

PERSONAL CARE

INGREDIENTS • FORMULATION • MANUFACTURE

Creating mild
cleansers with
natural emollients



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Floraesters K-20W® Jojoba [INCI: Hydrolyzed Jojoba Esters (and) Water (Aqua)] and Florasun® 90 [INCI: Helianthus Annuus (Sunflower) Seed Oil] are plant derived emollients (from *Simmondsia chinensis* and *Helianthus annuus*, respectively) that are commonly used in cosmetic and personal care products for their functionality and oxidative stability.

Floraesters K-20W Jojoba (now referred to as K-20W) is an oleogel comprised of hydrolyzed jojoba oil (20%) and water (80%). Multiple studies have shown that K-20W imparts a variety of benefits to the skin such as hydration, and barrier protection and repair.^{1,2} Due to its derivatization from a wax ester, the use of K-20W also allows for “oil-free” claims. K-20W is very well suited for rinse-off finished products due to its ability to provide water, wear, and transfer resistance to finished formulas. It functions by trapping small molecules like glycerin and glycolic acid at the skin’s surface,³ allowing these molecules to work longer. It works especially well when formulating mild products, such as those geared towards mothers and babies, or those that require the use of skin irritating ingredients like surfactants, soap, glycolic acid, and alcohol. Even in the presence of these ingredients K-20W is able to trap humectants to the skin surface to potentiate hydration and provide a protective layer on the skin surface to mitigate barrier disfunction caused by these necessary but harsh ingredients. The present research will discuss how K-20W functions in bar soaps and face washes without negatively affecting the foaming capabilities.

Incorporating triglyceride oils into surfactant systems is another way to generate a milder wash product. Florasun 90 (now referred to as high oleic sunflower oil) is a natural triglyceride oil with high oxidative stability due to its high oleic content (>85%) and low levels of polyunsaturates. Not only is it useful in producing milder wash products, but it also has a non-greasy skin-feel and can extend the shelf life of a finished product.

All studies presented in this article were double-blind, vehicle-controlled, randomized, and carried out under controlled temperature and humidity conditions.

Table 1: Vehicle formulation.

Bar Soap		Fash Wash	
Ingredient	%wt./wt.	Ingredient	%wt./wt.
Soap Noodles ⁵	q.s.	Water	q.s.
Corn Starch	8.00	Water (and) Sodium Lauroyl Methyl Isethionate (and) Sodium Lauroamphoacetate (and) Cocamide MIPA	40.00
Talc	8.00	Helianthus Annuus (Sunflower) Seed Oil	10.00
Glycerin	2.00	Sodium Chloride	3.00
Fragrance	1.50	Glycerin	2.25
Sodium Chloride	0.80	Trisodium Ethylenediamine Disuccinate	0.50
Titanium Dioxide	0.65	Xanthan Gum	0.40
Tetrasodium EDTA	0.10	Guar Hydroxypropyltrimonium Chloride	0.35
Butylated Hydroxytoluene (BHT)	0.05	Hydroxyacetophenone	0.20
		Citric Acid (and) Water	q.s.
		Preservative	q.s.
		Fragrance	q.s.

Formulating milder bar soaps and face washes

K-20W protects skin health

K-20W was evaluated for skin hydration (Corneometer CM 825⁴), barrier function (Tewameter® TM 300⁴), and skin smoothness (Visioscan VC 98⁴), in addition to consumer perception evaluations, at 0.50% in a bar soap and 0.75% in a face

wash compared to the respective vehicle formulas (see Table 1).

For the bar soap, baseline hydration and barrier function (i.e. TEWL) measurements on male and female subjects’ forearms (n=19) were captured, followed by repeated washing with each bar soap 10 times (i.e. wet, 10 strokes, 60 second wash by hand, rinse, and pat dry). Measurements were repeated 30 minutes post-wash. The results appear in Figures 1 and 3. To evaluate skin smoothness and consumer perception, female subjects’ hands (n=25) were washed with each bar soap one time (i.e. wash soiled⁶ hands with soap for 30 seconds, rinse for 10 seconds, and pat dry). Skin smoothness was measured at baseline and 30 minutes post-wash, and consumers evaluated their hands during the wash, 0 (i.e. immediately after washing), and 30 minutes after washing with the bar soap.

