



Self-Tanning Formulations are Improved with the Addition of Floraesters® K-20W Jojoba

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Abstract

Data from multiple, pilot, clinical studies have shown that Floraesters K-20W Jojoba (K-20W) enhances the efficacy and sensory properties of multiple finished cosmetic and personal care formulations. For example, K-20W in combination with glycerin enhances skin moisturization; sunscreen actives in combination with K-20W are retained on the skin after water immersion; and some fragrances are retained on the skin longer in the presence of K-20W. Theoretically, the activity is due to the film-forming ability of the K-20W. In addition to these studies we now show that K-20W can also prolong the artificial skin color produced by a sunless tanner (i.e. self-tanner), while also improving its sensory appeal to consumers.

In a small, double-blind, vehicle-controlled, clinical study, subjects' backs were treated with one application of several sunless tanner formulations, all containing 5% DHA.¹ Formulations varied with regard to pH and the amount of K-20W, acrylates/octylacrylamide copolymer,² and erythrolulose.³ Skin color and moisturization measurements were taken before treatment, and 24, 48, 72, and 96 hours after treatment. Test articles containing K-20W (at 1%), or a combination of K-20W and erythrolulose (at 0.5-1%), produced the greatest percent increase and retention of skin color ($p < 0.05$ compared to the vehicle) at all time points. Test articles containing K-20W also produced higher levels of skin moisturization 24 hours after test article application. Test articles with and without 0.5% K-20W were also evaluated in consumer preference studies on the legs with repeat applications. Consumers preferred the formulations that contained K-20W for evenness of tan, longevity of tan, moisturization, odor, and overall preference. These results show that the addition of Floraesters K-20W Jojoba into sunless tanner formulations can enhance the effectiveness of these safe alternatives to sun exposure.

Background Information

- Floraesters K-20W Jojoba [INCI: Hydrolyzed Jojoba Esters (and) Water (Aqua)] is composed of 20% hydrolyzed jojoba esters and 80% water. Hydrolyzed jojoba esters are derived from jojoba (*Simmondsia chinensis*) seed oil.
- Dihydroxyacetone is utilized within sunless tanner formulations at 3-5%. DHA is a sugar that interacts with amino acids in the skin to result in a brown color change (stain) which lasts several days.⁴ According to the Academy of Dermatology, sunless tanning formulations containing DHA are the most effective.⁵
- Erythrolulose is also a sugar used in sunless tanning formulations. It utilizes the same mechanism as DHA, however the reaction occurs more slowly thereby extending the life of the tan.⁶
- Dermacryl-79 (INCI: acrylates/octylacrylamide copolymer) is a film-forming polymer used to maintain active ingredients at the site of application.⁷

References / Footnotes

- Dihydroxyacetone (DHA) was supplied by EMD Chemicals Inc.
- Dermacryl-79 (INCI: Acrylates/Octylacrylamide Copolymer) was supplied by Akzo Nobel Chemicals.
- Erythrolulose was supplied by DSM Nutritional.
- SB Levy. Dihydroxyacetone-containing sunless or self-tanning lotions. *Journal of the American Academy of Dermatology*. 27(6): 989-993. 1992.
- <http://www.medicinenet.com/script/main/art.asp?articlekey=23898> Accessed August 6, 2013. Web.
- CG Burkhardt and CN Burkhardt. Dihydroxyacetone and methods to improve its performance as artificial tanner. *The Open Dermatology Journal*. 3: 42-43. 2009.
- <http://sc.akzonobel.com/en/personalcare/Pages/product-detail.aspx?prodID=6638> Accessed August 6, 2013. Web.
- Mexameter MX 18 is a product of Courage+Khazaka Electronic GmbH (Köln, Germany).
- Corneometer is a registered trademark of Courage + Khazaka Electronic GmbH (Köln, Germany).

Increased Color Retention

Objective: To determine if Floraesters K-20W Jojoba could increase skin color retention when incorporated into a sunless tanning formulation which contained 5% DHA.

Design: One application of each of the sunless tanning formulations was made (2.5 mg/cm²) to randomized locations on the lower backs of fifteen male and female subjects.

End Point: Melanin measurements (i.e. skin color) via Mexameter MX 18⁸ were conducted at baseline, and 24, 48, 72, and 96 hours, post sunless tanning formulation application.

