



**Product Efficacy Testing Report
APP 01**

Latest Revision Date: N/A

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1. Purpose and Scope

Floritech is committed to providing customers with functional ingredients. This report summarizes efficacy testing conducted on products offered by Floritech. Floritech maintains files of actual test results separately; these reports are available for review. Methods are only briefly described; comprehensive protocols are available on request.

Floritech conducts a variety of testing to support efficacy claims made about our products. The type of testing conducted varies according to the function claimed. If not self-explanatory according to the protocol or test method title, the method used to ascertain the efficacy claimed is briefly described in Section 4. Detailed protocols or test methods are referenced in Section 2. They are available upon request.

2. Applicable Documents

2.1 QMS Documents

QMS Test Methods

- a. TW08 Jojoba Oil and Jojoba Ester Composition
- b. TW10 Hydrophile-Lipophile Balance System
- c. TW13 Melting Point Determination - Fisher-Johns
- d. TW38 Playtime Test of Soft Spheres
- e. TW39 GC Method for Tocopheryl Acetate Determination in Florasomes
- f. TW40 GC Method for Ascorbyl Palmitate Determination
- g. TW47 Nova Meter Operation
- h. TW68 Wax Dropping Point Determination Method

SOP

- i. New Product Introduction SOP

2.2 Business Documents

- a. APP 04 Relative Lipstick Strength
- b. APP 09 Spreadability Testing
- c. APP 15 Fragrance Adherence Determination
- d. APP 10 Slip Test for Solid and Liquid Materials
- e. CTL 04 Clinical Evaluation of Moisturization Potential

2.3 American Oils Chemist's Society (AOCS) Methods

- a. Cc 7-25 Refractive Index
- b. Cd 12b-92 Oxidative Stability Index
- c. Ja 10-87 Brookfield Viscosity

2.4 American Society for Testing and Materials (ASTM) Methods

- a. D 1321-95 Standard Test Method for Needle Penetration of Petroleum Waxes
- b. D 3601-88 Foam test

3. Floratech Products

3.1 Hard Bead Products

Floratech makes free-flowing microspheres from a variety of hard waxes for use as exfoliatives in personal care products. These products are described in Table 1. The microspheres can be pigmented to match standard or custom colors, as desired.

Table 1. Hard Bead Products

Floratech Trade Name	INCI Name of Wax Ingredient	Japanese Name	Other Ingredients
Florabeads Carnauba	Copernica Cerifera (Carnauba) Wax	Carnauba Wax	Pigments
Florabeads Jojoba	Jojoba Esters	Hydrogenated Jojoba Oil	Pigments
Florabeads RBW	Oryza Sativa (Rice) Bran Wax	Rice Bran Wax	Pigments
Florapearls Jojoba	Jojoba Esters	Hydrogenated Jojoba Oil	Pigments
Metabeads Microwax	Microcrystalline Wax	Microcrystalline Wax	Pigments
Metapearls -1-STD	Polyethylene	Polyethylene Wax	Pigments

Florabeads and Metabeads microspheres are screened to obtain certain size fractions. Sizes are specified in Table 2. Florapearls and Metapearls are “mono-sized” and the standard size is 800- 1200 microns (custom sizes will vary).

Table 2. Mesh Size and Corresponding Micron Size

Mesh Size	Micron Size
10/10	100 – 900
28/60	250 – 600
40/60	250 – 420
60/100	150 – 250
STD	800 - 1200

Hard bead products are available in a variety of standard colors. These are listed in Table 3.

Table 3. Standard Colors

Color	Florabeads Carnauba	Florabeads Jojoba	Florabeads RBW	Florapearls Jojoba	Metabeads Microwax	Metapearls 1-STD
Arizona Sky		X		X	X	X
Brick Red		X		X	X	X
Burnt Orange		X		X	X	X
Café Olé		X		X	X	X
Desert Rose		X		X	X	X
Evergreen		X		X	X	X
Gypsy Rose (Red, Apache Rose)		X		X	X	X
Iron Blue (Sapphire)		X		X	X	X
Jade (Green)		X		X	X	X
Jasmine		X		X	X	X
Lapis (Blue)		X		X	X	X

Table 3. Standard Colors (cont'd)

Color	Florabeads	Florabeads	Florabeads	Florapearls	Metabeads	Metapearls
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	Carnauba	Jajoba	RBW	Jajoba	Microwax	1-STD
Maize		X		X	X	X
Merlot		X		X	X	X
Oasis Verde		X		X	X	X
Onyx		X			X	X
Sapphire		X		X	X	X
Sonora Sand (Peach)		X			X	
Sunburst Orange		X		X	X	X
Tequila Sunrise		X		X	X	X
Tiger Lily,				X		X
Topaz (Yellow)		X	X	X	X	X
White (Natural)		X		X	X	X
White (Pigmented)	Only		Only			
Natural	X		X			

Table 4 identifies the pigments used in each of Floratech's colored bead products.