For the face wash, baseline hydration and skin smoothness measurements on female subjects’ faces (n=26) were captured, followed by washing the left or right side of the face with the respective face wash one time (i.e. wet, 30 second wash by hand, rinse, and pat dry).

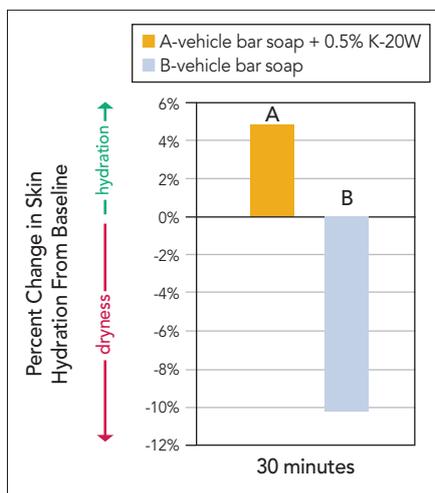


Figure 1: Improved skin hydration – bar soap.

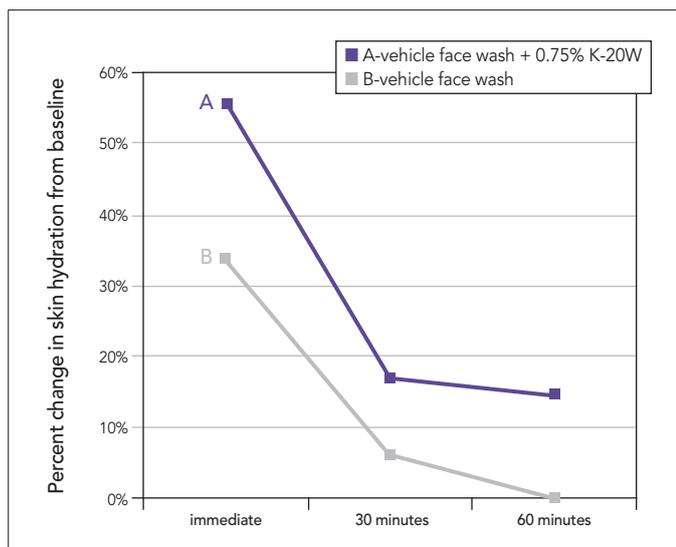


Figure 2: Improved skin hydration – face wash.

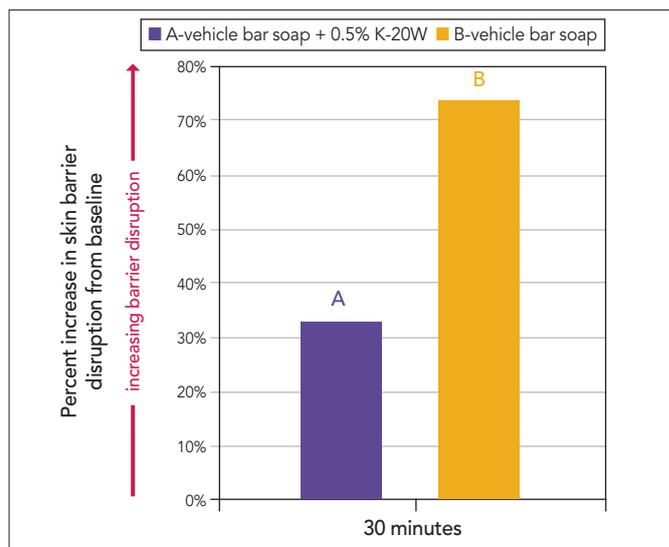


Figure 3: Reduced skin barrier dysfunction.

Measurements were repeated at the respective evaluation time points. The results for skin hydration appear in Figure 2. Consumer evaluations were also made during the wash, 0 (i.e. immediately after washing), and 30 minutes after washing with the face wash.

The data in Figures 1 and 2 show that the inclusion of 0.50% K-20W in a soap or 0.75% K-20W in a face wash resulted in increased skin hydration as compared to the respective vehicle ($p < 0.001$). In both wash products, the K-20W was able to mitigate the drying effect caused by surfactants and soap after a single use as well as multiple uses.