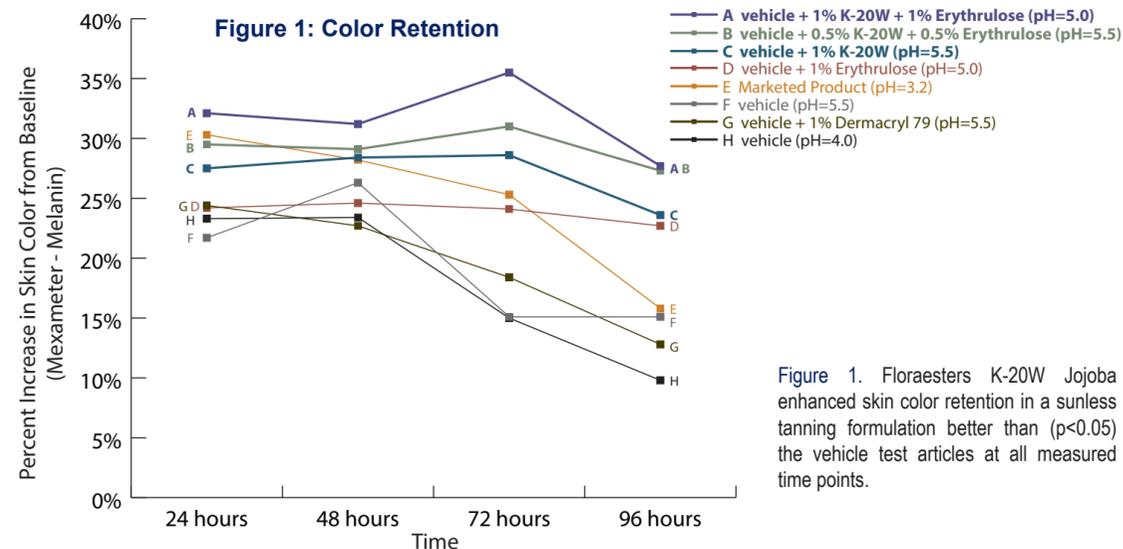


Figure 1. Floraesters K-20W Jojoba enhanced skin color retention in a sunless tanning formulation better than ($p < 0.05$) the vehicle test articles at all measured time points.

Increased Skin Hydration

Objective: To determine if Floraesters K-20W Jojoba (in conjunction with glycerin) could increase skin hydration when incorporated into a sunless tanning formulation which contained 5% DHA.

Design: One application of each of the sunless tanning formulations was made (2.5 mg/cm²) to randomized locations on the lower backs of fifteen male and female subjects.

End Point: Skin hydration measurements via Corneometer® CM 825⁹ were conducted at baseline and 24 hours post sunless tanning formulation application.

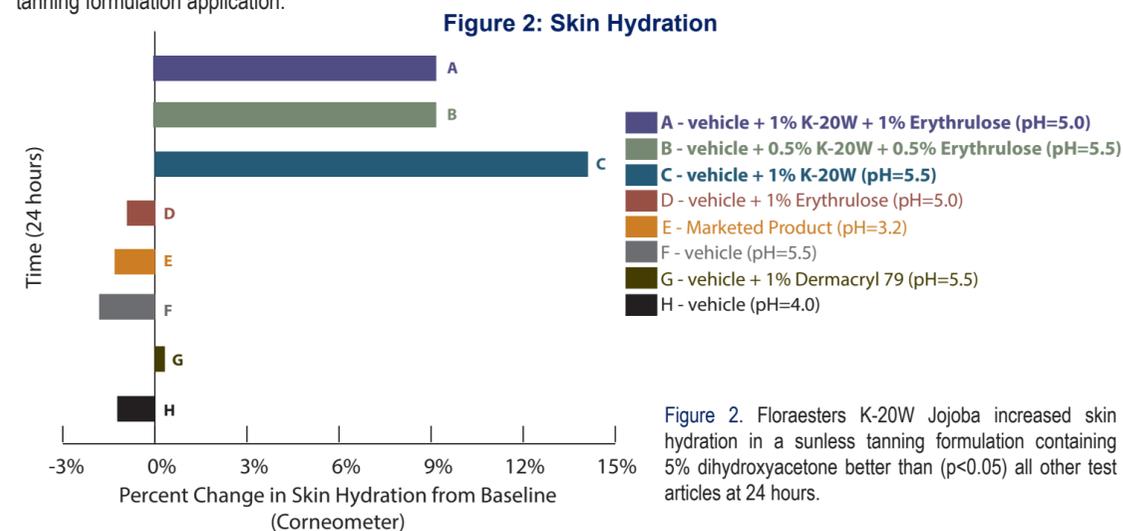


Figure 2. Floraesters K-20W Jojoba increased skin hydration in a sunless tanning formulation containing 5% dihydroxyacetone better than ($p < 0.05$) all other test articles at 24 hours.

