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EUROPE

# PERSONAL CARE

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# Hydrolysed jojoba esters offer enhanced skin care

Jojoba (*Simmondsia chinensis*) is a perennial shrub native to Arizona, California, and north western Mexico.<sup>1</sup> The oil from this plant, jojoba seed oil, is a wax ester that has been used in the past as a folk remedy for renal colic, sunburn, chaffed skin, hair loss, headache, wounds, sore throats, psoriasis, and acne (e.g., sulphurised jojoba).<sup>2,3</sup> The ester is composed of long-chain linear fatty alcohols, 20 to 24 carbons in length and long-chain linear fatty acids, 18 to 22 carbons in length. Nearly all of the acid and alcohol moieties are  $\omega$ -9 monounsaturated.<sup>4</sup> More recently, Floratech has hydrolysed this wax ester for use in various cosmetic and personal care formulations.

Hydrolysed jojoba oil [INCI name: Hydrolyzed Jojoba Esters (and) Jojoba Esters (and) Water (Aqua)] has been proven to increase and extend moisturisation potential when used in conjunction with glycerin in lotions, hand sanitisers, and body washes.<sup>5,6</sup> In small-scale, controlled, clinical studies, the hydrolysed wax ester has proven very effective in skin care product formulations.

## Natural raw ingredients

The use of natural raw ingredients is steadily on the rise. When price is not an issue, many consumers will choose to purchase personal care products that incorporate natural raw ingredients which can include many categories (e.g. botanical, green, or organic).

The popularity of “natural” finished products drives raw material manufacturers to offer this category of alternatives for commonly-used raw ingredients, or natural ingredients that can be used in conjunction with previously accepted synthetic raw ingredients.

Often, these natural ingredients do not provide the same benefits, esthetically and functionally. In addition, natural ingredients that offer superior functionality are often expensive, which in turn leads to higher priced products. One way of attacking this issue is to incorporate natural ingredients in combination with synthetic ingredients which produce a functional and esthetically superior product.



*Simmondsia chinensis*.

## Formulating body washes

Formulating cost effective, moisturising body washes is often quite tricky. In order to impart skin hydration, mild surfactant systems in combination with heavy, substantive moisturisers must be incorporated. However, these products must be formulated in such a way as to leave a pleasing, non-greasy, after-feel.

One option in formulating body washes is to incorporate botanically-derived hydrolysed jojoba esters and glycerin into a mild body wash system. It is hypothesised that small amounts of these hydrolysed jojoba esters are left on the skin following rinse-off, which in turn traps glycerin molecules on the skin surface. The glycerin molecules then pull water from the atmosphere to the surface of the skin. This allows for the incorporation of a botanically-derived ingredient which can potentiate the skin moisturising action of the glycerin following rinse-off of a mild body wash.

Skin feel after rinse-off and dry-down is another important feature to consider when formulating a body wash. A smooth, slick dry-down can be achieved with proper skin

hydration as well as the incorporation of botanically-derived PEG-16 macadamia glycerides. Although the PEG-16 macadamia glycerides do not provide skin hydration, they do improve the esthetics of the body wash itself, as well as the feel of the skin after body wash use.

*In vitro* tests were conducted on the formulation with and without the hydrolysed jojoba esters. Both formulations proved to be stable under various conditions (i.e. temperature and UV). Two different foam retention tests (shake test and blender test) were performed and the product with 1.25% hydrolysed jojoba esters and 1.25% PEG-16 macadamia glycerides retained more foam longer than the product without the hydrolysed jojoba esters. This same product resulted in the mildest formulation in the Zein test. *In vitro* data supports the use of this botanically derived raw ingredient.

There are many important factors which guide a body wash formulator. One of the major issues is trying to incorporate every positive attribute possible within one, cost-effective formula. Another issue is testing the finished formulation for each of the product's positive attributes. Do you generate performance data on the body wash product solely from instrumental analysis or from consumer preference, or both? Will the results correlate to one another? We have generated both bio-instrumental data and consumer preference data to support the attributes of a mild body wash product.

