



# Formulator Report:

## Hair Care with Floraesters K-20W<sup>®</sup> and K-100<sup>®</sup> Jojoba



### Floraesters K-20W Jojoba and Floraesters K-100 Jojoba: *condition and protect*

In rinse-out hair care applications Floraesters K-20W Jojoba and Floraesters K-100 Jojoba have been proven to reduce wet comb force, provide hair dye color protection, and improve perception of hair quality (e.g. smoothness, frizz, and shine) by consumers.

**Floraesters K-20W Jojoba** [INCI: Hydrolyzed Jojoba Esters (and) Water] and **Floraesters K-100 Jojoba** [INCI: Hydrolyzed Jojoba Esters (and) Jojoba Esters (and) Water] are multifunctional ingredients that have been utilized and/or tested in a variety of cosmetic and personal care formulations such as creams/lotions, hand sanitizers, nonwoven wipes, sunscreens, sunless tanners, shampoos/conditioners, toners/astringents, and face washes.<sup>1</sup> The film-forming properties of these Floraesters make them ideal for rinse-off products, products that require water resistance, or to extend the period of residence time of a product on the hair or skin.

The botanically-derived Floraesters K-20W Jojoba and Floraesters K-100 Jojoba are Ecocert certified, and EU and China REACH compliant.

The substantivity of Floraesters K-20W Jojoba and Floraesters K-100 Jojoba make them well-suited to deposit on hair fibers, maintaining lasting conditioning benefits to the hair shaft.

### Study Facts<sup>2</sup>:

Floraesters K-20W Jojoba in a shampoo:

- Reduced wet comb force 60% more than the vehicle shampoo (**Figure 1**)
- Caused 10% less red hair dye color loss than the vehicle shampoo (**Figure 3**)
- Caused 35% less brown hair dye color loss than the vehicle shampoo (**Figure 3**)

Floraesters K-100 Jojoba in a conditioner:

- Reduced wet comb force up to 50 times more than the vehicle conditioner (**Figure 1**)
- Resulted in up to 59% less frizz than the vehicle conditioner (**Figure 2**)
- Caused 13% less red hair dye color loss than the vehicle conditioner (**Figure 4**)
- Caused 22% less brown hair dye color loss than the vehicle conditioner (**Figure 4**)
- Increased shine up to 384% more than the vehicle conditioner (**Figure 5**)
- Significantly improved consumer perception of hair qualities for multiple categories (**Figure 6**)

### Formulation Benefits:

- Emolliency remains after rinse-off
- Substantivity
- Readily biodegradable<sup>3</sup>
- Water resistant
- Soluble in most alcohols and glycols
- Botanically-derived

Floraesters K-20W Jojoba remains on hair after rinsing,<sup>2</sup> and thus provides long-lasting conditioning and protection benefits.