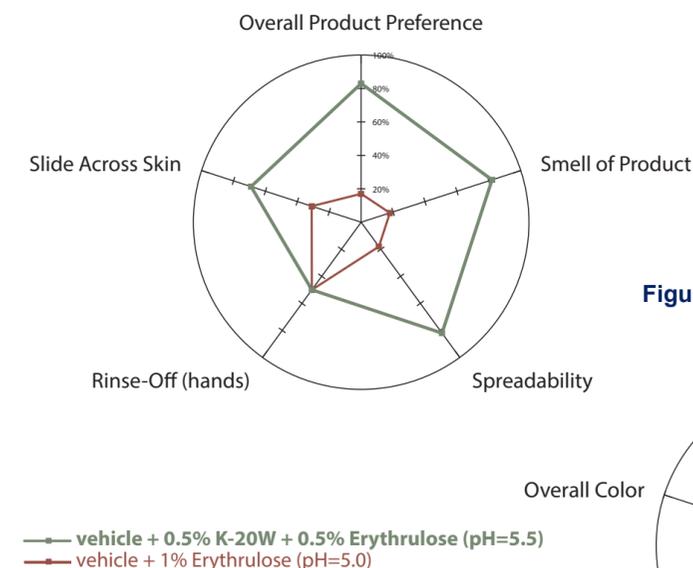
Enhanced Consumer Preference

Objective: To determine the consumer preference between a sunless tanning formulation with and without Floraesters K-20W Jojoba.

Design: Randomized daily applications (2.5 mg/cm²) of two sunless tanner formulations, for three days, to the outer lower legs of 27 female subjects.

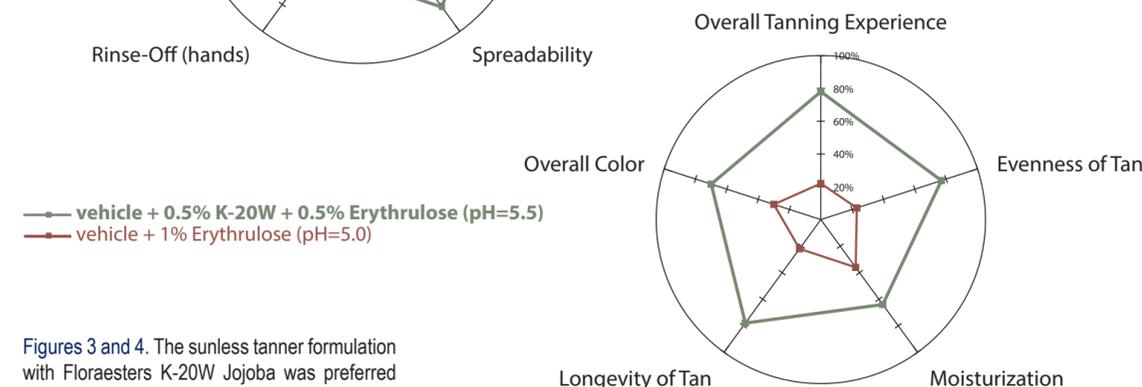
End Point: A consumer preference survey was completed on Day 3 for immediately observable skin and product properties and on Day 7 for long-term properties.

Figure 3: 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

Figure 4: Skin Characteristics



Figures 3 and 4. The sunless tanner formulation with Floraesters K-20W Jojoba was preferred by consumers over the vehicle test article.

Conclusions

- Floraesters K-20W Jojoba increased skin color retention when incorporated into a sunless tanning formulation.
- Floraesters K-20W Jojoba increased skin hydration when incorporated into a sunless tanning formulation.
- 80% of consumers preferred the smell of the sunless tanning formulation with Floraesters K-20W Jojoba.
- Floraesters K-20W Jojoba increased consumer perception when incorporated into a sunless tanning formulation.

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