



Formulator Report: Sunless Tanning Lotion with Floraesters K-20W®



Floraesters K-20W Jojoba enhances skin color retention, skin hydration, and consumer perception:

Floraesters K-20W Jojoba [INCI Hydrolyzed Jojoba Esters (and) Water] has been shown to enhance the efficacy and sensory properties of multiple finished cosmetic and personal care formulations, and has been explored in various categories such as creams/lotions, hand sanitizers, nonwoven wipes, sunscreens, mascara/eyeliner, shampoos/conditioners, toners/astringents, and face washes.¹ Its film-forming properties make it ideal for rinse-off products and products that require water resistance or an extended period of residence time on the skin.

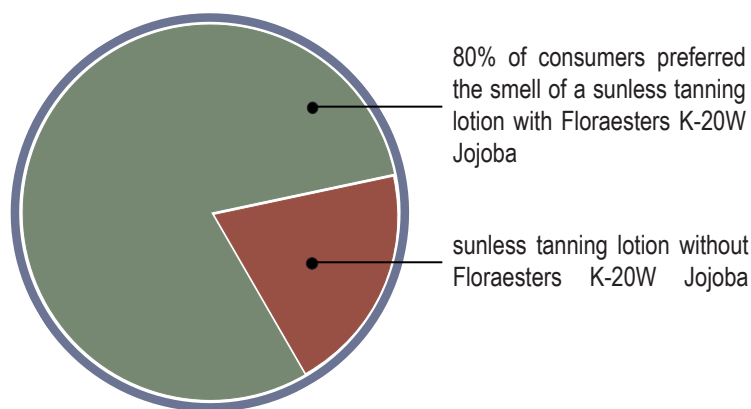
The substantivity of Floraesters K-20W Jojoba makes it well-suited to entrap molecules at the skin surface. For example, in combination with glycerin Floraesters K-20W Jojoba enhances skin moisturization;² sunscreen actives in combination with Floraesters K-20W Jojoba are retained on the skin after water immersion;³ and some fragrances are retained on the skin longer in the presence of Floraesters K-20W Jojoba.⁴ Clinical studies have also shown that Floraesters K-20W Jojoba is effective at reducing the appearance of irritation-associated erythema, as well as playing an active role in skin barrier function and restoration.⁵

The botanically-derived Floraesters K-20W Jojoba is Ecocert certified, and EU and China REACH compliant.

Clinical Study Facts⁶:

In double-blind, vehicle-controlled clinical studies, Floraesters K-20W Jojoba in a sunless tanning lotion (containing 5% dihydroxyacetone and 2% glycerin) was shown to provide the following benefits:

- 80% of consumer preference with regard to the smell of the sunless tanning lotion (Figure 1)
- 82% of consumer preference for overall product preference (Figure 1)
- 78% of consumer preference for overall tanning experience, as well as >50% preference for other skin attributes such as evenness of tan, moisturization, longevity of tan, and the overall color (Figure 2)
- prolonged skin color retention over the vehicle by up to 20% (Figure 3)
- increased skin hydration over all test articles by up to 16% at 24 hours post application (Figure 4)



Formulation Benefits:

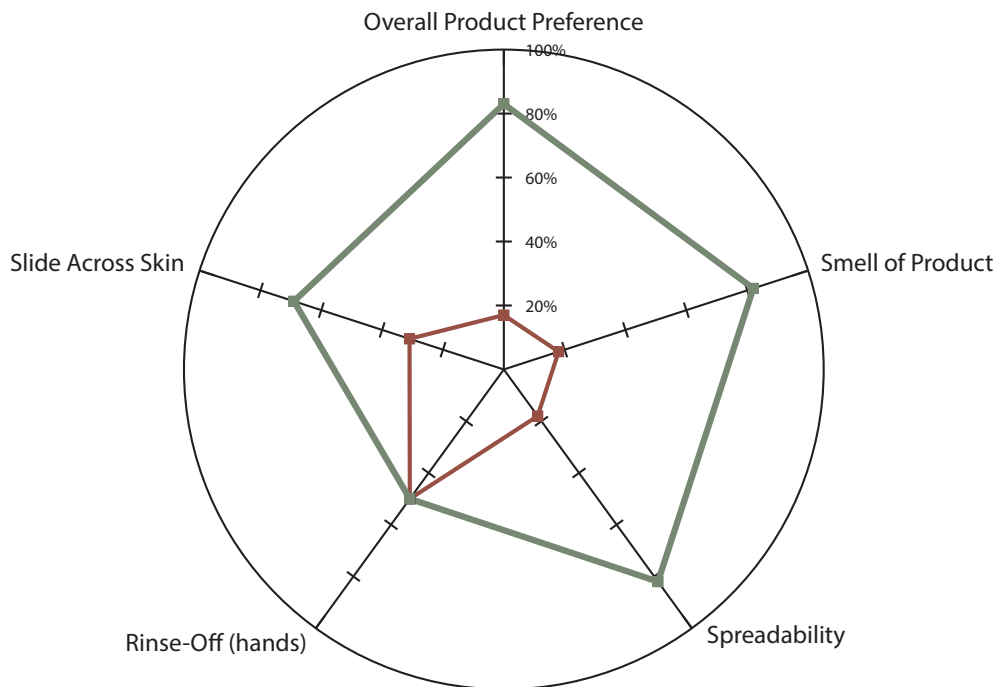
- Emolliency remains after rinse-off
- Substantivity
- Water resistant
- Soluble in most alcohols and glycols
- Results in rich emolliency on skin
- Botanically derived
- Readily biodegradable⁷

1. Cargill has not tested Floraesters K-20W Jojoba in final OTC drug formulations. Compliance with FDA regulations is the responsibility of the customer.
2. See Claim Sheets 09-013, 09-014, 10-017, 10-024, and 13-052 for more information.
3. See Claim Sheet 10-018 for more information.
4. M Cummings. Built to last. *Soap, Perfumery & Cosmetics*. November 2001.
5. See Claim Sheets 11-035 and 11-036 for more information.
6. Final Reports available upon request. Figures can be found on the next two pages of this document.
7. Biodegradable according to OECD 301B.

Figures⁸:

Floraesters K-20W Jojoba Enhances Consumer Preference in a Sunless Tanning Lotion

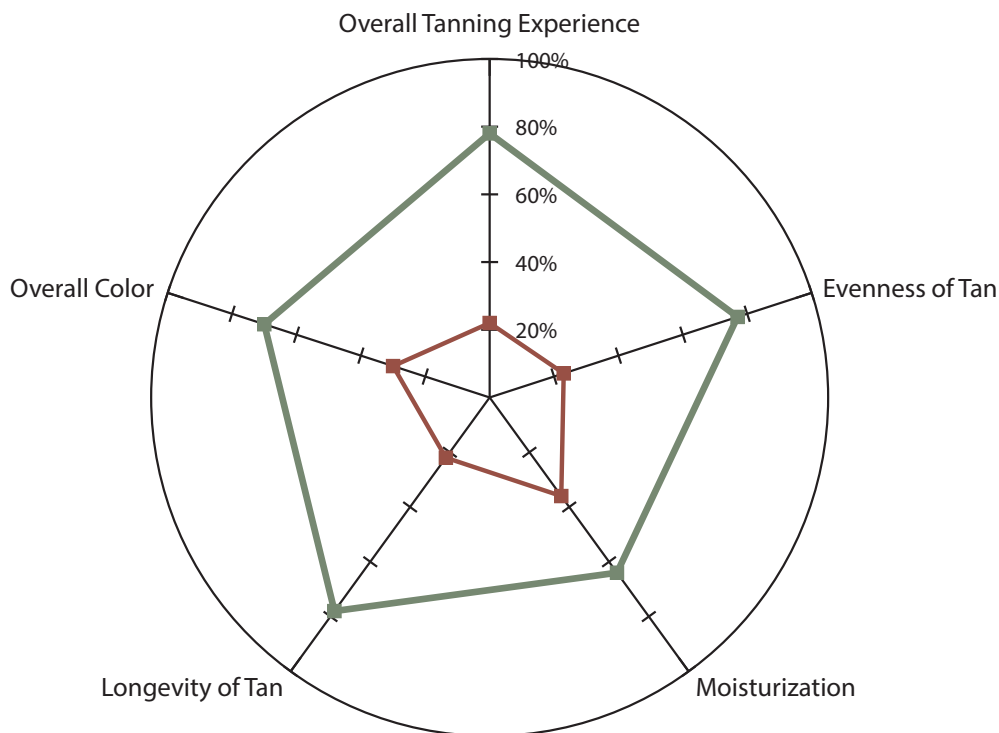
Fig. 1 - Product Characteristics



| Evaluation | Day |
|----------------------------|-----|
| Smell of Product | 3 |
| Spreadability | 3 |
| Slide Across Skin | 3 |
| Rinse-Off (hands) | 3 |
| Moisturization | 3 |
| Overall Product Preference | 7 |
| Overall Color | 7 |
| Evenness of Tan | 7 |
| Longevity of Tan | 7 |
| Overall Tanning Experience | 7 |