Table 4. Pigments

Color	Pigment INCI Name	CI Number(s)
Apache Rose (Red)	Red 30	73360
	Talc	77718
Arizona Sky	Blue 1 Lake	42090:2
	Yellow 5 Lake	19140:1
	Titanium Dioxide	77891
Brick Red	Iron Oxides	77491
Burnt Orange	Red 30	73360
	Talc	77718
	Iron Oxides	77492
Café Olé	Iron Oxides	77491
		77492
		77499
Desert Rose	Red 30	73360
	Talc	77718
	Ferric Ferrocyanide	77510
Evergreen	Chromium Oxide Green	77288
Gypsy Rose (Red)	Red 30	73360
	Talc	77718
Jade (Green)	Chromium Hydroxide Green	77289
Jasmine (Purple)	Red 30	73360
	Talc	77718
	Ultramarines	77007
Lapis (Blue)	Ultramarines	77007
Maize	Iron Oxides	77492
Merlot	Red 30	73360
	Talc	77718
	Ferric Ferrocyanide	77510

Table 4. Pigments (cont'd)

Color	Pigment INCI Name	CI Number(s)
Oasis Verde	Chromium Hydroxide Green	77289

	Yellow 5 Lake Ferric Ferrocyanide	19140:1 77510
Onyx (Black)	Iron Oxides	77499
Sapphire (Iron Blue)	Ferric Ferrocyanide	77510
Sonora Sand (Peach)	Red 30 Talc Yellow 5 Lake Iron Oxides Titanium Dioxide	73360 77718 19140:1 77491 77891
Sunburst Orange	Red 30 Talc Yellow 5 Lake	73360 77718 19140:1
Tequila Sunrise	Red 30 (and) Talc Iron Oxides	73360 77718 77491
Topaz (Yellow)	Yellow 5 Lake	19140:1
White (Natural)	None	N/A
White (Pigmented)	Titanium Dioxide	77891
Yellow (Natural)	None	N/A

3.1.1 Hard Bead Product Efficacy Testing

Efficacy claims made regarding hard bead products are as follows:

a. Emollient Deposition (4.1)

At this time, only Florabeads Jojoba have been tested for emollient deposition. Florabeads Jojoba have been shown to deposit jojoba esters during use as an exfoliative.

b. Bead Stability (4.2)

At room temperature, beads were tested neat in presence of ammonium lauryl sulfate (ALS), sunflower oil, mineral oil, water with pH 3, water with pH 7, water with pH 10, propylene glycol (PG), ethanol, Standapol ES-2 (sodium laureth sulfate), sodium lauryl sulfate (SLS), SLS and lactic acid (LA), triethanolamine (TEA) 99%. The results for bead stability testing are summarized in Table 5.

Table 5. Stability Test Results for Hard Bead Products

Product Name	Bead Stability (10 Weeks)
<p><u>Florabeads Jojoba:</u> Café Olé Gypsy Rose (Red) Iron Blue (Sapphire) Jade (Green) Jasmine (Purple) Lapis (Blue) Onyx (Black) Topaz (Yellow) White (Natural)</p>	<p><u>ALS:</u> Maintained shape & size. White maintained color; others began fading in UV light between 1 & 14 days. White began softening after 6 weeks; others softened between 2 & 5 weeks.</p> <p><u>Sunflower Oil:</u> All began softening between 5 & 14 days; dissolved between 1 & 3 weeks.</p> <p><u>Mineral Oil:</u> All began softening between 5 & 14 days; dissolved between 1 & 3 weeks.</p> <p><u>Water, pH 3:</u> Maintained shape, size & hardness. Fading in UV light – Jade (after 4 weeks), Iron Blue/Lapis (after 5 days), Jasmine and Café Olé (after 2 weeks). All others maintained color.</p> <p><u>Water, pH 7:</u> Maintained shape, size & hardness. Fading in UV light – Jade (after 4 weeks), Iron Blue (after 7 weeks), Jasmine/Lapis (after 2 weeks). All others maintained color.</p> <p><u>Water, pH 10:</u> Maintained shape, size & hardness. Fading in UV light – Jade (after 4 weeks), Iron Blue (after 7 weeks), Jasmine/Lapis (after 6 days). All others maintained color.</p> <p><u>PG:</u> Maintained color, shape, & size. Softening in UV light – Jade, Iron Blue, Lapis, Onyx, Topaz, Café Olé (after 3 to 5 weeks). All others maintained hardness.</p> <p><u>Ethanol:</u> Fading began after 2 days (primary & pastel); softening began between 2 & 6 days (all colors).</p> <p><u>Standapol ES-2:</u> Maintained shape & size. All softened after 2 to 5 weeks. Fading in UV light – Gypsy Rose/Lapis (after 2 weeks), Jade/Jasmine/Iron Blue/Topaz (after 5 days), Café Olé (2 days), Onyx (3 weeks).</p> <p><u>SLS:</u> Maintained shape & size. Fading in UV light – Gypsy Rose (after 2 weeks), Iron Blue/Jade/Lapis/Onyx/Topaz (after 5 days), Café Olé (2 days) All softened after 3 to 7 weeks.</p> <p><u>SLS & LA:</u> Maintained shape & size. Fading in UV light – Gypsy Rose (after 4 weeks), Café Olé/Iron Blue/Jade/Jasmine/Lapis/Onyx/Topaz/Café Olé (after 2-6 days), White discolored (yellowed) after 6 days. Lapis softened after 3 days; all softened after 2 to 4 weeks.</p> <p><u>TEA 99%:</u> Maintained shape & size. Iron Blue/Lapis/Onyx/Café Olé softened (after 3-5 weeks); all others maintained hardness. White discolored (yellowed) after 6 days.</p>

Table 5. (cont'd)