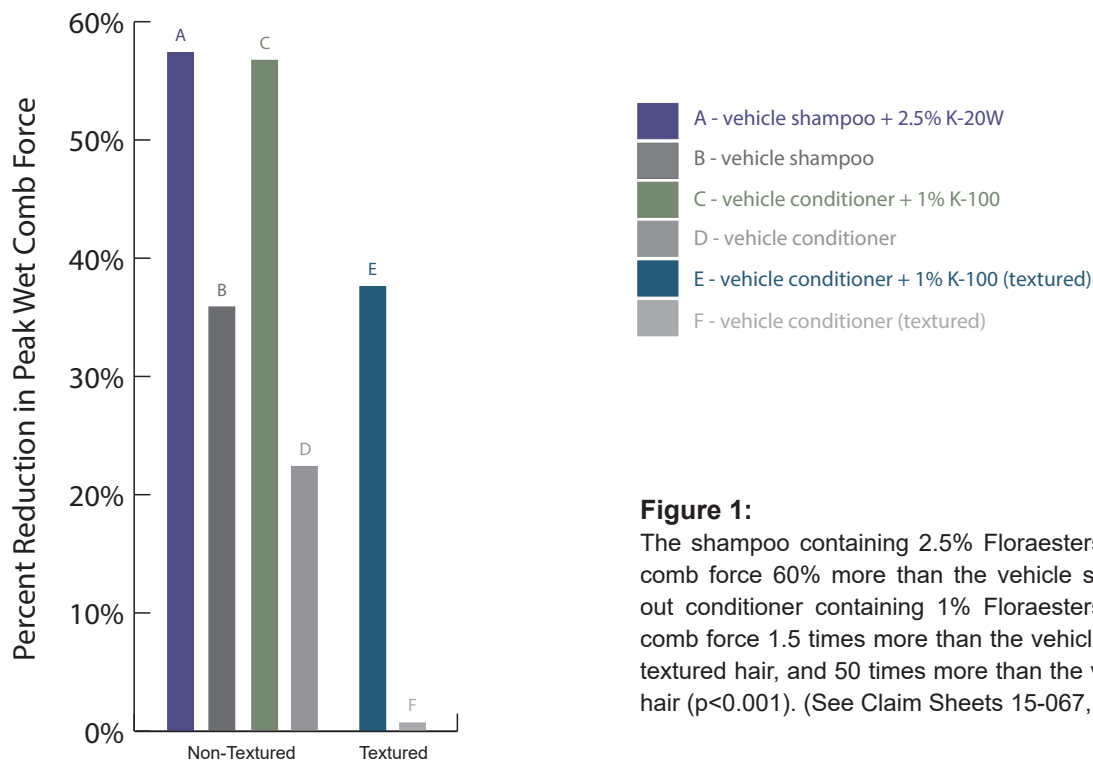
1. Cargill has not tested Floraesters K-20W Jojoba or Floraesters K-100 Jojoba in final OTC drug formulations. Compliance with FDA regulations is the responsibility of the customer.

2. Final Reports available upon request. Figures can be found on the next two pages of this document.

3. Biodegradable according to OECD 301B.

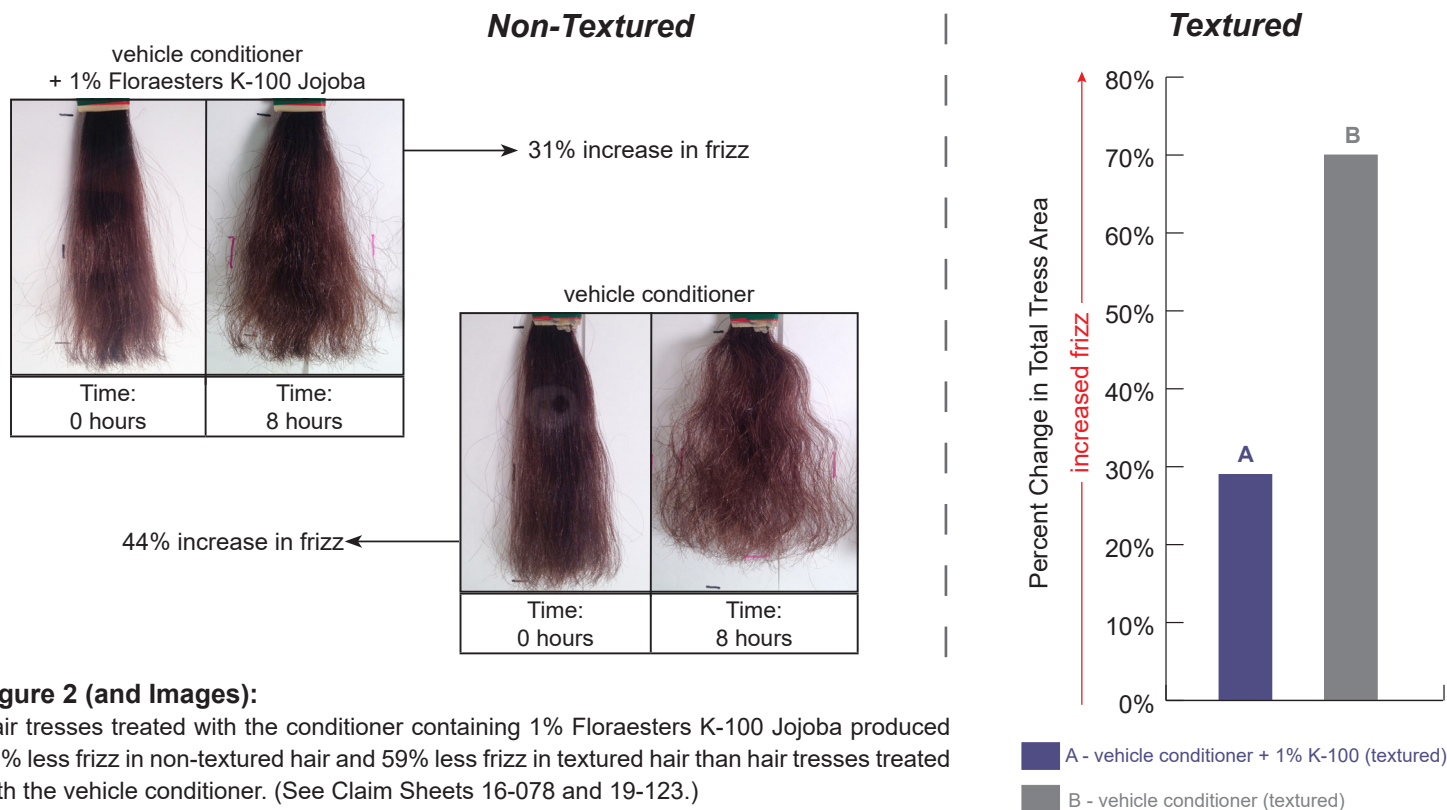
## Figures<sup>4</sup>:

