Emulsun increases skin hydration, reduces TEWL, and increases flexibility of product aesthetics.

Emulsun [INCI: Hydrogenated Sunflower Seed Oil Polyglyceryl-3 Esters (and) Hydrogenated Sunflower Seed Oil Glyceryl Esters (and) Cetearyl Alcohol (and) Sodium Stearoyl Lactylate] is a sunflower-derived o/w emulsifier, in particle form, that can be utilized in skin and hair care applications. This versatile emulsifier helps create stable, aesthetically pleasing emulsions.

Typical Usage Levels: 3 - 8%

Typical Oil Loading Levels: 15 - 40%

Compatibilities:
- Triglyceride oils, esters, silicones, sunscreens, ethanol (up to 10%)
- A variety of rheology modifiers and thickeners, including xanthan gum, polymeric thickeners and stabilizers, and cellulose
- pH tolerance of 4 - 11

How to Use Emulsun:
Add Emulsun to the oil phase. Heat both the oil and aqueous phases to 75-80°C. Combine the oil and aqueous phases with moderate to rapid mixing (or homomixing). Reduce mixing speeds at temperatures below 60°C. When adding other ingredients (e.g., fragrance, preservatives, etc.) below 40°C, disperse briefly with slow to moderate mixing, as over mixing may cause a loss of viscosity.

Formulation Benefits:
- Easy to handle particles
- Low odor and color
- Oxidatively stable
- Sensory appeal
- Liquid crystal structure

Clinical Study Facts:
In double-blind, vehicle-controlled, randomized clinical studies, Emulsun produced the following benefits:
- Increased skin hydration up to 1.2 times more than other emulsifiers (Figure 1)
- Reduced TEWL up to 6.4 times more than other emulsifiers (Figure 2)
- Allowed for a variety of product aesthetics by changing the loading level (Figure 3)
- Allowed for the inclusion of sunscreen actives with minimal effect on product aesthetics (Figure 4)
- Provided similar product aesthetics as other emulsifiers (Figures 5-7)

Purpose:
The purpose of this investigation was to evaluate Emulsun in an o/w emulsion compared to other emulsifiers for its ability to increase skin hydration, reduce TEWL, and provide a variety of product aesthetics.

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1. Final Reports available upon request. Figures can be found on the next two pages of this document.
Increased Skin Hydration and Reduced TEWL:
Emulsifiers were compared within an o/w emulsion with 20% oil for skin hydration and TEWL\(^3\) (n=18). The results appear below in Figures 1 and 2.

**Emulsun Increased Skin Hydration**

![Figure 1. The inclusion of 6% Emulsun increased skin hydration up to 1.2 times more than other emulsifiers.\(^4\) (See Claim Sheet 18-115.)](image1)

**Emulsun Reduced TEWL**

![Figure 2. The inclusion of 6% Emulsun decreased TEWL up to 6.4 times more than other emulsifiers.\(^5\) (See Claim Sheet 18-116.)](image2)

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2. All studies were conducted double-blind, vehicle-controlled, and randomized.
3. Skin hydration and TEWL measurements were captured using the Corneometer CM 825 and Tewameter TM 300, respectively; both instruments are products of Courage+Khazaka (Köln, Germany).
4. The test article with Emulsun resulted in a statistically significant (p<0.05) increase in skin hydration from baseline, as compared to Cetearyl Alcohol / Ceteareth-20, Glyceryl Stearate / PEG-100 Stearate, Cetearyl Olivate / Sorbitan Olivate, Candelilla/Jojoba/Rice Bran Polyglyceryl-3 Esters / Glyceryl Stearate / Cetearyl Alcohol / Sodium Stearoyl Lactylate, and Candelilla/Jojoba/Rice Bran Polyglyceryl-3 Esters / Glyceryl Stearate / Cetearyl Alcohol / Sodium Stearoyl Lactylate 4 hours post test article application.
5. The test article with Emulsun resulted in a statistically significant (p<0.05) decrease in TEWL from baseline, as compared to Glyceryl Stearate / PEG-100 Stearate / Cetearyl Alcohol at all evaluation points post test article application, and as compared to Cetearyl Olivate / Sorbitan Olivate at the 2 hour evaluation point post test article application.
Consumer Perception:
Emulsun was evaluated by female consumers (n=24-26) on a 1-5 scale for initial product observations and skin feel immediately after application. The higher the score, the more the listed attribute was perceived by consumers (e.g. a score of 5 for moisturization indicates moisturized skin, whereas a score of 1 indicates dry skin). For the texture attribute, a higher score indicates a thicker product. The results appear below in Figures 3-7.6

Figure 3. Emulsun allowed for the creation of a medium texture lotion to a heavy cream without affecting the stickiness or greasiness of the product.