## Bio-instrumental evaluation

A sulphate-free body wash formulation containing glycerin was tested with and without the hydrolysed jojoba esters as well as with and without PEG-16 macadamia glycerides. These formulations were also compared to a currently marketed body wash containing mineral oil which claims to moisturise the skin. Corneometer CM 825 (Courage+Khazaka, Koln, Germany) results showed that after one application, rinse-off, and a dry-down the formulation containing 2% glycerin and either 1.25% or 2.5% hydrolysed jojoba esters increased

skin hydration up to four hours, better than all other formulations,  $p < 0.05$  (see Fig. 1).

The formulations containing the hydrolysed jojoba esters maintained at least a 30% increase in skin hydration after four hours. The increased skin hydration results were as expected based on previous work published with hydrolysed jojoba esters and glycerin.

The Visioscan VC 98 (Courage+Khazaka, Koln, Germany) was also used to measure skin roughness changes from baseline (untreated skin) to four hours post treatment. The PEG-16 macadamia glycerides were added to the body wash formulation to smooth the skin; therefore, decreasing skin roughness. Only the two formulations containing 1.25% PEG-16 macadamia glycerides and either 1.25% hydrolysed jojoba esters or 2.5% hydrolysed jojoba esters showed reductions in skin roughness by 6.4% and 15.9% ( $p < 0.10$ ), respectively. All other formulations showed increases in skin roughness.

### Consumer perception

Three of the original body wash formulas tested bio-instrumentally were then tested in a consumer study. These included the formulations with 1.25% hydrolysed jojoba esters with and without 1.25% PEG-16 macadamia glycerides, as well as the currently-marketed product. Subjects were surveyed regarding body wash esthetics, skin-feel after body wash use, skin condition improvement after body wash use, and body wash preference. Most factors surveyed could never be detected bio-instrumentally.

The body wash containing 1.25% hydrolysed jojoba esters and 1.25% PEG-16 macadamia glycerides showed superiority ( $p < 0.05$ ) over the marketed product with regards to ease of application, foam feel, and fragrance, and over both products ( $p < 0.05$ ) with regards to overall product appearance, overall product texture, and foam volume.

Subjects were also surveyed regarding skin appearance, skin texture, skin feel after rinse-off, skin feel after dry-down and improvement of softness, silkiness, and moisturisation. The formulation containing 1.25% hydrolysed jojoba esters and 1.25% PEG-16 macadamia glycerides produced higher scores than the other two formulations in all cases. Subjects preferred the body wash formulation containing 1.25% hydrolysed jojoba esters and 1.25% PEG-16 macadamia glycerides the most ( $p < 0.10$ ).

### Comparisons

In terms of skin hydration, the bio-instrumental and consumer results correlated with one another. Although

