanthan Gum 0.10%

Part 4
- MgSO4 7H2O - A&C American Chemicals: Magnesium Sulphate Heptahydrate 1.00%
- ALLANTOIN - Jeen International: Allantoin 0.10%
- Dermofeel® PA-3 - Dr. Straetmans/ Kinetik: Sodium Phytate 0.10%

Part 5
- Zemea® - Du Pont & Tate: Propanediol 2.50%
- Hydrolyl® 5 Green - Symrise: Pentylene Glycol 0.75%
- AE Preserve® PEG - AE Chemie: Phenethylalcohol (And) Caprylyhydroxamic Acid (And) Glycerin 0.60%

Manufacturing Procedure
1. In the main vessel, homogenize the first five ingredients in Part 1 until batch is smooth. Add the last ingredient and heat to 80-85°C.
2. In side kettle, weigh out Part 2. Pre-mix Part 3 and add to Part 2 with fast speed propeller mixing. Mix for at least 30 minutes.
3. With mixing, begin heating Parts 2 and 3 to 65-70°C. Add Part 4, one at a time while heating.
4. With homogenization, slowly add Parts 2, 3 and 4 to Part 1.
5. Cool with stirring to 50°C and homogenize at medium speed while adding premixed Part 5. Homogenize for at least 3-5 minutes.
6. With slow speed homogenization, blend Part 6 into batch and then cool with mixing to 30°C.

Description
This naturally-derived mineral sunscreen cream is non-greasy with minimal whitening on skin. NHP55STS, (Titanium Dioxide dispersion in C13-15 Alkane) provides SPF protection with a light after feel. The varying particle sizes of zinc oxide (in GCP55MZ8SG and ZnO-C-ASG3J) provide effective UVA protection. SunBoost ATB Natural helps boost SPF. MSS-500/5H and MSS-500W give the product a soft application and non-greasy after feel.

Active Ingredients
Titanium Dioxide 8.50%
Zinc Oxide 15.50%

Testing
SPF: in vivo on 5 subjects