



a Cargill company

# Technical Report: Formulating with Floraesters K-20W<sup>®</sup> Jojoba



## Synopsis:

**Floraesters K-20W Jojoba** [INCI: Hydrolyzed Jojoba Esters (and) Water] is a multifunctional ingredient that has 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, face washes, face (sheet) masks, and other formulations.<sup>1</sup> Its film-forming properties make it ideal for rinse-off products and products that require water resistance or to extend the period of residence time on the skin.

Floraesters K-20W Jojoba is comprised of 20% hydrolyzed jojoba esters (*i.e.* potassium jojobate and jojoba alcohols) and 80% water, creating a non-traditional emollient with a unique solubility profile. There are, however, numerous techniques that can be utilized by a formulator to incorporate Floraesters K-20W Jojoba into nearly any finished product application.

**Floraesters K-100<sup>®</sup> Jojoba** [INCI: Hydrolyzed Jojoba Esters (and) Jojoba Esters (and) Water] is a more concentrated version of the hydrolyzed jojoba esters; comprised of 80% hydrolyzed jojoba esters, 10% residual jojoba esters, and 10% water. Floraesters K-100 Jojoba is a unique emollient, which can be predispersed in glycerin and added to the water phase, or added directly to the oil phase, providing more formulation versatility. Floraesters K-100 Jojoba can be used at a concentration approximately five times less than that of Floraesters K-20W Jojoba, and will provide a similar efficacy.

This technical report will discuss the following:

- Techniques formulators can use to incorporate Floraesters K-20W Jojoba into a variety of systems
- Solubility of Floraesters K-20W Jojoba / Floraesters K-100 Jojoba in multiple solvents
- An example of a stable, clear, PEG-free, water-based system in which Floraesters K-20W Jojoba was incorporated
  - Skin benefits provided by Floraesters K-20W Jojoba in this system
  - Foam and clarity profiles with a variety of solubilizers in this system

**Typical Usage Levels:** 0.1 - 5.0%

## Formulation Benefits:

- Botanically derived (Ecocert certified)
- Improves water resistance of sunscreens
- Peg-free emollient for clear water-based systems
- Results in rich emolliency on skin, even after rinse-off
- Soluble in most alcohols<sup>2</sup> and glycols
- Enhances hydration effect of glycerin and butylene glycol
- Facilitates neutralization of carbomers
- Readily biodegradable<sup>3</sup>
- Beneficial to skin and hair care products
- EU and China REACH compliant

## Clinically Substantiated Claims<sup>4</sup>:

- Improved water resistance in sunscreen applications<sup>5</sup>
- Increased color longevity and reduced odor in sunless tanning applications<sup>6</sup>
- Increased skin firmness, increased elasticity, and enlarged pore reduction in face mask applications<sup>7</sup>
- Increased skin firmness and enlarged pore reduction in astringent applications<sup>8</sup>
- Increased skin barrier function and reduced the appearance of erythema in nonwoven wipe applications<sup>9</sup>
- Improved skin hydration when used in combination with glycerin<sup>10</sup>
- Improved conditioning in rinse-out hair care applications<sup>11</sup>
- Improved hair dye color retention in rinse-out hair care applications<sup>12</sup>
- Increased consumer perception in a variety of applications<sup>13</sup>

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. Only Floraesters K-20W Jojoba is soluble in most alcohols.