Product Name	Bead Stability (10 Weeks)
<p><u>Florabeads Carnauba:</u> Peach Green</p>	<p><u>ALS:</u> Maintained shape, size and hardness. Peach maintained color; pastel began fading in UV light after 5 days.</p> <p><u>Sunflower Oil:</u> Maintained shape, size and hardness. Green maintained color; Peach began fading in UV light after 2 days.</p> <p><u>Mineral Oil:</u> Maintained shape, size and hardness. Green maintained color; Peach began fading in UV light after 5 days.</p> <p><u>Water, pH 3:</u> Maintained shape, size and hardness. Green maintained color; Peach began fading in UV light after 2 weeks.</p> <p><u>Water, pH 7:</u> Maintained shape, size and hardness. Green maintained color; Peach began fading in UV light after 2 weeks.</p> <p><u>Water, pH 10:</u> Maintained shape, size and hardness. Green maintained color; Peach began fading in UV light after 2 weeks.</p> <p><u>PG:</u> Maintained shape, size and hardness. Green maintained color; Peach began fading in UV light after 4 days.</p> <p><u>Ethanol:</u> Fading began after 2 days (Green & Peach); softening began after 2 days (Green & Peach).</p> <p><u>Standapol ES-2:</u> Maintained shape, size and hardness. Green maintained color; Peach began fading in UV light after 5 days.</p> <p><u>SLS:</u> Maintained shape, size and hardness. Green maintained color; Peach began fading in UV light after 2 days.</p> <p><u>SLS&LA:</u> Maintained shape & size. Green maintained color; Peach began fading in UV light after 3 days. Peach maintained hardness; Green began softening after 6 weeks.</p> <p><u>TEA 99%:</u> Maintained shape, size and hardness. Green maintained color; Peach began fading after 4 days.</p>

Table 5. (cont'd)

Product Name	Bead Stability (10 Weeks)
<p>Florabeads RBW: Sandune (Natural) (other standard colors in process)</p>	<p>ALS: Maintained color, shape, size and hardness.</p> <p>Sunflower Oil: Maintained color, shape, size and hardness.</p> <p>Mineral Oil: Maintained color, shape, size and hardness.</p> <p>Water, pH 3: Maintained shape, size and hardness; began fading began in presence of UV light after 4 weeks.</p> <p>Water, pH 7: Maintained shape, size and hardness; began fading began in presence of UV light after 3 weeks.</p> <p>Water, pH 10: Maintained shape, size and hardness; began fading began in presence of UV light after 3 weeks.</p> <p>PG: Maintained color, shape, size and hardness.</p> <p>Ethanol: Maintained shape. Fading began after 5 days; softening began after 3 weeks.</p> <p>Standapol ES-2: Maintained color, shape, size and hardness.</p> <p>SLS: Maintained shape, size and hardness; began fading in presence of UV light after 2 weeks.</p> <p>SLS & LA: Maintained shape, size and hardness; began fading in presence of UV light after 6 weeks.</p> <p>TEA 99%: Maintained color, shape, size and hardness.</p>
<p>Metabeads Microwax: White (Natural) Red (other colors in process)</p>	<p>ALS: Maintained color, shape, size and hardness.</p> <p>Sunflower Oil: Maintained color, shape, size and hardness.</p> <p>Mineral Oil: Maintained color, shape, and size. Softening observed after 7 weeks.</p> <p>Water, pH 3: Maintained color, shape, size and hardness.</p> <p>Water, pH 7: Maintained color, shape, size and hardness.</p> <p>Water, pH 10: Maintained color, shape, size and hardness.</p> <p>PG: Maintained color, shape, size and hardness.</p> <p>Ethanol: Maintained color, shape, size and hardness.</p> <p>Standapol ES-2: Maintained color, shape, size and hardness.</p> <p>SLS: Sight fading in some colors after 7 weeks, maintained shape, size and hardness.</p> <p>SLS & LA: Maintained color, shape, size and hardness.</p> <p>TEA 99%: Maintained color, shape, size and hardness.</p>

3.2 Soft Sphere Products

Floratech makes free-flowing soft spheres from a variety of soft waxes. These products are described in Table 6. These soft spheres function to deliver emolliency and as “visual

actives” or carriers of “active” ingredients. These soft spheres can be pigmented to match standard or custom colors, as desired. Sphere softness can be adjusted to some extent to give longer or shorter playtime of the sphere on the skin before it is absorbed or disappears into the skin.

Soft spheres are available in several sizes ranging from 300 to 1700 microns. Florasomes and Floraspheres have three standard sizes. For Metasomes and Metaspheres, the standard sphere diameter is 1000 microns and any other size is considered a custom product. The technology used produces a sphere of fairly consistent diameter; soft beads cannot be mechanically sized (i.e., screened). Florabeads Silkies come in a particle size range of approximately 100 to 2000 microns.

Table 6. Soft Sphere Products

Florotech Trade Name	INCI Name of Wax Ingredient	Japanese Name (s)	Other Ingredients
Florabeads Silkies	Jojoba Esters	Partially Hydrogenated Jojoba Oil (and) Hydrogenated Jojoba Oil	Pigments and/or active ingredients
Florasomes Jojoba	Jojoba Esters	Partially Hydrogenated Jojoba Oil	Pigments and/or active ingredients
Floraspheres Jojoba	Jojoba Esters	Partially Hydrogenated Jojoba Oil	Pigments
Metasomes	Petrolatum (and) Polyethylene (and) Ethylhexyl Palmitate	Petrolatum (and) Polyethylene Wax (and) 2-Ethylhexyl Palmitate	Pigments and/or active ingredients
Metaspheres	Petrolatum (and) Polyethylene (and) Ethylhexyl Palmitate	Petrolatum (and) Polyethylene Wax (and) 2-Ethylhexyl Palmitate	Pigments

3.2.1 Soft Bead Product Efficacy Testing

Efficacy claims made regarding soft bead products are as follows:

- a. Fragrance Fixative Properties (4.3)
- b. Active Ingredient Verification, if applicable (4.4)

3.2.2 Full-Scale Production Information

This information applies to the full-scale use of soft spheres in gels and emulsion. The designated equipment was used during an actual production run of 360kg of Hand Sanitizer with Florasomes. 5000 units were filled on standard equipment using a single spout piston filler, capped, labeled, coded, and bulk packed. No extraordinary precautions were necessary to protect the soft spheres during any stage of the manufacturing or filling process.