The data in Figure 3 show that the inclusion of 0.50% K-20W in a soap produced a 56% decrease in skin barrier dysfunction as compared to the vehicle ($p < 0.001$). The data demonstrates the protective effect provided by the K-20W, which subsequently reduced damage to the skin barrier after repeated washes.

The study also showed that the inclusion of 0.50% K-20W in a soap or 0.75% K-20W in a face wash increased skin smoothness more than 1.5 times as much as the respective vehicle ($p < 0.05$). The K-20W was able to increase skin smoothness after a single face wash use, also after multiple bar soap uses⁷.

It was also shown that more than 94% of consumers also preferred the bar soap with 0.50% K-20W for skin hydration (i.e. less dry skin) and skin smoothness both immediately and 30 minutes after use ($p < 0.05$), which supports the results seen using bioinstrumentation. Additionally, the bar soap with 0.50% K-20W was also preferred for skin softness, as well as foam properties such as creaminess, foam generation, and quantity ($p < 0.05$)⁷.

More than 80% of consumers also preferred the face wash with 0.75% K-20W for skin hydration (i.e. less dry skin) and skin smoothness after use ($p < 0.05$), which again supports the results seen using bioinstrumentation. The face wash with 0.75% K-20W was preferred for foam properties such as creaminess and quantity ($p < 0.10$) as well⁷.

K-20W improves foam retention

The bar soaps were diluted to 1% in water and blended for one minute. The foam solution was then transferred to a graduated cylinder and foam volume (ml) was measured initially and after 20 minutes. The inclusion of 0.50% K-20W resulted in 22% more foam after 20 minutes. The bar soaps were also rubbed by hand for approximately 60 seconds and foam was collected. The results

appear in Figure 4. The soap with 1.0% K-20W produced a creamier, denser foam compared to the vehicle soap without K-20W.

Additional studies also indicated 0.50% K-20W in a bar soap produced smoother, more stable foam, and foam with a more compact structure, finer bubbles, and greater structural strength. K-20W also had the ability to reduce cracking of the bar soap over time.³

The face washes were diluted to 5% in water and blended for one minute. The foam solution was then transferred to a graduated cylinder and foam volume (ml) was measured every five minutes for 20 minutes. The inclusion of 0.75% K-20W Jojoba produced up to 27% more foam than the vehicle face wash. The results appear in Figure 5.

High oleic sunflower oil improves oxidative stability

The oxidative stability index (OSI) of high oleic sunflower oil (Florasun 90) versus traditional sunflower oil was determined, with and without fragrance, at room temperature (0 weeks), after 12 weeks at 43°C, and after two weeks at 50°C. The results appear in Figure 6.

OSI is indicative of how long a product will stay stable on the shelf. Not all triglyceride oils are as stable as high oleic sunflower oil, and subsequently go rancid more quickly. This is especially true in the presence of fragrance. The data in Figure 6 show that the high oleic sunflower oil produced a higher oxidative stability both with and without fragrance⁸ than the traditional sunflower oil. This is indicative of a longer shelf life.

Conclusion

Studies have shown that Floraesters K-20W Jojoba can increase skin hydration and smoothness, improve barrier function, reduce erythema, and improve consumer perception in a variety of finished products applications.^{1,2} This current research demonstrates that many of these benefits

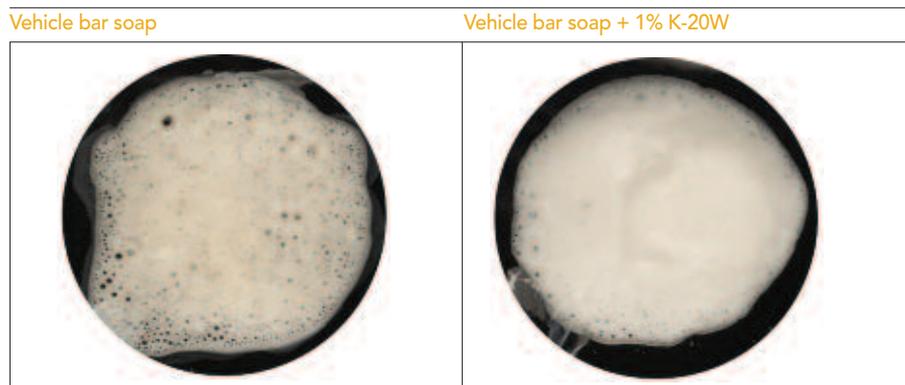


Figure 4: Creamier foam.