3. Biodegradable according to OECD 302D.

4. Final Reports available upon request. All studies were conducted double-blind, vehicle-controlled, and randomized.

5. See Claim Sheet 15-066 for more information.

6. See Claim Sheets 13-048 and 13-050 for more information.

7. See Claim Sheets 14-059 and 14-060 for more information.

8. See Claim Sheets 13-051 and 13-052 for more information.

9. See Claim Sheets 11-035 and 11-036 for more information.

10. See Claim Sheets 13-049, 13-052, 14-059, and 15-070 for more information.

11. See Claim Sheets 15-067 and 15-069 for more information.

12. See Claim Sheets NEW for more information.

13. See Claim Sheets 11-033, 13-050, 13-053, 14-057, and 14-058 for more information.

# Technical Report: Formulating with Floraesters K-20W<sup>®</sup> Jojoba

## Floraesters K-20W Jojoba in a clear water-based system (C030 / C032):

- Requires the use of a **solubilizer**
  - Plantaren 810UP (INCI: Caprylyl/Capryl Glucoside)
  - Sophogreen (INCI: Water (and) Glucose (and) Rapeseed Acid)
  - Solubilisant LRI (INCI: PPG-26 Buteth-26 (and) PEG-40 Hydrogenated Castor Oil)
  - Symbiosolv Clear (INCI: Caprylyl/Capryl Glucoside (and) Aqua (and) Polyglyceryl-5 Oleate (and) Sodium Cocoyl Glutamate (and) Glyceryl Caprylate (and) Citric Acid)
- Requires **predispersion**
  - Blend Floraesters K-20W Jojoba *thoroughly* with glycols or glycerin (e.g. pentylene glycol, glycerin, or butylene glycol). Figure 1 demonstrates the appearance of each predispersion at a 3:1 ratio of glycol or glycerin to Floraesters K-20W Jojoba.
  - Add the appropriate solubilizer to the predispersion prior to introducing to the appropriate phase. To ensure clarity, make sure that this blend is uniform and free of gel bodies before adding to the remainder of the system.
  - Keep in mind that although predispersions may be clear to start, pH shifts can affect this initial clarity; hence the importance of a solubilizer and the order of addition.

## Floraesters K-20W Jojoba in a hydro-alcoholic gel system (C013):

- Requires **predispersion**
  - System *without* a standard neutralizer: Blend Floraesters K-20W Jojoba *thoroughly* with a solubilizer (e.g. Glycerox 767). Add a portion of alcohol and *thoroughly* mix prior to introducing to the polymeric system. Add remaining alcohol.
  - System *with* a standard neutralizer: Blend Floraesters K-20W Jojoba *thoroughly* with a portion of alcohol. Mix polymeric system with the other portion of alcohol. Add the predispersion to the polymeric system. Neutralize the polymer with a standard neutralizer at the end of the formulation.



**Figure 1. Predispersions with Floraesters K-20W Jojoba**

Pentylene Glycol: provided a clear solution and took <60 seconds to achieve (Clarity was also achieved with a 1:1 ratio.)

Glycerin: provided a hazy solution (no gel bodies) and took <60 seconds to achieve

Zemea Propanediol: provided a hazier solution and took longer to disperse Floraesters K-20W Jojoba

Butylene Glycol: provided the haziest solution and took the longest to disperse Floraesters K-20W Jojoba

From Left To Right: Pentylene Glycol, Glycerin, Zemea Propanediol, Butylene Glycol

# Technical Report: Formulating with Floraesters K-20W<sup>®</sup> Jojoba

## Neutralization of carbomers with Floraesters K-20W Jojoba (C028):

- Completely hydrate carbomer in water.
- Gel Systems: Predisperse Floraesters K-20W Jojoba in alcohol, glycol, or glycerin and blend *thoroughly*. If clarity is desired, include a solubilizer within the predispersion. Slowly add (with agitation) predispersion to the hydrated carbomer phase.
- Emulsion Systems: Add Floraesters K-20W Jojoba neat wherever Triethanolamine (TEA) would typically be added.
- Neutralization with Floraesters K-20W Jojoba requires at least 8-10 times as much Floraesters K-20W Jojoba as TEA.
- Fatty acids, acrylate crosspolymers, and polymer fixatives can also be neutralized following the same method.

## Floraesters K-20W Jojoba / Floraesters K-100 Jojoba in low pH emulsion systems (L038):

- Add Floraesters K-20W Jojoba / Floraesters K-100 Jojoba after the emulsion has been created at 50-60°C, but prior to making pH adjustments.
- In the case of polymeric systems, add Floraesters K-20W Jojoba / Floraesters K-100 Jojoba after the emulsion has been created, but before neutralization of the polymer. As mentioned above, Floraesters K-20W Jojoba will partially neutralize the polymer when used at low levels; and can completely neutralize the polymer when used at higher levels.
- Although predispersion of Floraesters K-20W Jojoba may not be required in a low pH emulsion system, predispersing in glycols or glycerin can ease the addition of Floraesters K-20W Jojoba to low pH emulsion systems. Floraesters K-100 Jojoba can be predispersed, or added directly to the oil phase and mixed until uniform.