Equipment:

- a. Phase tank (A) SS with propeller agitation.
- b. Hemispherical SS vessel (Groen). Agitation: side sweep with counter-rotating pitched blades.

- c. SS pails for phase C, D; diaphragm pump (Wilden) for recirculation deaeration, evacuation.

3.3 Liquid Oil-Soluble Products

Floratech makes several kinds of plant-derived oil-soluble products that are liquid at ambient temperatures. These products are described in Table 7. Floraesters products are jojoba-based. Floramac products are macadamia nut oil-based. Florasun products are high oleic sunflower seed oil-based.

Table 7. Liquid Oil-Soluble Products

Floratech Trade Name	INCI Name of Predominant Ingredient(s)	Japanese Name(s)	Other Ingredients
Floraesters 15	Jojoba Esters	Jojoba Oil	Tocopherol
Floraesters IPJ	Isopropyl Jojobate (and) Jojoba Alcohol (and) Jojoba Esters	Isopropyl Jojobate (and) Jojoba Alcohol (and) Jojoba Esters	Tocopherol
Floraesters Jojoba Oil (R/P ¹ & NR/P ² grades)	Simmondsia Chinensis (Jojoba) Seed Oil	Jojoba Oil	None
Floramac 10	Ethyl Macadamiate	Ethyl Oleate	Tocopherol (and) Malic Acid
Floramac Macadamia Oil	Macadamia Integrifolia Seed Oil	Macadamia Oil	Tocopherol
Florasun 90	Helianthus Annuus (Sunflower) Seed Oil	Sunflower Oil	Tocopherol

3.3.1 Liquid Oil-Soluble Product Efficacy Testing

Efficacy claims made regarding liquid oil-soluble products are as follows:

- a. Fragrance Fixative Properties (4.3)
- b. Hydrophile-Lipophile Balance (HLB) *Requirement* (4.5)
- c. Dropping Point (4.6)
- d. Oxidative Stability Index (OSI), in hours (4.7)
- e. Refractive Index (2.23.a)
- f. Slip Test (4.8.1)
- g. Solubility (4.16)
- h. Spreadability (4.9)
- i. Viscosity (4.14)

The results of claims testing for Floratech’s liquid oil-soluble products are contained in Table 8.

¹ Refined and Pasteurized

² Not Refined and Pasteurized

Table 8. Efficacy Test Results for Liquid Oil-Soluble Products

	Jojoba Oil	Floraesters 15	Floraesters IPJ	Floramac Macadamia Oil	Floramac 10	Florasun 90
HLB Requirement	6 – 7	6 – 7	5.5 – 7.5	7 – 8	4 – 8	6 – 7
Dropping Point	12 – 15°C	10 – 15°C	6 – 12°C	Liquid at RT ³	Liquid at RT	Liquid at RT
OSI	R/P: 70 NR/P: 30	70	95	100	85	60
Refractive Index @ 40°C	1.458 – 1.460	1.458 – 1.460	1.452 – 1.454	1.460 – 1.461	1.444 – 1.445	1.461 – 1.462
Slip, angle°	82	82.3	82.5	80.5	69.4	76.6
Solubility	Table 18	Table 18	Table 18	Table 19	Table 19	Table 19
Spreadability, %	28	30	30	20	32	20
Viscosity, cP @ 25°C	35 – 40	30 – 35	18 – 20	60 – 65	5 – 10	65 – 70

Additional efficacy testing has been done on selected liquid oil-soluble products. A summary of reports that are available is contained in Table 9.

Table 9. Additional Efficacy Reports for Liquid Oil-Soluble Products

Report Title	Product Tested	Report No.	Summary of Findings
The Efficacious Effect of Jojoba Oil on Cuticle and Fingernail Condition	<ul style="list-style-type: none"> Floraesters Jojoba Oil 	CSRI Project #98-085	Jojoba oil improved cuticle condition; sunflower oil showed little improvement.
The Efficacious Effect of Jojoba Oil to Penetrate and Persist in Stratum Corneum in Healthy Subjects: An Ultrastructural Microscopic Analysis	<ul style="list-style-type: none"> Floraesters Jojoba Oil 	CSRI Project #98-084	Jojoba oil demonstrated presence and persistence in the upper & lower anatomical regions of the stratum corneum.
Comedogenicity Study	<ul style="list-style-type: none"> Floraesters Jojoba Oil Floraesters IPJ 	CSRI Project #97-096	Statistically less comedogenic than positive control; not significantly different from negative control.
Phototoxicity	<ul style="list-style-type: none"> Floraesters Jojoba Oil Floraesters IPJ 	CSRI Project #97-097	Did not exhibit significant phototoxic potential when compared with the negative control.
Evaluation of the Effects of Jojoba Oils on Skin Moisturization and Barrier Function and Evaluation of Jojoba Oil's Substantivity	<ul style="list-style-type: none"> Floraesters Jojoba Oil 	HTR Project #98-101181-76	Jojoba significantly increased relative skin hydration compared to baseline readings, formed an occlusive barrier against evaporative water loss from the skin, which increased with time, and substantivity was significantly increased compared to the untreated site.

