New Generation of Sunscreens

SunCat® MTA

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Head of Technical Development – Surfachem

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NEW GENERATION OF SUNSCREENS: SunCat® MTA

CLOSE ALLIANCE - DEVELOPMENT

INVENTOR / PRODUCER

PRODUCT/MARKET

EXCLUSIVE DISTRIBUTORS

We welcome you to visit us on STAND 6T10 if you are interested in becoming an Exclusive Distributor.
Sun Care Background
Types of UV filters

- **Organic sunscreens**
  - Carbon based molecules absorb UV radiation and convert it to heat energy.
  - **Examples** - Butyl methoxydibenzoylmethane, Octocrylene, Butyl Methoxycinnamate

- **Physical sunscreens**
  - Adsorb and scatter UV radiation.
  - Titanium dioxide, Zinc oxide
  - Micronised versions now extensively available.
Organic vs Physical - Advantages

• **Organic**
  – Well understood by formulators.
  – Low concentrations can give good efficacy.
  – Good skin feel with no powdery appearance.

• **Physical**
  – Broad spectrum and photostable.
  – Safe and low irritancy.
  – No need to use more than one active to gain high SPF.
  – Once dispersed are easy to incorporate into finished product.
Organic vs Physical - Disadvantages

• Organic
  – Most are narrow spectrum and some are not photostable.
  – Usually need to mix to get broad spectrum and high SPF.
  – Questions over irritancy and impact on environment.

• Physical
  – Can be difficult to formulate with if not pre-dispersed.
  – Can leave skin appearing white and if not formulated carefully give poor skin feel.
  – Questions over nano particles, do they absorb into skin?
Ultra violet radiation

- **UVA**: Stimulates Tanning, Causes Aging, Can lead to chronic skin issues
- **UVB**: Causes Burning & Tanning, Can lead to chronic skin issues
- **UVC**: Blocked by Atmosphere

**Boots Star System (SPF) - UVA**: 5
**SUN Protection Factor (SPF) - UVB**: 12
Ultra violet radiation

- **UVA**: 320 – 400 nm – ca. 95% of total UV radiation reaching earth
- **UVB**: 290 – 320 nm ca. 5% of total UV reaching Earth
- **UVC**: 100 – 290 nm does not reach earth (blocked by the ozone layer)
Sunscreen for the next generation

**Enwrapped form for even protection**
- Particles won’t aggregate
- Lower dosage for higher SPF
- Extended broad spectrum protection.

**Safer on the skin**
- Won’t get absorbed into skin
- Comfortable and refreshing skin feel

**Easier formulation**
- Water dispersible
- No guesswork required for SPF.
Enwrapped form

- **Double sphere enwrapping**
  - Pre-solubilized mixture of both liquid and powder chemical UV filters.
  - Through a proprietary, high pressure, and high shear process.
  - Micronized sunscreen enwrapped in double-layered sphere.
  - Negatively charged outer sphere to prevent flocculation.
SunCat® MTA provides even protection

Traditional chemical sunscreen with uneven protection

Evenly spread protection of SunCat
Safer on the skin

Comfortable and refreshing
- Won’t get absorbed by skin.
- Non-irritant.
- Longer and safer skin residence time.
- High oil formulation not required.
- Forms a thin layer of water resistant protective shield upon skin.
- Allows the skin to breathe freely.
Suitable for a wide range of formulations

Compatible with most ingredients used in personal care products

Nonionic, anionic, or cationic emulsifying systems

20% w/w will yield the maximum concentration allowed

Safely used within a pH range of 5~7.5
Easier formulation

- A specific ratio of sunscreens premixed and solubilised.
- No guesswork required to achieve desired SPF.
- Aqueous dispersion suitable for most cosmetic formulations.
- Compatible with both “cold process” and “hot process” formulations.
- Added in the final stage therefore no need to pre solubilise.
Composition

Active ingredients
• The combination of the actives Ethylhexyl Methoxycinnamate (20%), Octocrylene (10%) and Butyl methoxy-dibenzoylmethane (20%) provides broad-spectrum protection.