### Condition Hair: Reduced Wet Comb Force with Floraesters K-20W and K-100 Jojoba<sup>5</sup>



**Figure 1:** The shampoo containing 2.5% Floraesters K-20W Jojoba reduced wet comb force 60% more than the vehicle shampoo ( $p < 0.10$ ). The rinse-out conditioner containing 1% Floraesters K-100 Jojoba reduced wet comb force 1.5 times more than the vehicle conditioner ( $p < 0.05$ ) in non-textured hair, and 50 times more than the vehicle conditioner in textured hair ( $p < 0.001$ ). (See Claim Sheets 15-067, 15-068, and 19-122.)

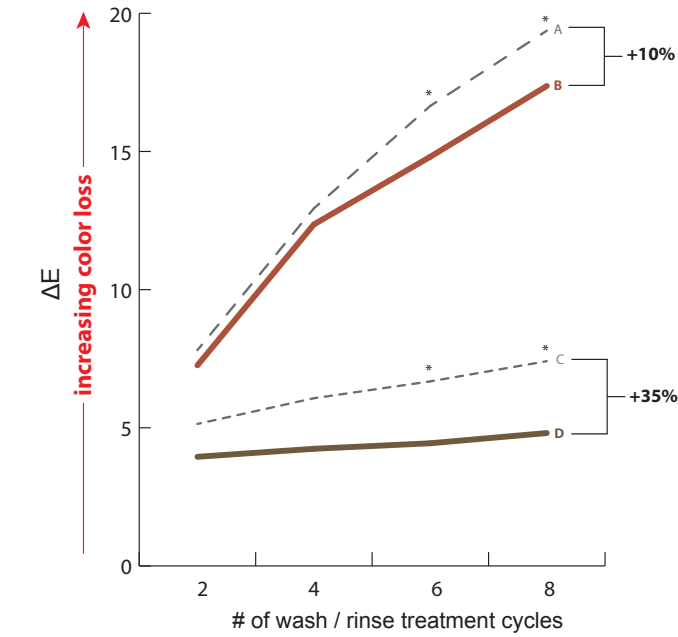
### Condition Hair: Reduced Frizz with Floraesters K-100 Jojoba<sup>6</sup>



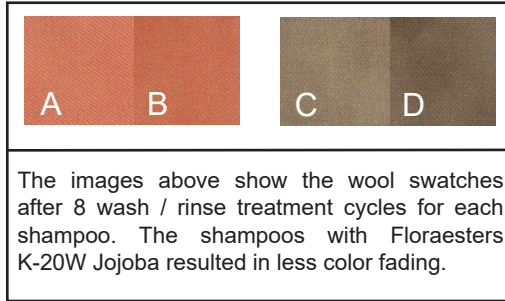
**Figure 2 (and Images):** Hair tresses treated with the conditioner containing 1% Floraesters K-100 Jojoba produced 30% less frizz in non-textured hair and 59% less frizz in textured hair than hair tresses treated with the vehicle conditioner. (See Claim Sheets 16-078 and 19-123.)