## Floraesters K-100 Jojoba in systems with pH-sensitive ingredients:

- Requires a reduction of pH in the phase with Floraesters K-100 Jojoba prior to introducing to the remainder of the system.
- This can be done with lactic or citric acid, and will not affect the functionality of Floraesters K-100 Jojoba.
- Antiperspirants are an example product application.

## Floraesters K-20W Jojoba / Floraesters K-100 Jojoba in clear surfactant systems (C018 / C019 / C027):

- Blend *thoroughly* with selected glycol or glycerin when applicable. Although predispersion may not be required, predispersing in glycols or glycerin can ease the addition of Floraesters K-20W Jojoba / Floraesters K-100 Jojoba.
- Add the appropriate solubilizer to the predispersion, and make sure that this blend is uniform and completely free of gel bodies.
- Mix all surfactants. Add the predispersion to the surfactant mix.
- The pH of the entire system can then be adjusted at the very end of the formulation. This technique works for both high and low pH systems.

# Technical Report: Formulating with Floraesters K-20W<sup>®</sup> Jojoba

## Floraesters K-20W Jojoba in clear surfactant systems without solubilizer:

- Procedure (Table 1): Pre-mix Phase B. Combine Phases A and B and mix well. Add Phases C, D, and E in the order listed with mixing. (Salt can be added to increase viscosity without affecting clarity.)
- Procedure (Table 2): Pre-mix Phase C. Combine Phases B and C with mixing. Add Phases A, D, E (pH = 5.5-6.5), and F in the order listed with mixing.

**Table 1. Sulfate System**

Phase	Trade Name	INCI Name	T1	T2	T3
A	Sulfochem <sup>®</sup> ES-2K Surfactant	Sodium Laureth Sulfate (27% solids)	40.0	26.0	16.0
B	Floraesters K-20W Jojoba	Hydrolyzed Jojoba Esters (and) Water (Aqua)	0.5	0.5	0.5
	---	Butylene Glycol	4.0	4.0	4.0
	---	Glycerin	1.5	1.5	1.5
C	Deionized Water	Water	49.9	65.3	76.3
D	Chembetaine <sup>®</sup> C Surfactant	Cocamidopropyl Betaine (34-37% solids)	4.0	2.6	1.6
E	Kathon <sup>®</sup> CG	Methylchloroisothiazolinone (and) Methylisothiazolinone	0.1	0.1	0.1
	<b>Total</b>		<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
	<b>Total Surfactant Solid</b>		<b>12.6</b>	<b>8.2</b>	<b>5.0</b>

**Table 2. Sulfate-Free System**

Phase	Trade Name	INCI Name	T1	T2
A	Deionized Water	Water	55.9	54.3
B	Chemccinate <sup>®</sup> DSLS Surfactant	Disodium Laureth Sulfosuccinate	8.0	8.0
	Plantaren <sup>®</sup> 2000 N UP	Decyl Glucoside	7.5	7.5
	Perlastan <sup>®</sup> C-30	Sodium Cocoyl Sarcosinate	12.0	12.0
C	Floraesters K-20W Jojoba	Hydrolyzed Jojoba Esters (and) Water (Aqua)	1.0	2.5
	---	Propylene Glycol	3.0	3.0
	---	Glycerin	2.0	2.0
D	Chembetaine <sup>®</sup> C Surfactant	Cocamidopropyl Betaine	10.0	10.0
E	Citric Acid, USP (30% Solution)	Citric Acid (and) Water	0.5	0.6
F	Kathon <sup>®</sup> CG	Methylchloroisothiazolinone (and) Methylisothiazolinone	0.1	0.1
	<b>Total</b>		<b>100.0</b>	<b>100.0</b>