■ vehicle + 0.5% K-20W + 0.5% Erythrulose (pH=5.5)
■ vehicle + 1% Erythrulose (pH=5.0)

Fig. 2 - Skin Characteristics



Figures 1 and 2. Consumers stated an overall preference for the sunless tanning lotion with 0.5% Floraesters K-20W Jojoba over the vehicle 82% of the time for overall product preference and 78% for overall tanning experience. (See CS 12-050 for study details)

8. All studies were run double-blind and randomized. 0.5%-1% Floraesters K-20W Jojoba was incorporated into sunless tanning lotion vehicles (which all contained 5% dihydroxyacetone and 2% glycerin). Dihydroxyacetone (INCI: Dihydroxyacetone) was supplied by EMD Chemicals Inc.; Erythrulose (INCI: Erythrulose) was supplied by DSM Nutritional.; and Dermacryl-79 (INCI: Acrylates/Octylacrylamide Copolymer) was supplied by Akzo Nobel Chemicals.

Increased Skin Color Retention with Addition of Floraesters K-20W Jojoba in a Sunless Tanning Lotion

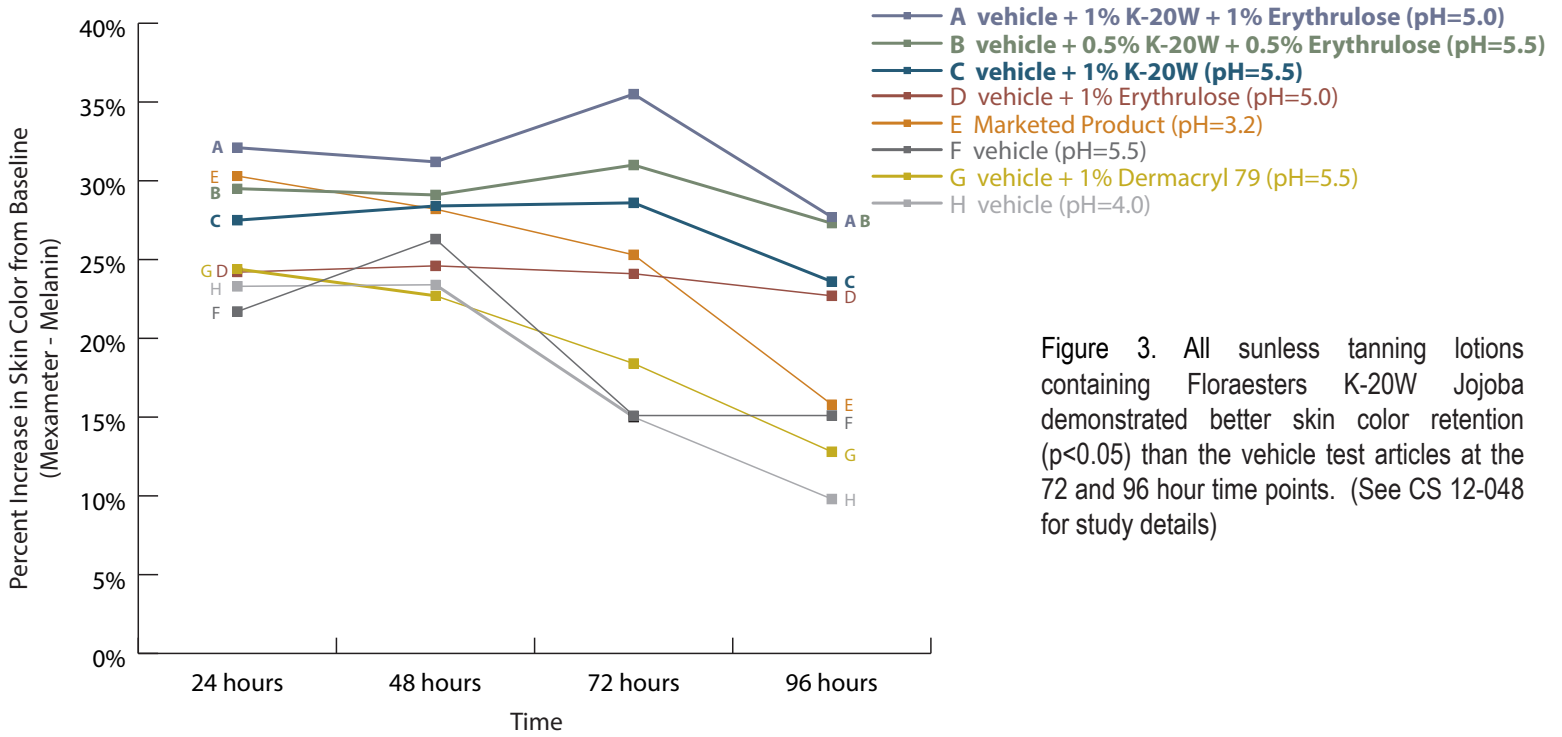


Figure 3. All sunless tanning lotions containing Floraesters K-20W Jojoba demonstrated better skin color retention ($p < 0.05$) than the vehicle test articles at the 72 and 96 hour time points. (See CS 12-048 for study details)

Increased Skin Hydration with Addition of Floraesters K-20W Jojoba in a Sunless Tanning Lotion