4. All studies were conducted double-blind, vehicle-controlled, and randomized (when applicable).  
 5. Naturally curly, dark brown hair tresses were damaged by double-bleaching and cleansed with a 10% sodium lauryl sulfate solution prior to use in the study (non-textured hair), and naturally tightly coiled, tresses cleansed with a 10% sodium lauryl sulfate solution prior to use in the study (textured hair).  
 6. Naturally curly, dark brown hair tresses (non-textured) and naturally tightly coiled hair tresses (textured) were cleansed with a 10% sodium lauryl sulfate solution prior to use in the study.

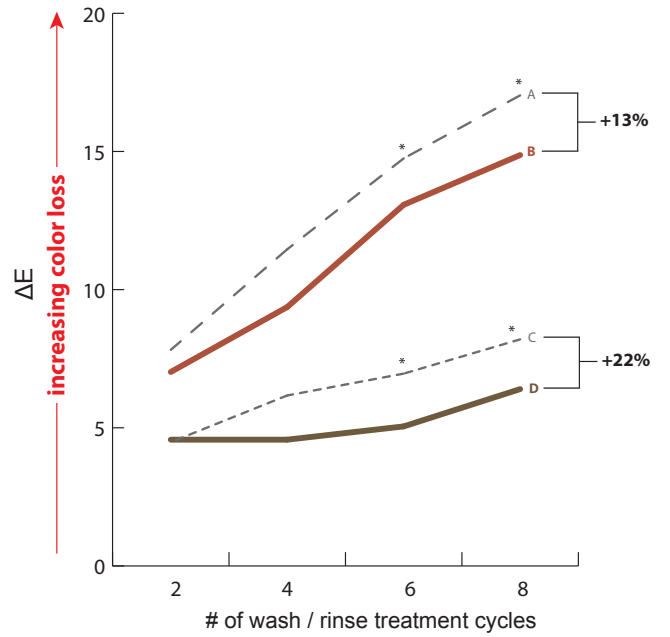
# Protect Hair: Improved Color Retention of Hair Dyes with Floraesters K-20W Jojoba and Floraesters K-100 Jojoba<sup>7</sup>



- A - vehicle shampoo (red)
- B - vehicle shampoo + 2.5% K-20W (red)
- - - C - vehicle shampoo (brown)
- D - vehicle shampoo + 2.5% K-20W (brown)



The images above show the wool swatches after 8 wash / rinse treatment cycles for each shampoo. The shampoos with Floraesters K-20W Jojoba resulted in less color fading.



- A - vehicle conditioner (red)
- B - vehicle conditioner + 1% K-100 (red)
- - - C - vehicle conditioner (brown)
- D - vehicle conditioner + 1% K-100 (brown)