## Floraesters K-20W Jojoba and Floraesters K-100 Jojoba have unique solubility profiles:

**Table 3. Solubility**

Solubility	Floraesters K-20W Jojoba	Floraesters K-100 Jojoba
Soluble	Decyl Glucoside <sup>14</sup> , Glycerin <sup>15</sup> , Propylene Glycol <sup>15,16</sup>	
	Ethyl Alcohol, Isopropyl Alcohol, Polysorbate 20, Polysorbate 80	
Partially Soluble	Butylene Glycol <sup>17</sup> , Lanolin Oil	
	Castor Oil	
Insoluble	Acetone, Caprylic/Capric Triglyceride, Cyclopentasiloxane, Decyl Oleate, Dimethicone, Ethyl Acetate, Isononyl Isononanoate, Isopropyl Myristate, Isopropyl Palmitate, Mineral Oil, Octyldodecyl Stearoyl Stearate, Oleyl Alcohol, PPG-15 Stearyl Ether, Safflower Oil (High Oleic), Sodium Lauryl Sulfate (30% Solution), Sorbitol	
		Castor Oil, Ethyl Alcohol, Isopropyl Alcohol, Polysorbate 20, Polysorbate 80

Table 3 provides a list of common ingredients in which Floraesters K-20W Jojoba / Floraesters K-100 Jojoba are soluble, partially soluble (*i.e.* one phase but not clear), or insoluble. Samples were tested at a 9:1 ratio of solvent to Floraesters K-20W Jojoba / Floraesters K-100 Jojoba at room temperature unless otherwise noted.

It is also important to note that insoluble does not indicate incompatible or a lack of dispersibility. Floraesters K-100 Jojoba can also be directly added to and dispersed within the oil phase of a formula, regardless of solubility. Using the formulating techniques described on pages 2 and 3, Floraesters K-20W Jojoba / Floraesters K-100 Jojoba can be incorporated into almost any system.

14. Floraesters K-100 Jojoba: soluble with heat.

15. Also soluble at a 1:1 ratio.

16. Floraesters K-20W Jojoba: soluble with heat.

17. Partially soluble with heat.

# Technical Report: Formulating with Floraesters K-20W<sup>®</sup> Jojoba



## Formula: PEG-Free Clear Hydrating Toner<sup>18</sup> (C032)

This crystal clear, alcohol-free and PEG-free toner revitalizes and balances the skin. Floraesters K-20W Jojoba hydrates and firms the skin, leaving the face feeling clean, refreshed, and moisturized.

Phase	Trade/Common Name	INCI Name	Manufacturer	% wt./wt.
A	Deionized Water	Water	-----	q.s.
	Versene <sup>®</sup> Na2 Crystals	Disodium EDTA	The Dow Chemical Co.	0.10
B	Glycerine 99.7% USP Kosher	Glycerin	Acme-Hardesty Co	0.30
	1,3-BG	Butylene Glycol	Nexeo Solutions	2.00
	<b>Floraesters K-20W Jojoba</b>	<b>Hydrolyzed Jojoba Esters (and) Water (Aqua)</b>	<b>Florotech</b>	<b>0.50</b>
	Fragrance <sup>19</sup>	-----	-----	q.s.
	Plantaren <sup>®</sup> 810UP	Caprylyl/Capryl Glucoside	BASF	3.00
	Preservative <sup>20</sup>	-----	-----	q.s.
C	Witch Hazel Distillate preserved with Phenoxyethanol	Hamamelis Virginiana (Witch Hazel) Water	American Distilling, Inc.	3.50
	Trehalose 100	Trehalose	Hayashibara Co., Ltd.	0.10
	Sodium Hyaluronate Powder (1% Solution)	Sodium Hyaluronate (and) Water	Tri-K Industries Inc.	0.10
D	Purac <sup>®</sup> Hipure 90 (15% Solution)	Lactic Acid (and) Water	Corbion	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.
- Weigh the Floraesters K-20W Jojoba in a separate container. Add the other ingredients of Phase B to the Floraesters K-20W Jojoba, in the order listed. Begin mixing at room temperature with low to moderate propeller agitation. Make sure the Floraesters K-20W Jojoba is completely dissolved.
- Add Phase B to Phase A with moderate to rapid propeller agitation.
- Add Phase C to Phase AB, one ingredient at a time in the order listed, at room temperature with moderate to rapid propeller agitation. Make sure each ingredient is uniformly mixed in the solution before the next ingredient is added.
- Add Phase D with moderate to rapid propeller agitation to achieve pH 5.5.

## Additional Solubilizer Options:

Trade Name	INCI Name	% wt./wt.	Technique
Solubilisant LRI	PPG-26 Buteth-26 (and) PEG-40 Hydrogenated Castor Oil	0.70	N/A
Sophogreen	Water (and) Glucose (and) Rapeseed Acid	3.00	Clarity is pH-dependent. Phase A and the final formula require a pH>6.