³ Room Temperature

Table 9. (cont'd)

Report Title	Product Tested	Report No.	Summary of Findings
Evaluation of the Effects of Jojoba Derivatives on Skin Moisturization and Barrier Function and Evaluation of Their Substantivity	<ul style="list-style-type: none"> • Floraesters IPJ • Floraesters Jojoba Oil 	HTR Project #98-101687-76	Induced significant improvement in relative skin hydration throughout the study. Found to be as substantive as the positive control (mineral oil) throughout the test.
Evaluation of Moisturization and Skin Smoothing Effects of Jojoba Oils	<ul style="list-style-type: none"> • Floraesters Jojoba Oil 	HTR Project #98-101182-76	Surface skin hydration was higher throughout the test. Jojoba oil tended to increase smoothness compared to untreated sites.
Skin Conditioning Effects of Shampoos with and without Jojoba Oil	<ul style="list-style-type: none"> • Floraesters Jojoba Oil 	HTR Project # 99-101952-76	There was a trend for shampoo containing jojoba oil to have higher relative skin hydration compared to the sites treated with shampoo that did not contain jojoba oil.
Dermatosensory Profile by a Trained Panel of Judges	<ul style="list-style-type: none"> • Floraesters Jojoba Oil 	HTR Report #93-3523-73	Jojoba oil left more slip on the skin than Floraesters 60. Petrolatum left more residues than jojoba oil following absorption. Jojoba oil left the skin with a treated feeling 30 minutes after absorption.
Evaluation of Floraesters Materials to Ameliorate Ultraviolet Light (UVL) Induced Erythema	<ul style="list-style-type: none"> • Floraesters IPJ • Floraesters 15 • Floramac Mac. Oil 	CSRI Project #97-077A	All test sites showed less erythema compared to the control (water).
Lipstick Evaluation	<ul style="list-style-type: none"> • Floraesters Jojoba Oil • Floraesters 15 	N/A	4.15

3.4 Solid Oil-Soluble Products

Solid oil-soluble products that Floratech makes are described in Table 10. Floraesters 20, 30, and 60 consist of soft, solid paste-like jojoba esters. Floraesters 70 is hard, solid wax-like jojoba-derived materials that are flaked or powdered for handling ease.

Table 10. Solid Oil-Soluble Products

Floritech Trade Name	INCI Name of Predominant Ingredients	Japanese Name(s)	Other Ingredients
Floraesters 20	Jjoba Esters	Partially Hydrogenated Jjoba Oil	Tocopherol
Floraesters 30	Jjoba Esters	Partially Hydrogenated Jjoba Oil	Tocopherol
Floraesters 60	Jjoba Esters	Partially Hydrogenated Jjoba Oil	Tocopherol
Floraesters 70	Jjoba Esters	Hydrogenated Jjoba Oil	None

3.4.1 Solid Oil-Soluble Product Efficacy Testing

Efficacy claims made regarding solid oil-soluble products are as follows:

- a. Fragrance Fixative Properties (4.3)
- b. HLB Requirement (4.5)
- c. Dropping Point (4.6)
- d. Oxidative Stability Index (OSI) in hours (4.7)
- e. Penetration (4.10)
- f. Slip Test (4.8.1)
- g. Solubility (4.16)

The results of claims testing for Floritech's solid oil-soluble products are contained in Table 11.

Table 11. Efficacy Test Results for Solid Oil-Soluble Products

	Floraesters 20	Floraesters 30	Floraesters 60	Floraesters 70
HLB Requirement	5.3 – 7.5	4.3 – 7.5	5.3 – 8.5	4.3 – 9.6
Melting Range	42 – 48°C	47 – 51°C	56 – 60°C	66 – 70°C
OSI, hours	130	165	200	675
Penetration, decimillimeter	Complete Penetration	26	10	0.8
Slip Test, angle°	<65	67	76	74
Solubility	Table 20	Table 20	Table 20	Table 20

Additional efficacy testing has been done on selected solid oil-soluble products. As summary of reports that are available is contained in Table 12.

Table 12. Additional Efficacy Reports for Solid Oil-Soluble Products

Report Title	Product Tested	Report Number	Summary of Findings
Comedogenicity Study	Floraesters 70	CSRI Project #97-096	Statistically less comedogenic than positive control; not significantly different from negative control (water).
Evaluation of the Effects of Jjoba Derivatives on Skin Moisturization and Barrier Function and Evaluation of Their Substantivity	Floraesters 20 Floraesters 30	HTR Project #98-101687-76	Induced significant improvement in relative skin hydration throughout the study.