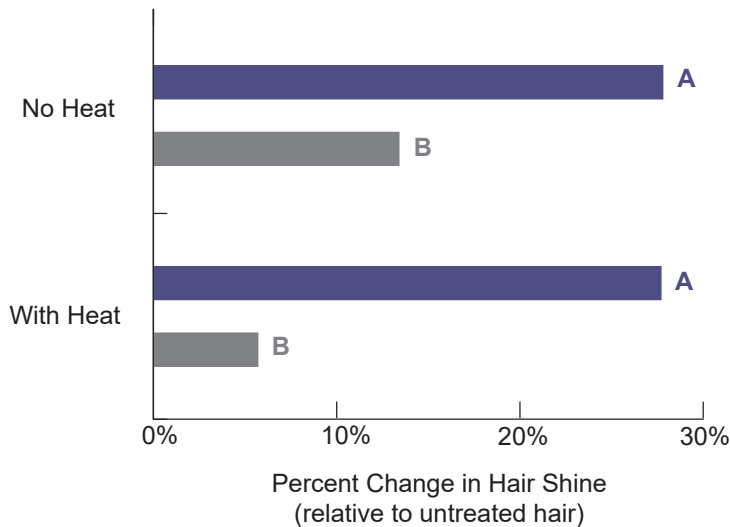
**Figure 3 (and Images):**

Wool swatches dyed with commercial red or brown permanent hair dyes retained up to 35% more color when a shampoo containing 2.5% Floraesters K-20W Jojoba was compared to a shampoo without. Statistical (\*) significance between test articles was apparent where indicated ( $p < 0.05$ ). (See Claim Sheet 15-074.)

**Figure 4:**

Wool swatches dyed with commercial red or brown permanent hair dyes retained up to 22% more color when a conditioner containing 1% Floraesters K-100 Jojoba was compared to a conditioner without. Statistical (\*) significance between test articles was apparent where indicated ( $p < 0.05$ ). (See Claim Sheet 15-075.)

# Condition Textured Hair: Increased Shine with Floraesters K-100 Jojoba<sup>8</sup>



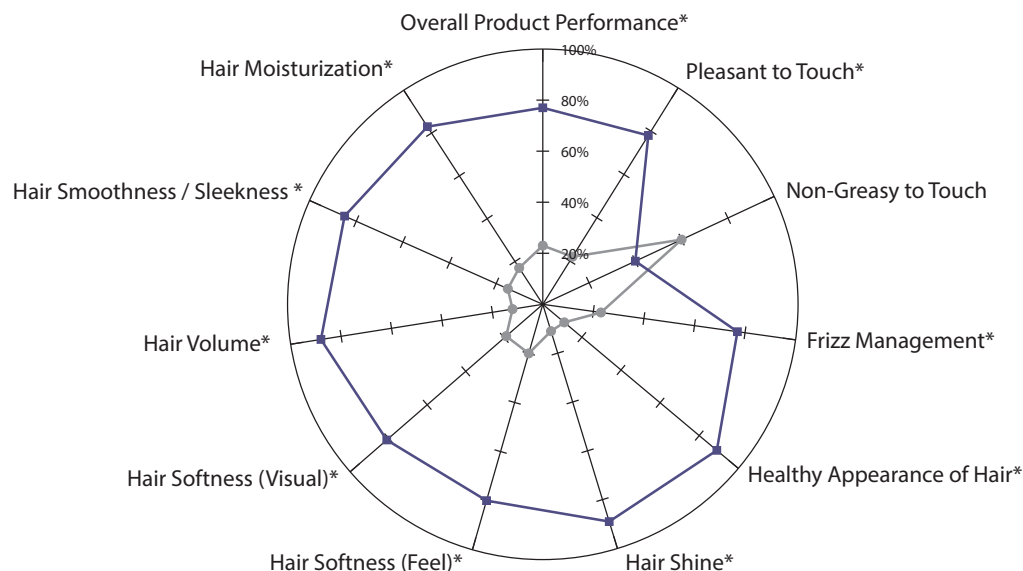
- A - vehicle conditioner + 1% K-100 (textured)
- B - vehicle conditioner (textured)

**Figure 5:**

Hair tresses treated with the conditioner containing 1% Floraesters K-100 Jojoba increased hair shine 107% more than the vehicle without the use of heat, and 384% more than the vehicle with the use of heat ( $p < 0.05$ ). (See Claim Sheet 19-124.)

7. Wool swatches were dyed with commercial hair dyes according to package instructions.  
 8. Naturally tightly coiled hair tresses (textured) were cleansed with a 10% sodium lauryl sulfate solution prior to use in the study.

# Condition Hair: Increased Consumer Preference with Floraesters K-100 Jojoba<sup>9</sup>



**Figure 6:**  
77% of consumers<sup>10</sup> preferred hair tresses treated with a rinse-out conditioner containing 1% Floraesters K-100 Jojoba compared to a vehicle conditioner without. Statistical (\*) significance between test articles was apparent where indicated ( $p < 0.05$ ). (See Claim Sheet 16-077.)