Excipients
• Excipients; Water; 1,3-Butylene Glycol; Phospholipids; Phenoxyethanol (0.1 %)

Note
• Inclusion of up to 20% of SunCat® MTA will stay well under the maximum of each API allowed in Europe in the end formulation. In reality much less that 20% is usually needed
UV transmission

- Sample: 20% SunCat® MTA cream
- Protection range: 280~400nm
- 97% UV light can be screened
Formulation reference chart

<table>
<thead>
<tr>
<th>SPF &amp; UVA protection Reference Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MTA %</strong></td>
</tr>
<tr>
<td><strong>Base</strong></td>
</tr>
<tr>
<td><strong>Cream Base</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Gel Base</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Cream +3% ST-2000</strong></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

- **In vitro tested by Labsphere UV-1000S Ultraviolet Transmittance Analyzer**
- **3% Nestdry ST-2000 eq. 2.2 % TiO₂**
Correlation between concentration and SPF

The results can be followed by formulators to easily develop new sunscreen formulas with desired SPF in the most efficient way.
Photostability test

· Test method
  – Expose the slides applied with each sample under the natural sunlight for 2, 4, 6 hours.
  – After the sun exposure, test the SPF respectively.

· Sun exposure conditions
  – October, Ultraviolet Index: 6~7
  – Time: 10:00 AM ~ 2:00 PM
  – Temperature: 30~32°C
In vivo SPF test (vs. in vitro)

- Similar in vivo SPF test results are obtained comparing to in vitro ones.

<table>
<thead>
<tr>
<th>SPF Test</th>
<th>Cream Base</th>
<th>Gel Base</th>
<th>Cream +3% ST-2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>SunCat MTA, wt.%</td>
<td>5 %</td>
<td>17 %</td>
<td>8 %</td>
</tr>
<tr>
<td>In vitro SPF</td>
<td>31.86</td>
<td>51.36</td>
<td>42.60</td>
</tr>
<tr>
<td>In vivo SPF</td>
<td>35.7</td>
<td>56.2</td>
<td>39.3</td>
</tr>
</tbody>
</table>

- 3 subjects panel in skin type II
- Tests performed by AMA Lab.
In vivo UVA-PF test (ISO-24442)

- Similar in vivo UVA protection test results are obtained comparing to in vitro ones.

<table>
<thead>
<tr>
<th>In vivo UVA-PF</th>
<th>Cream Base</th>
<th>Gel Base</th>
<th>Cream +3% ST-2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>SunCat MTA, wt.%</td>
<td>5 %</td>
<td>10 %</td>
<td>3 %</td>
</tr>
<tr>
<td>UVA-PF Value</td>
<td>17.9</td>
<td>18.3</td>
<td>19.2</td>
</tr>
<tr>
<td>UVA-PF</td>
<td>PA ++++</td>
<td>PA ++++</td>
<td>PA ++++</td>
</tr>
</tbody>
</table>

- ISO-24442 - Cosmetics - Sun protection test methods - In vivo determination of sunscreen protection
- Tests performed by AMA Lab.
In vitro photo stability test

<table>
<thead>
<tr>
<th></th>
<th>Cream</th>
<th>Gel</th>
<th>SunCat MTA, w%</th>
<th>SPF, before sun exposure</th>
<th>SPF, after 2hrs exposure</th>
<th>SPF, after 4hrs exposure</th>
<th>SPF, after 6hrs exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5%</td>
<td>17%</td>
<td>8%</td>
<td>42.60</td>
<td>45.59</td>
<td>42.92</td>
<td>46.08</td>
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<tr>
<td></td>
<td>10%</td>
<td></td>
<td>3%</td>
<td>48.39</td>
<td>51.39</td>
<td>48.71</td>
<td>51.69</td>
</tr>
<tr>
<td></td>
<td>3%</td>
<td></td>
<td>5%</td>
<td>57.36</td>
<td>63.91</td>
<td>67.46</td>
<td>70.18</td>
</tr>
<tr>
<td></td>
<td>5%</td>
<td></td>
<td>5%</td>
<td>63.50</td>
<td>73.11</td>
<td>70.17</td>
<td>72.63</td>
</tr>
</tbody>
</table>