Report Title	Product Tested	Report Number	Summary of Findings
Dermatosensory Profile by a Trained Panel of Judges	Floraesters 30 Floraesters 60	HTR Report #93-3523-73	FE-60 absorbed the fastest and was the least shiny. FE-30 left more slip on the skin. Mineral oil left more residues than FE-60 immediately following absorption. Petrolatum left more residues than mineral oil, FE-30, and FE-60 following absorption. Petrolatum left more residues than all other products at 10 minutes following absorption. FE-30 and FE-60 left the skin with a treated feeling 30 minutes after absorption.
Evaluation of the Efficacy of 4 Emollients to Improve Skin Condition	Floraesters 20 Floraesters 30 Floraesters 60 Floraesters 70	IRSI #1210RHN0794	FE-20, FE-30, and FE-60 demonstrated the ability to significantly reduce dryness, roughness, and flaking/scaling at all time points. FE-70 was able to significantly reduce flaking/scaling. Comparisons among the different Floraesters found that FE-20 seemed to perform the fastest in reducing dryness and roughness while FE-60 provided longer lasting benefits. NOVA meter results indicate that FE-30 demonstrates consistent increased skin surface water levels and performed best in this area. Dermaflex-A results showed all Floraesters tested were able to significantly improve (reduce) skin distensibility. Skin distensibility is inversely related to skin firmness (i.e., reduced distensibility indicates increased firmness). Skin replica analysis indicates that all product sites experienced significant reductions in fine lines at some point after application. FE-20 and FE-30 effectively reduced fine lines for up to one hour, after which they reached a plateau. FE-60 showed the most even reduction over time while FE-70 showed the greatest reduction between one and five hours.

Table 12. (cont'd)

Report Title	Product Tested	Report Number	Summary of Findings
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Evaluation of Floraesters to Ameliorate Peri-Ocular Fine Line Wrinkles	Floraesters 30	CSRI Project #97-079	FE-30 can ameliorate peri-ocular fine line wrinkles.
Evaluation of Floraesters Materials to Ameliorate Ultraviolet Light (UVL) Induced Erythema	Floraesters 30 Floraesters 60	CSRI Project #97-077A	All test sites showed less erythema compared to the control (water).
Lipstick Evaluation	Floraesters 20 Floraesters 30	N/A	4.15

3.5 Water-Soluble Products

Water-soluble products that Floratech makes are described in Table . Florasolvs PEG-10 Sunflower and PEG-16 Macadamia are both clear liquids at room temperature. Florasolvs PEG-80 Jojoba is a soft, solid paste. Florasolvs PEG-120 Jojoba PEG-150 Hydrogenated Jojoba is a hard wax-like material and is flaked for handling ease. Floraesters K-20W Jojoba is a viscous liquid.

Table 13. Water-Soluble “Oil-Free” Products

Floratech Trade Name	INCI Name of Predominant Ingredient	Japanese Name	Other Ingredients
Floraesters K-20W Jojoba	Hydrolyzed Jojoba Esters (and) Water (aqua)	Soap Base from Potassium Salts (and) Water	None
Floraesters K-100 Jojoba	Hydrolyzed Jojoba Esters (and) Jojoba Esters (and) Water (aqua)	Soap Base from Potassium Salts (and) Jojoba Oil (and) Water	None
Florasolvs PEG-10 Sunflower	PEG-10 Sunflower Glycerides	Polyoxyethylene (10) Glycerol Oleate	None
Florasolvs PEG-16 Macadamia	PEG-16 Macadamia Glycerides	Polyoxyethylene (16) Glycerol Oleate	None
Florasolvs PEG-80 Jojoba	Jojoba Wax PEG-80 Esters	Polyoxyethylene (80) Jojoba	None
Florasolvs PEG-120 Jojoba	Jojoba Wax PEG-120 Esters	Polyoxyethylene (120) Jojoba	None
Florasolvs PEG-150 Hydrogenated Jojoba	Jojoba Oil PEG-150 Esters		None

3.5.1 Water-Soluble “Oil-Free” Product Efficacy Testing

Efficacy claims pertaining to Floratech’s water-soluble products are as follows:

- a. Clarity in water (4.11)
- b. Foaming characteristics (4.12): foam test (4.12.1) and percent defoamed after 20 minutes (4.12.2)
- c. Fragrance Fixative Properties (4.3)
- d. HLB Number (4.13)
- e. Dropping Point (2.3.b)
- f. Refractive Index (2.3.a)
- g. Slip Test (4.8.2), using 5% Floratech material in 95% propylene glycol
- h. Solubility (4.16)
- i. Spreadability (4.9)
- j. Viscosity (4.14)
- k. Viscosity versus concentration (4.14.1)
- l. Viscosity versus pH (4.14.2)

m. Viscosity versus temperature (4.14.3)

The results of claims testing for Floratech's water-soluble products are contained in Table 14.