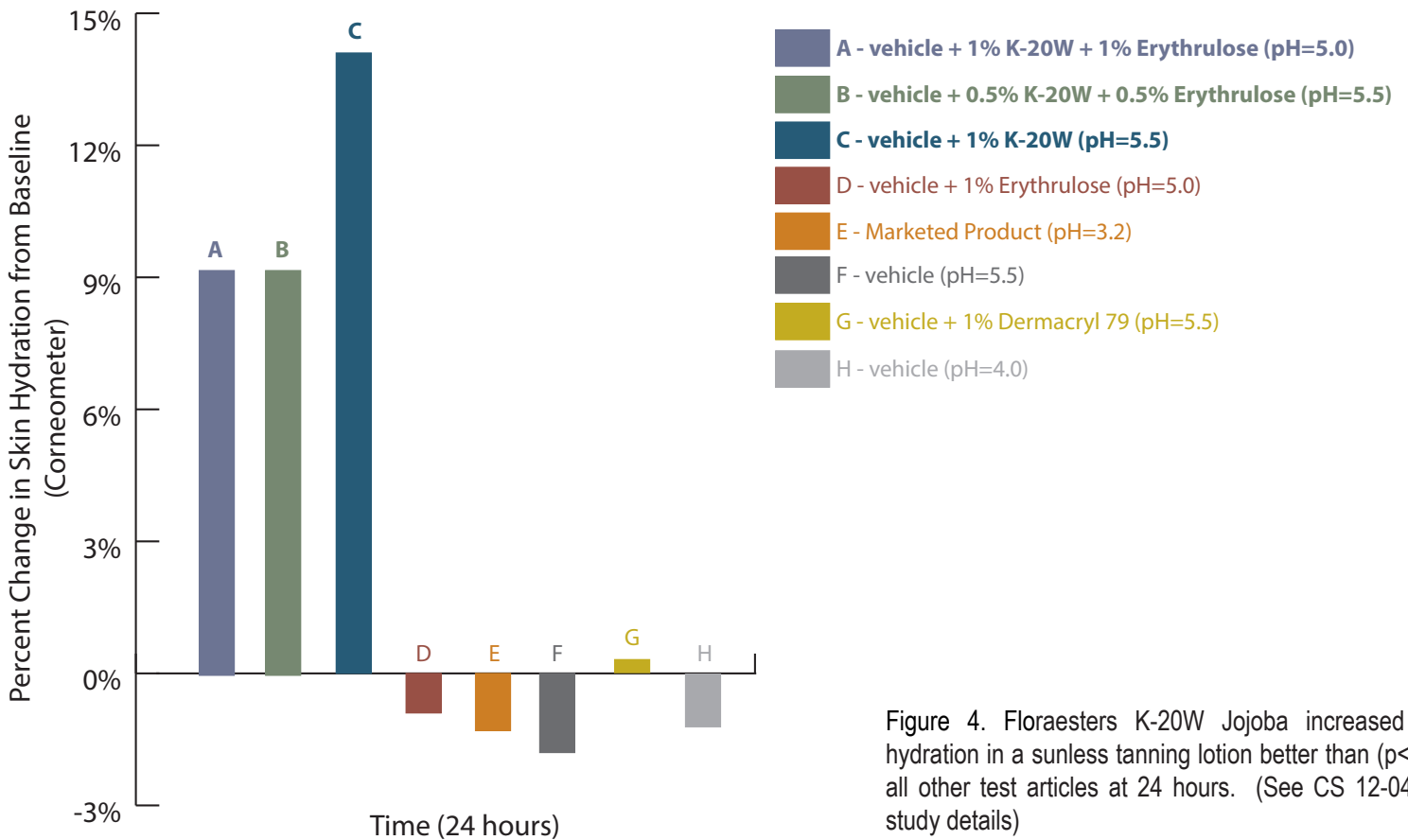


Figure 4. Floraesters K-20W Jojoba increased skin hydration in a sunless tanning lotion better than ($p < 0.05$) all other test articles at 24 hours. (See CS 12-049 for study details)

Formula: Sunless Tanning Lotion with Floraesters K-20W Jojoba⁹

The emollient phase featuring Floraesters K-20W Jojoba, which in combination with glycerin, provides a synergistic moisturization package that combats the drying-effect caused by dihydroxyacetone (DHA). Floraesters K-20W Jojoba also contributes to the product aesthetic with regard to slip and spreadability. The film-forming nature of Floraesters K-20W Jojoba traps sunless tanning actives within the upper layers of the skin, resulting in prolonged color retention. Even at low percentages, Floraesters K-20W Jojoba functions as a truly unique cosmetic ingredient in sunless tanning lotions.

Many sunless tanners are formulated within a pH range of 3-5 to ensure the stability of DHA, which typically results in a more even and natural-looking tan. However Floraesters K-20W Jojoba allows for a slightly elevated pH range (5.0-5.5), more similar to the skin's natural pH, without sacrificing the color or evenness of the tan.

This formula is a starting point for many possible sunless tanning lotion and gel formulations, and can be modified and added upon to create a truly superb sunless tanning product.

| Phase | Trade/Common Name | INCI Name | Manufacturer | % wt./wt. |
|-------|----------------------------------|--|----------------------------|--------------------|