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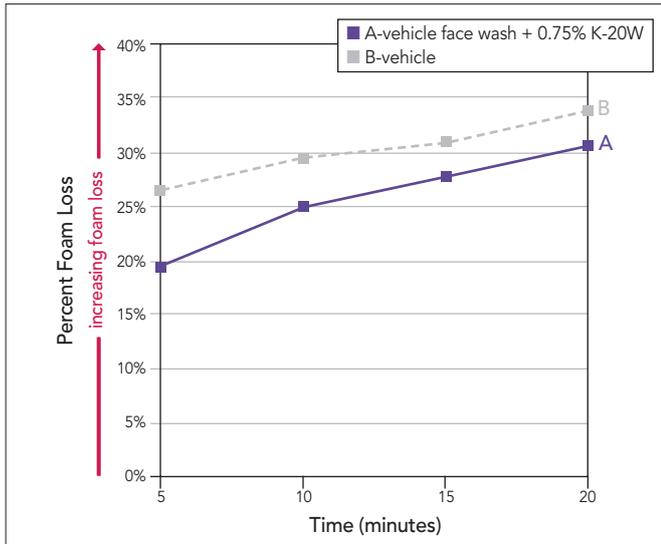


Figure 5: Increased foam retention.

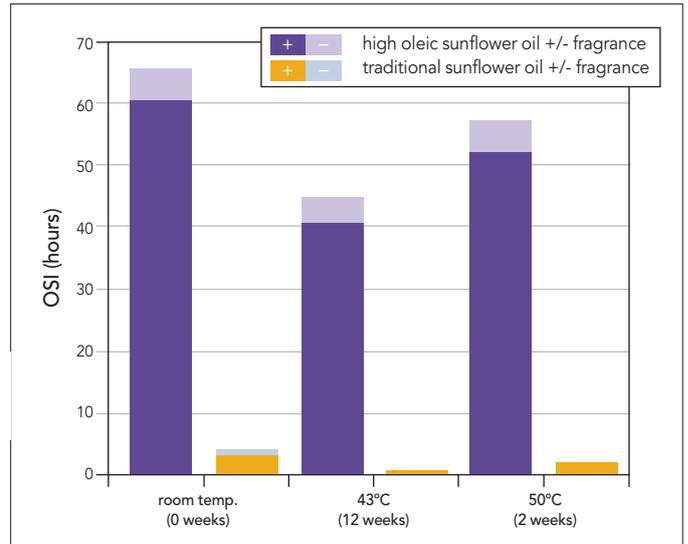


Figure 6: Improved OSI.

can also be realized in rinse off wash products. Floraesters K-20W Jojoba has many beneficial skin protection capabilities, which makes it ideal for use in wash products that need to be mild to the skin. Additionally, Florasun 90 can be used to impart emollience, while also lending its oxidative stability to the shelf life of the finished formula. These natural emollients are perfect for building skin friendly wash products. PC

References:

- 1 Oliphant T, Harper R. Advantages of Jojoba Esters in Nonwovens. *Personal Care Europe* 2012; 94-96.
- 2 Quinn T, Harper R. Evaluation of Barrier Protection Properties of Jojoba Esters. *SOFW Journal* 146. 06/20. pp 22-24.
- 3 Unpublished data. Final report available upon request.
- 4 Corneometer® CM 825, Tewameter® TM 300, and Visioscan VC 98 are products of Courage + Khazaka (Köln, Germany).
- 5 Soap Noodles consist of the following: Sodium Palmate, Sodium Palm Kernelate, Sodium Chloride, Glycerin, Tetrasodium EDTA, and Sodium Etidronate.
- 6 Hands were soiled in a controlled manner by rubbing one milliliter of a mixture of store-bought soil and macadamia oil for approximately 30 seconds.
- 7 Data available on request.
- 8 Almond Cream Fragrance (supplied by Orchidia) was used. This is the same fragrance found within the face wash.

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Natural
PEG-Free
Emulsifier

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PEG-Free
Liquid Crystal Structure
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Botanically Derived
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Achieve Target Viscosity
Improve Skin Hydration
Decrease TEWL



Product Video