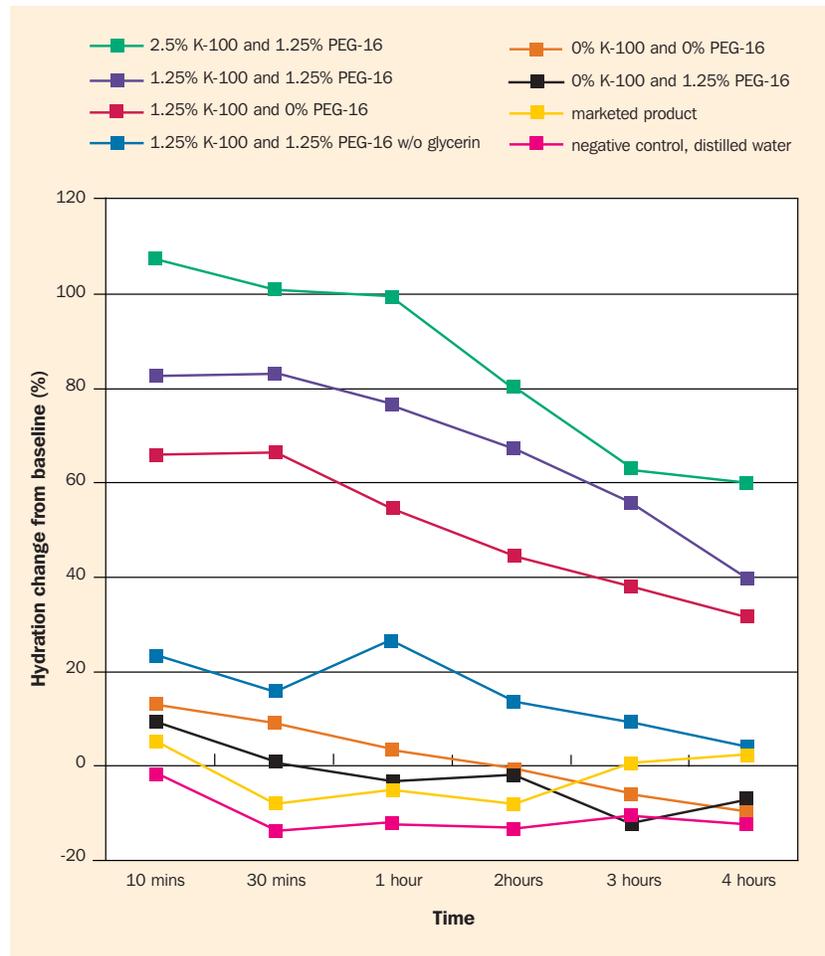


Figure 1: Average percentage change in skin hydration.

the consumer study did not show statistical significance, the bio-instrumental results confirmed the consumer perception. In terms of the skin roughness (data obtained with the Visioscan VC 98) which can be related to the skin softness and silkiness results from the consumer survey, the 1.25% hydrolysed jojoba esters and 1.25% PEG-16 macadamia glycerides body wash formula produced better results in both cases. Again, only the product with both hydrolysed jojoba esters and PEG-16 macadamia glycerides produced favourable results.

### Conclusion

It is important that both types of data collection occur to properly evaluate a body wash formula. Bio-instrumental evaluations often point to questions to ask consumers and consumer surveys collect valuable information that cannot be obtained with instrumentation. In the case of Floratech's body wash formula, the bio-instrumental data and the consumer data showed an improved product was obtained when botanically-derived ingredients were used in conjunction with synthetic ingredients. **PC**

### References

- Ed. Kartesz, John T. Natural Resources Conservation Service - PLANTS Profile. United States Department of Agriculture. Web. 30 January 2009. [<http://plants.usda.gov/java/profile?symbol=SI1CH>]
- Yaron A. "Metabolism and Physiological Effects of Jojoba Oil." *The Chemistry and Technology of Jojoba Oil*. Ed. J Wisniak. Champagne, IL: American Oil Chemists' Society Press, 1987, 251-65.
- Mosovich B. "Treatment of Acne and Psoriasis." *Proceedings of the Sixth International Conference on Jojoba and Its Uses*. Ed. J Wisniak and J Zabicky. Beer Sheva, Israel: University of the Negev, 1985, 393-7.
- Wisniak J. *The Chemistry and Technology of Jojoba Oil*. Champagne, IL: American Oil Chemists' Society Press, 1987, 42-45.
- Rheins L., Harper R., Sondgeroth J., Ashley D, Oliphant T., Marshall B. "The Role of Hydrolyzed Jojoba Esters as a Unique Botanical Technology for Long Acting Moisturization." *The 67th Annual Meeting of the American Academy of Dermatology*. American Academy of Dermatology. San Francisco, CA. 6-10 March 2009.
- Floritech Final Reports 09-020, 09-021, 09-023, and 09-024.