Table 14. Efficacy Test Results for Floratech Water-Soluble Products

Property:	Florasolvs PEG 10 Sunflower	Florasolvs PEG 16 Macadamia	Florasolvs PEG 80 Jojoba	Florasolvs PEG-120 Jojoba	Florasolvs PEG 150 Jojoba	Floraesters K-20W Jojoba	Floraesters K-100 Jojoba
Clear in water? (yes or no) If yes, up to what %?	No Cloudy at 0.2%	Yes Up to 50%	Yes Up to 50%	Yes Up to 50%	Yes Up to 5%	No	No
Foaming Properties @ pH=2-3 Foam Quantity % Defoamed after 20 min.	125 mL 20%	700 mL 20%	450 mL 10%	475 mL 15%	TBD	N/A ⁴	N/A ⁵
Foaming Properties @ pH=6-7 Foam Quantity % Defoamed after 20 min.	100 mL 0%	725 mL 20%	450 mL 5%	500 mL 5%	TBD	0 N/A	0 N/A
Foaming Properties @ pH=9-10 Foam Quantity % Defoamed after 20 min.	75 mL 25%	700 mL 20%	450 mL 5%	525 mL 10%	TBD	200 mL 25%	200 mL 25%
Fragrance Fixative	Yes	No	Yes	Yes	TBD	Yes	Yes
HLB Number	8-10	12-14	16-18	17-19	18.3	Solubilizes at all levels (4-20)	Solubilizes at all levels (4-20)
Dropping Point	Liquid at RT	Liquid at RT	50 – 55	50 – 55	55-60	N/A	N/A
Refractive Index @ 40°C	1.459 – 1.461	1.459 – 1.461	N/A	N/A	N/A	N/A	N/A
Slip Test, Angle° (5% in PG ⁶)	76.7	75.5	79.6	78.9	72.6	75.1	75.1
Solubility	Table 21	Table 21	Table 21	Table 21	Table 21	Table 22	Table 22
Spreadability, %	13	10	N/A	N/A	N/A	N/A	N/A
Viscosity vs. concentration in 1% water in 5% water in 10%water	10.9 21.2 96.4	10.1 13.5 20.0	11.0 12.8 17.0	11.2 13.7 23.3	1.4 1.8 3.6	1.3 1.3 1.3	1.3 1.3 1.3
Viscosity vs. pH @ 5% conc. at pH 2 – 3 at pH 6.5 – 7.5 at pH 9 – 10	75 cP 75 cP 90 cP	12 cP 12 cP 12 cP	13 cP 13 cP 13 cP	13 cP 13.3 cP 13.2 cP	1.9 1.9 1.9	N/A ⁷ 1.3 1.3	N/A 1.3 1.3
Viscosity (neat) vs. temperature at 25°C at 40°C	100 – 105 cP 50 -55 cP	40 cP 55 cP	Solid at both temps.	Solid at both temps.	Solid at both temps.	N/A ⁸	Solid at both temps.

Additional efficacy testing has been done on selected liquid oil-soluble products. A summary of reports that are available is contained in Table 15.

⁴ Floraesters K-20W Jojoba breaks down at low pH

⁵ Floraesters K-100 Jojoba breaks down at low pH

⁶ Propylene Glycol

⁷ Floraesters K-20W Jojoba breaks down at low pH

⁸ Floraesters K-20W Jojoba shears due to thixotropic properties

Table 15. Additional Efficacy Reports for Water-Soluble Floratech Products

Report Title	Product Tested	Report Number	Summary of Findings
The Effect of Jojoba Oil on the Conditioning of Hair in Human Subjects – A Microscopic Study	Florasolvs PEG-120 Jojoba	CSRI Project #98-106	Majority of the subjects using the jojoba conditioner had an increased smoothness of the hair surface. The majority of the subjects using the control showed no increased smoothness of the hair surface.
Evaluation of the Effects of Jojoba Derivatives on Skin Moisturization and Barrier Function and Evaluation of Their Substantivity	Florasolvs PEG-120 Jojoba	HTR Project #98-101687-76	Induced significant decrease in skin hydration throughout the study.
Summary of Nova meter test comparing or astringent with and without K-20W / K-100	Floraesters K-20W Jojoba; Floraesters K-100 Jojoba	"Built to Last" article (S&C Nov. 2001)	Astringent with K-20W or K-100 shows significant increase in skin hydration.
Summary of Nova meter test comparing protective lotion with and without K-20W / K-100	Floraesters K-20W Jojoba; Floraesters K-100 Jojoba	"Built to Last" article (S&C Nov. 2001)	Lotion with K-20W or K-100 shows significant increase in skin hydration.
Summary of Nova meter test comparing makeup with and without K-20W / K-100	Floraesters K-20W Jojoba; Floraesters K-100 Jojoba	"Built to Last" article (S&C Nov. 2001)	Makeup containing K-20W or K-100 shows significant increase in skin hydration.
Modified Rubine Dye Test	Floraesters K-20W Jojoba; Floraesters K-100 Jojoba	"Built to Last" article (S&C Nov. 2001)	Improved performance of quats most of the time.

4. Test Methods

4.1 Emollient Deposition

This method determines whether an exfoliative deposits emollient residue on the skin when rubbed onto the skin. The exfoliative is rubbed onto a subject's skin, the area is extracted with a solvent, and the solvent is analyzed for the ester composition or fatty acid profile (as applicable) of the exfoliative. The results of this test are reported as a "yes" or "no" for emollient deposition (i.e., the results are not quantified).

4.2 Bead Stability

This method (2.1.i) is a "torture test" used to determine the ability of Florabeads products and any incorporated pigments or "active" materials to withstand extreme conditions. The bead/sphere product is mixed neat with a matrix of commonly used cosmetic ingredients. For a period of time, the samples are checked for bleeding, fading, softening, swelling, etc. This allows us the ability to inform customers in advance of conditions where one type of bead/sphere product may work better than another does. This information can also be used to investigate problems a customer may have using our hard beads.

4.3 Fragrance Fixative Properties

Some raw materials have the ability to make fragrances adhere to the skin longer before the fragrance is volatilized. This capability is measured using a gas chromatography (GC) method (2.2.c) where the presence of a standard in a specific formula is determined. The last point at which the standard is present in a detectable quantity is given in hours. Dermacryl[®] 79 (a National Starch product advertised to be a fragrance fixative) had a Fragrance Adherence Capability of 5 hours. Dermacryl 79 is a high molecular weight, hydrophobic carboxylated acrylic copolymer.