## Formula Properties:

Property	Result
pH	5-6
Clarity	96-100% Transmittance

18. INCI/Trade names must be verified with each manufacturer.

19. Fragrance: Citrus Herbal ORC0801108 supplied by Orchidia

20. Preservative: Botanista<sup>®</sup> PF-64 [INCI: Phenoxyethanol (and) Caprylyl Glycol (and) Ethylhexylglycerin (and) Hexylene Glycol] supplied by Botanigenics, Inc.

# Technical Report: Formulating with Floraesters K-20W<sup>®</sup> Jojoba

## Increased Skin Hydration and Improved Consumer Preference with Floraesters K-20W Jojoba in an Alcohol-Free Toner

### Methodology:

Clear, PEG-free, alcohol-free toners were formulated with or without 0.5% Floraesters K-20W Jojoba, 2% butylene glycol, and 0.3% glycerin. Skin hydration measurements (using the Corneometer) were taken at baseline, one, and two hours post-test article application. Consumers were also asked to complete a consumer preference survey comparing two of the toners.

### Materials:

Corneometer<sup>®</sup> CM 825 is a product of Courage+Khazaka (Köln, Germany).

### Subjects:

Figure 2: 20 (n ≥ 15 per test article) female subjects 35-56 years of age (lower legs)

Figure 3: 28 female subjects 28-64 years of age (face)

### Results:

The inclusion of 0.5% Floraesters K-20W Jojoba, in conjunction with either glycerin or butylene glycol, resulted in statistically significant (p<0.05) increases in skin hydration in each toner formula at both time points. Floraesters K-20W Jojoba added to a toner increased skin hydration up to 18% more than the comparative test article without Floraesters K-20W Jojoba. The toner containing 0.5% Floraesters K-20W Jojoba was preferred over the vehicle toner (without Floraesters K-20W Jojoba).

Figure 2. Skin Hydration

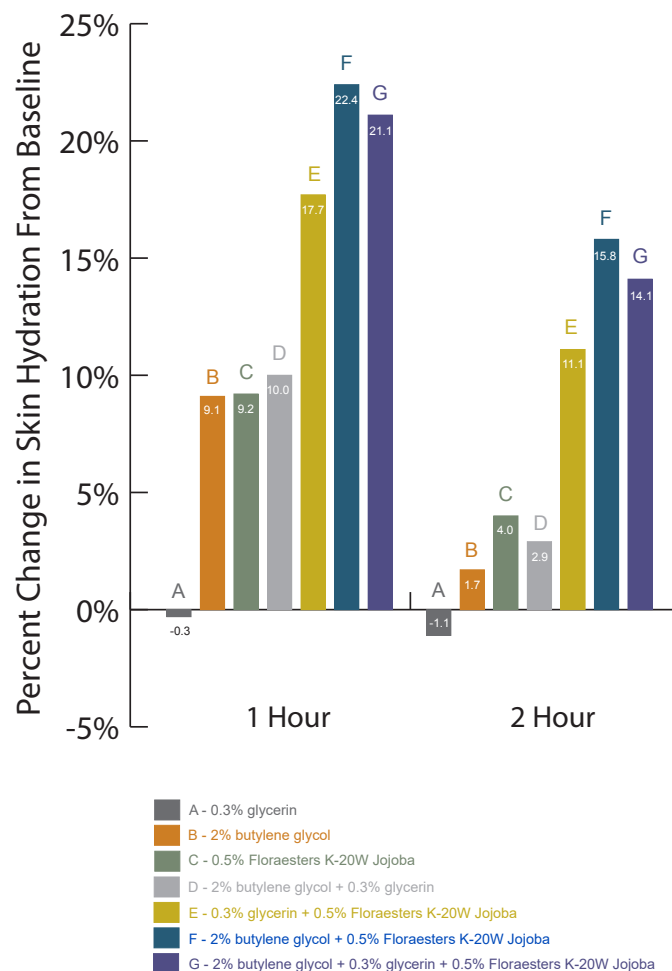
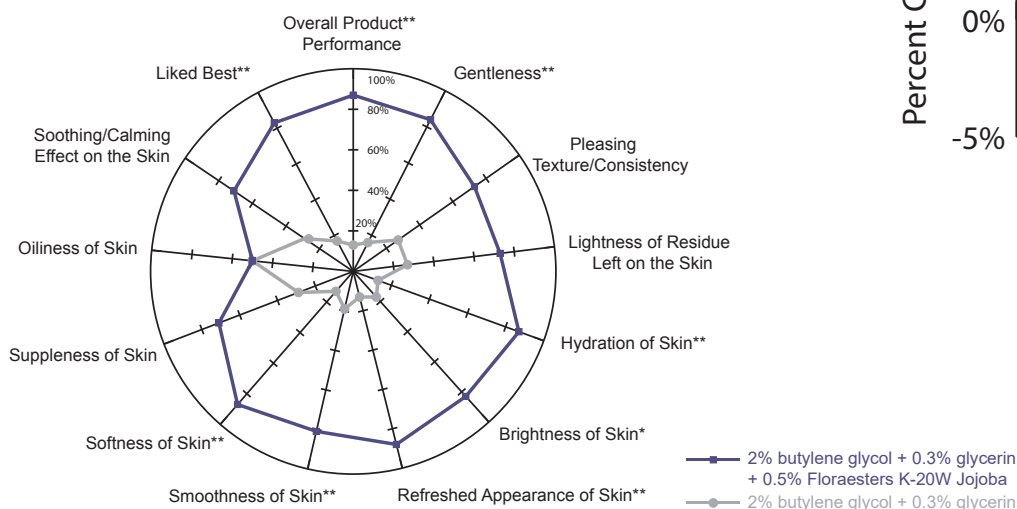