Figure 4. Emulsun allowed for the inclusion of sunscreens without noticeably affecting product aesthetics.

Figure 5 and 6. Emulsun allowed for the creation of similar product aesthetics, with less greasiness and more hydration, than Cetearyl Olivate / Sorbitan Olivate.

Figure 7. Emulsun allowed for the creation of a thicker product with similar product aesthetics and less odor than Candelilla/Jojoba/Rice Bran Polyglyceryl-3 Esters / Glyceryl Stearate / Cetearyl Alcohol / Sodium Stearoyl Lactylate (blended emulsifier).
Formula: PEG-Free, Silicone-Free Day Cream with L22 and Emulsun

This light weight, hydrating facial cream is delicate enough for daytime wear under makeup and powerful enough to provide all day moisturization. Emulsun, a versatile naturally-derived PEG-free emulsifier, allows for viscosity and product feel customization, while also adding skin hydration and barrier function benefits. The use of Floramac 10 in this formulation imparts the skin with radiance, while L22 delivers its patented lipid profile of a healthy 22 year old. Additionally, the Floratech emollients (Florasun 90, Floraesters 15, and Floraesters 60) provide the moisturization and emolliency benefits to this superb formulation.

### Phase A

<table>
<thead>
<tr>
<th>Trade/Common Name</th>
<th>INCI Name</th>
<th>Manufacturer</th>
<th>% wt./wt.</th>
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<tr>
<td>Deionized Water</td>
<td>Water</td>
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<tr>
<td>Glycerine 99.7% USP Kosher</td>
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<td>Acme-Hardesty Co.</td>
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<td>Keltrol® CG-SFT</td>
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### Phase B

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<tr>
<td>Helianthus Annuus (Sunflower) Seed Oil</td>
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<tr>
<td>Jojoba Esters</td>
<td>Floratech</td>
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<tr>
<td>Jojoba Oil/Macadamia Seed Oil Esters (and) Squalene (and) Phytosteryl Macadamiate (and) Phytosterols (and) Tocopherol</td>
<td>Floratech</td>
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### Phase C

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<td>Emulsun</td>
<td>Hydrogenated Sunflower Seed Oil Polyglyceryl-3 Esters (and) Hydrogenated Sunflower Seed Oil Glyceryl Esters (and) Cetearyl Alcohol (and) Sodium Stearyl Lactylate</td>
<td>Floratech</td>
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<td>Citric Acid, USP (10% Solution)</td>
<td>Citric Acid (and) Water</td>
<td>Archer Daniels Midland Co.</td>
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### Phase E

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<tr>
<td>Fragrance®</td>
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<tr>
<td>Preservative®</td>
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<td>q.s.</td>
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### Total

| Total | 100.00 |

**Procedure:**

1. Combine ingredients of Phase A at room temperature with rapid mixing. Once completely dispersed, heat to 75-80°C.
2. Combine all ingredients of Phase B in a separate vessel, start heating to 55-60°C, and slowly mix when the ingredients start melting.
3. Add the ingredients of Phase C to Phase B with moderate mixing and continue heating to 75-80°C.
4. Add Phase BC to Phase A at 75-80°C with moderate to slow mixing. When the mixture becomes smooth and uniform, begin cooling to 60-65°C.
5. Add Phase D to Phase ABC at 60-65°C with rapid to moderate mixing. When the mixture becomes uniform, shift the mixing speed to moderate to slow to avoid over mixing, and cool to 50-55°C.
6. At 50-55°C, add Phase E to Phase ABCD with sweep mixing. Adjust the weight with water (at 50-55°C) as needed.
7. Keep cooling to 40-45°C with moderate to slow mixing.

**Formulas Properties:**

<table>
<thead>
<tr>
<th>Property</th>
<th>Result</th>
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<tbody>
<tr>
<td>pH</td>
<td>5 - 6</td>
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<tr>
<td>Viscosity</td>
<td>136 - 247 kcP</td>
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**Ingredient Information**

24/7 Online

[iLabel](www.floratech.com/info)