| A | Simulgel® EG | Sodium Acrylate / Sodium Acryloyldimethyl Taurate Copolymer (and) Isohexadecane (and) Polysorbate 80 | Seppic | 3.00 |
| | Cetiol® LC | Coco Caprylate Caprate | BASF Corporation | 3.00 |
| | Glycerin, USP | Glycerin | The Dow Chemical Co. | 2.00 |
| | Floraesters K-20W® Jojoba | Hydrolyzed Jojoba Esters (and) Water (Aqua) | Floratech | 0.50 - 1.00 |
| B | Deionized Water | Water | ---- | q.s. |
| | Dihydroxyacetone | Dihydroxyacetone | EMD Chemicals, Inc. | 5.00 |
| | Erythrulose | Erythrulose | DSM Nutritional Products | 0.50 - 1.00 |
| C | Fragrance ¹⁰ | Fragrance | ---- | q.s. |
| | Sepicide HB | Phenoxyethanol (and) Methylparaben (and) Ethylparaben (and) Propylparaben (and) Butylparaben | Thor Specialities Ltd. | 0.80 |
| D | Citric Acid (30% solution) | Citric Acid (and) Water | Archer Daniels Midland Co. | q.s. |
| | | | Total | 100.00 |

Procedure:

1. Combine Simulgel EG, Cetiol LC, and Glycerin, USP of Phase A in a suitable vessel. Add specified amount of Floraesters K-20W Jojoba.
2. Combine water and Dihydroxyacetone of Phase B in a separate vessel. Add specified amount of Erythrulose.
3. Add Phase B to Phase A with moderate stirring.
4. Add Phase C to Phase AB, in the order listed, with moderate stirring.
5. Adjust to specified pH with the Citric Acid (30% solution) of Phase D.

Ingredient Information

24/7 Online

iLabel®

www.floratech.com/info



Floraesters
K-20W Jojoba

9. INCI/trade names must be verified with each manufacturer.

10. Fragrance: Whipped Amber Cream (ORC700385) supplied by Orchidia.