Figure 3. Consumer Preference<sup>21</sup>



21. Statistical (\*\*) and directional (\*) significance was apparent where indicated (p<0.05 and p<0.1, respectively).

# Technical Report: Formulating with Floraesters K-20W<sup>®</sup> Jojoba

## Methodology:

Clear, PEG-free, alcohol-free toners were formulated with a variety of solubilizers. Foam volume was analyzed (in triplicate) by measuring 20ml of each toner into a 100ml graduated cylinder, inverting the cylinder 10 times, and measuring foam volume at time zero, and every minute for four minutes. Bubble size was also noted (*i.e.* L, M, and S).<sup>22</sup>

The results in Table 5 correspond to the test articles in Table 4. The results in Table 6 correspond to formula C032 (see page 5).

**Table 4. Test Article Toner**

Trade/Common Name	INCI Name	Manufacturer	% wt./wt.
Deionized Water	Water	-----	q.s.
Versene <sup>®</sup> Na2 Crystals	Disodium EDTA	The Dow Chemical Co.	0.10
Glycerine 99.7% USP Kosher	Glycerin	Acme-Hardesty Co	0.30
1,3-BG	Butylene Glycol	Nexeo Solutions	1.50
<b>Floraesters K-20W Jojoba</b>	<b>Hydrolyzed Jojoba Esters (and) Water (Aqua)</b>	<b>Floratech</b>	<b>0.50</b>
Solubilizer	-----	-----	-----
Preservative <sup>23</sup>	-----	-----	0.05
Purac <sup>®</sup> Hipure 90 (15% Solution)	Lactic Acid (and) Water	Corbion	q.s.
		<b>Total</b>	<b>100.00</b>

**Table 5. Foam and Clarity Results (Table 2 Toners)**

Solubilizer			Foam Volume (ml)					Clarity (%)
Trade Name	INCI Name	% wt./wt.	0 min	1 min	2 min	3 min	4 min	
Solubilisant LRI	PPG-26 Buteth-26 (and) PEG-40 Hydrogenated Castor Oil	0.70	15.3 L+S	13.7 L+S	11.8 S	11.8 S	11.2 S	97-99
Sophogreen	Water (and) Glucose (and) Rapeseed Acid	3.00	9.0 M+S	8.0 M+S	7.0 M+S	5.7 S	5.3 S	97-100
Plantaren 810UP	Caprylyl/Capryl Glucoside	3.00	61.0 L+S	55.0 L+S	53.5 L+S	49.3 L+S	46.8 L+S	96-99
Symbiosolv Clear	Caprylyl/Capryl Glucoside (and) Aqua (and) Polyglyceryl-5 Oleate (and) Sodium Cocoyl Glutamate (and) Glyceryl Caprylate (and) Citric acid	3.00	56.3 L+S	49.5 L+S	48.8 L+S	48.7 L+S	48.3 L+S	96-100