—■— vehicle conditioner + 1% K-100  
—●— vehicle conditioner

## Formula: Silicone-Free, Ultra-Conditioning Shampoo with Floraesters K-20W Jojoba<sup>11</sup>

This luxurious shampoo is silicone-free. Floraesters K-20W Jojoba conditions the hair by reducing wet comb force, leaving the hair soft and manageable.

Phase	Trade/Common Name	INCI Name	Manufacturer	% wt./wt.
A	Deionized Water	Water	----	q.s.
	Versene® Na2 Crystals	Disodium EDTA	The Dow Chemical Co.	0.10
	Carbopol® Aqua SF-1 Polymer	Acrylates Copolymer	The Lubrizol Corporation	5.50
B	Glucamate® CCO	Methyl Glucose Caprate/Caprylate Oleate (and) Propandiol	The Lubrizol Corporation	2.00
	Chemccinate® DSLS Surfactant	Disodium Laureth Sulfosuccinate	The Lubrizol Corporation	12.00
	Plantaren® 2000 N UP	Decyl Glucoside	BASF Corporation	8.00
	Perlastar® L-30	Sodium Lauroyl Sarcosinate	Schill & Seilacher	8.00
	Pureact I-78C	Sodium Cocoyl Isethionate	Innospec Performance Chemicals	2.00
C	Rita EGDS	Glycol Distearate	Rita Corporation	1.50
	Deionized Water	Water	----	5.00
	Zemea® Propanediol	Propanediol	DuPont Tate & Lyle BioProducts	0.50
	<b>Floraesters K-20W Jojoba</b>	<b>Hydrolyzed Jojoba Esters (and) Water (Aqua)</b>	<b>Floratch</b>	<b>2.50</b>
D	Chembetaine® C Surfactant	Cocamidopropyl Betaine	The Lubrizol Corporation	8.00
E	Aquacat® CG518	Guar Hydroxypropyltrimonium Chloride	Ashland, Inc.	0.70
	AMP-Ultra® PC2000, Neutralizing Amine	Aminomethyl Propanol	Angus Chemical Company	q.s.
F	Fragrance <sup>12</sup>	----	----	q.s.
	Preservative <sup>13</sup>	----	----	q.s.
			<b>Total</b>	<b>100.00</b>

### Procedure:

- At room temperature, add the Versene Na2 Crystals to the deionized water of Phase A with moderate propeller agitation and mix until completely dissolved. Add the Carbopol Aqua SF-1 Polymer and mix until uniform. Start heating to 70-75°C.
- Add each ingredient of Phase B to Phase A at 70-75°C in the order listed with moderate propeller agitation and mix until uniform. Reduce the heat to 60-65°C.
- In a separate vessel, mix the Floraesters K-20W Jojoba and the Zemea Propanediol of Phase C until the Floraesters K-20W Jojoba is well dispersed. Add the deionized water of Phase C and continue mixing until uniform. Add Phase C to Phase AB at 60-65°C with moderate propeller agitation and mix until uniform.
- Add Phase D to Phase ABC with moderate propeller agitation and begin cooling.
- At 50-55°C, add Phase E to Phase ABCD with moderate to low propeller agitation and continue cooling.
- At 45-50°C, add Phase F to Phase ABCDE. Continue cooling the mixture to room temperature.

### Formula Properties:

Property	Result
pH	6 - 7
Viscosity	4400 - 7900cP

Ingredient Information  
24/7 Online

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www.floratch.com/info



Floraesters K-20W Jojoba

9. Naturally curly, dark brown hair tresses were damaged by double-bleaching and cleansed with a 10% sodium lauryl sulfate solution prior to use in the study.  
10. The preference data does not include subjects that indicated no preference.  
11. INCI/Trade names must be verified with each manufacturer.  
12. Fragrance: Clean Ocean Fragrance ORC 0801665 supplied by Orchidia  
13. Preservative: Microcare PHD [INCI: Phenoxyethanol (and) Decylene Glycol (and) Propylene Glycol] supplied by Thor Specialties, Ltd.