3% Nestdry ST-2000 eq. 2.2 % TiO₂

Surfachem
# Usage Concentration Limits of SunCat® MTA

<table>
<thead>
<tr>
<th></th>
<th>OMC</th>
<th>AVO</th>
<th>OTC</th>
<th>Restriction of SunCat MTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU.</td>
<td>10 %</td>
<td>5 %</td>
<td>10 %</td>
<td>EU. 25 %</td>
</tr>
<tr>
<td>USA</td>
<td>7.5%</td>
<td>3 %</td>
<td>10 %</td>
<td>USA 15 %</td>
</tr>
<tr>
<td>TWN</td>
<td>10 %</td>
<td>5 %</td>
<td>10 %</td>
<td>TWN 25 %</td>
</tr>
<tr>
<td>AUS</td>
<td>10 %</td>
<td>5 %</td>
<td>10 %</td>
<td>AUS 25 %</td>
</tr>
<tr>
<td>JPN</td>
<td>20 %</td>
<td>10 %</td>
<td>10 %</td>
<td>JPN 50 %</td>
</tr>
<tr>
<td>Composition of SunCat MTA</td>
<td>20 %</td>
<td>20 %</td>
<td>10 %</td>
<td></td>
</tr>
</tbody>
</table>
Intrinsic Benefits

• Suitable for wide range of formulations with full UVA/UVB spectrum protection, also compatible with hot or cold process

• Exhibits a dramatic synergistic durable SPF boost if used with a low % Titanium Dioxide, without causing instability of the other A.I.’s (including no decomposition of the Avobenzone)
Benefits for Formulator

- Effectiveness of the API’s is greatly enhanced, leading to much lower API usages.
- Ease of formulation by simple stirring into the normal formulation mix.
- SPF can be accurately predicted by reference to a simple formulation chart.
- Full protection over the full UVA/UVB range from 280 to 400 nm.
- No need to stock & use wide variety of sunscreen API’s - only need SunCat® MTA.
- Stable in storage – both as SunCat® MTA and in the end-product formulation.
Benefits for End-User

• API’s stay on the skin surface inside micro-enwrapped capsules providing an efficient barrier to UVA/UVB radiation, whilst almost eliminating skin penetration
• SPF stays almost constant on the skin when exposed to UV light 6 hours (and more).
• Excellent, smooth skin coverage resulting in very even protection from the sun.
• Non-oily, non-sticky and comfortable to wear on the skin – allows skin to breathe.
• Skin penetration by API’s is virtually eliminated – no irritation of sensitive skin.
• The enwrapped micro-spheres containing the API’s do not coalesce or disintegrate on skin.
Why SunCat® MTA?

- SunCat® MTA shown to provide broad spectrum protection throughout the whole UVB and UVA range, from 290nm to 400nm.
- High SPF and excellent photostability can be achieved with low concentrations of SunCat® MTA.
- More preferred ingredient: Octocrylene (vs. Benzophenone-3).
Suggested applications

SunCat®
MTA

Skin care
— Toner, lotion, cream, foundation, sunscreen spray, sunscreen wipe, etc.

Hair care
— Sunscreen toner spray.
To remind you again

**Aqueous form**
- Easier formulation
- Prevent skin absorption
- Very comfortable wear

**Enwrapped form** to help stabilize
- Prolong the protection capabilities of chemical sunscreen
- Prevent particle aggregation
- Even spread for better protection
- Fewer sunscreen actives and lower concentration used for higher SPF
Distributors of SunCat® MTA in Europe and The Americas
### Table of distributors of SunCat® MTA

<table>
<thead>
<tr>
<th>Agent Region</th>
<th>Company Logo</th>
<th>Company Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil &amp; Europe (1)</td>
<td><img src="#" alt="Surfachem" /></td>
<td>Surfachem Ltd</td>
</tr>
<tr>
<td>Chile, Colombia, Costa Rica &amp; Peru</td>
<td><img src="#" alt="Dorison Laboratories" /></td>
<td>Dorison Laboratories S.A.S.</td>
</tr>
<tr>
<td>Portugal &amp; Spain</td>
<td><img src="#" alt="Cestisa" /></td>
<td>Cestisa</td>
</tr>
</tbody>
</table>

Note: 1. Belgium, Denmark, Estonia, Finland, Germany, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Norway, Poland, Sweden, Switzerland, & United Kingdom.
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Thank You