**Table 6. Foam and Clarity Results (C032 Toners)**

Solubilizer			Foam Volume (ml)					Clarity (%)
Trade Name	INCI Name	% wt./wt.	0 min	1 min	2 min	3 min	4 min	
Solubilisant LRI <sup>23,24</sup>	PPG-26 Buteth-26 (and) PEG-40 Hydrogenated Castor Oil	0.70	17.0 M+S	10.7 S	9.0 S	8.3 S	7.0 S	94-100
Sophogreen <sup>24</sup>	Water (and) Glucose (and) Rapeseed Acid	3.00	12.3 L+S	4.3 L+S	3.0 L+S	2.3 L+S	2.0 L+S	97-100
Plantaren 810UP	Caprylyl/Capryl Glucoside	3.00	73.3 M+S	65.0 S	64.2 S	63.8 S	63.0 S	96-100

22. L - large size bubbles; M - medium size bubbles; and S - small size bubbles.

23. The preservative used in this system was Neolone<sup>®</sup> 950 [INCI: Methylisothiazolinone] supplied by The Dow Chemical Co.

24. These formulas only included 1.5% butylene glycol.

# Technical Report: Formulating with Floraesters K-20W<sup>®</sup> Jojoba

## Formula: PEG-Free Clear Hydrating Toner<sup>25</sup>

Test	Stability Temp.	Week 0	Week 1	Week 2	Week 3	Week 4	Week 8	Week 12
pH (5-6)	4°C		pass	pass	pass	pass	pass	pass
	25°C	pass	pass	pass	pass	pass	pass	pass
	43°C		pass	pass	pass	pass	pass	pass
	50°C		pass	pass				
Color-Visual	4°C		pass	pass	pass	pass	pass	pass
	25°C	pass	pass	pass	pass	pass	pass	pass
	43°C		pass	pass	pass	pass	pass	pass
	50°C		pass	pass				
Clarity (96-100% transmittance)	4°C		pass	pass	pass	pass	pass	pass
	25°C	pass	pass	pass	pass	pass	pass	pass
	43°C		pass	pass	pass	pass	pass	pass
	50°C		pass	pass				
Odor	4°C		pass	pass	pass	pass	pass	pass
	25°C	pass	pass	pass	pass	pass	pass	pass
	43°C		pass	pass	pass	pass	pass	pass
	50°C		pass	pass				
No Light at Room Temperature			pass	pass	pass	pass	pass	pass
Ultraviolet Light at Room Temperature			pass	fail <sup>26</sup>				
Freeze/Thaw Cycles		Cycle I	Cycle II	Cycle III				
pH		pass	pass	pass				

**Stability:** Evaluation was conducted under the following conditions

- 4°C, 25°C (room temperature), 43°C with ambient humidity for 12 weeks
- 50°C with ambient humidity for 2 weeks
- Freeze/Thaw: Freeze at -18°C; product was frozen/thawed once per day for 3 consecutive days (i.e. cycles)
- Ultraviolet Light: Room Temperature for 2 weeks
- No Light: Room Temperature for 12 weeks

**Methods:** Samples were evaluated at room temperature for pH, color (visual), clarity, and odor right after production (week 0). Samples were removed from the stability chamber and brought to room temperature before each evaluation. Evaluations were conducted on the 1st, 2nd, 3rd, 4th, 8th, and 12th week of stability. Samples meeting the criteria were noted as “pass”. Passing indicates the product is stable and maintains acceptable pH, color, clarity, and odor.

**Summary:** The PEG-Free Clear Hydrating Toner was stable in various temperatures and conditions for 12 weeks, with the exception of the ultraviolet light condition. Also, the pH after freeze/thaw testing was unchanged.

<sup>25</sup> Stability also applies to Sophogreen (without fragrance) and Solubilisant LRI.

<sup>26</sup> Failed due to a slight color change (yellow) and off odor.