4.4 Active Ingredient Verification

Because some active ingredients are susceptible to degradation when exposed to heat and other processing conditions, Floratech has developed methods to determine quantitative presence of certain active ingredients incorporated into Florasomes or Metasomes. The tests available to date are specified in Table 16. These methods can be used to confirm quantity of a certain amount of active ingredient. This method can also be used to confirm quantitative presence of an active ingredient after a storage period.

Table 16. Active Ingredient Verification

Active Ingredient	Test Method
Ascorbyl Palmitate	2.1.f
Tocopheryl Acetate	2.1.e

4.5 HLB Requirement

The hydrophilic-lipophilic balance (HLB) “requirement” is defined as the amount of surfactant required to make an oil-soluble product remain in solution (2.1.b). Each oil or wax to be emulsified has a “required” HLB number, indicating the surfactant HLB (4.13) necessary to give good emulsification. By choosing surfactants with HLB values appropriate for emulsifying any given oil system, trial and error effort is reduced and optimum performance is usually obtained rapidly. HLB requirement is determined in accordance with TW10 (2.1.b).

4.6 Dropping Point

Dropping point is determined using a variety of methods, depending on the form of the raw material. If dropping point or range is required on the certificate of analysis or product specification, the method used will be indicated on either document. The methods used to determine melting range of products reported in this document are referenced in the applicable section.

4.7 Oxidative Stability Index

OSI is a relative test that measures a material’s rate of degradation at an elevated temperature (110°C) when compared to other materials tested at the same temperature (2.3.b). An inflection point is generated and that inflection point is the length of time it took (reported in hours) for a material to degrade to an unusable state. The longer the time, the more oxidatively stable the material. The results reported are for the product “as sold” (i.e., containing the antioxidants used in the manufacture of the product). Floratech has found that, in general (for raw materials stored in nitrogen capped

containers), 10 to 20 OSI hours equals a shelf life of one year at room temperature in the original unopened container.

This method cannot be used on water-soluble PEG products or on materials containing water. This method can also be used for finished goods that do not contain water and for the oil-soluble fraction of a product (e.g., the oil phase of a lotion).

4.8 Slip Test

4.8.1 Oil Soluble Products

Slip test (or lubricity) of oil soluble products is determined by measuring the minimum angle at which a weight on a surface coated with a given material will travel. The smaller the angle (or reported value) the more slip or lubricity a material possesses. Floratech's method (2.2.d) gives relative results. As a point of reference, castor oil has a slip angle of degrees; isopropyl myristate has a slip angle of 79.6 degrees (parallel to horizon = 90.066.) 82.9.

4.8.2 Water Soluble Products

The slip properties of water soluble products is determined as described in 4.8.1 except that a solution of 5% Floratech product and 95% propylene glycol is measured. This is done because the slip of these products tends to be low. The dilution allows the slip of these low-slip products to be measured and compared. The slip value of propylene glycol by itself is 14.4.

4.9 Spreadability

Spreadability is defined as the relative amount that a raw material spreads at a given temperature. Our tests are conducted at room temperature (2.2.b) A specific amount of raw material is applied to a certain type of filter paper (which has been weighed). After a designated time, the outline created by the raw material on the filter paper is drawn in with a pencil. The excess filter paper is trimmed away and the remaining filter paper is weighed. The more the raw material spreads, the larger the area of filter paper that is wetted. This test gives relative results. As a point of reference, castor oil has a spreadability value of 7%; isopropyl myristate has a spreadability value of 32%.

4.10 Penetration

Penetration is determined using a penetrometer (2.4.a) with a 100 gram load. A specific type of probe is used to penetrate the wax. The depth that the probe penetrates a wax-like material is measured in decimillimeters. The softer the wax, the deeper the probe will penetrate.

4.11 Clarity in Water

This method ascertains whether a water-soluble product is clear when dissolved in water. It also determines what level a material can be dissolved in water and remain clear. In general, if a material is clear when mixed in water, it is more likely that one can formulate a clear product using the material.

4.12 Foam Characteristics

4.12.1 Foam Test

This method is used to ascertain the amount of foam generated under specific conditions in accordance with 2.4.b. The volume of foam produced (on a percent basis) is determined and reported. This test is conducted at pH ranges of 2-3, 6-7, and 9-10.

4.12.2 Percent Defoamed After 20 Minutes

This method is used to ascertain how much foam dissipates after 20 minutes. After foam is generated (4.12.1), the percent reduction in foam volume is measured after 20 minutes. This test is conducted at pH ranges of 2-3, 6-7, and 9-10.

4.13 HLB Number

The HLB System (2.1.b) simplifies the choice of surfactants to meet emulsion formulation requirements. It is based on the balance between the hydrophilic and the lipophilic proportions that give each surfactant its functionality. In the HLB System, the hydrophilic-lipophilic balance of each surfactant has a distinctive number, which is its HLB number.

4.14 Viscosity

Viscosity measurements were taken of all Floratech products that are liquids at room temperature (2.3.c). The measurements were taken at 25°C and are reported in centipoise (cP). A Brookfield Model RV-DV-E was used with spindle #1 at an appropriate rotating speed.

4.14.1 Viscosity at Different Concentrations

This method is used to ascertain the change in viscosity of a water-soluble product at different concentrations in a given formula. At concentrations of 1, 5, and 10 percent, Brookfield viscosity measurements are obtained. This test will indicate whether a raw material has the potential to change the viscosity of a finished product if a change is made in concentration of the raw material.

4.14.2 Viscosity at Different pH Values

This method is used to ascertain the change in viscosity of a water-soluble product at different pH levels in a given formula. At pH values of 2-3, 6.5-7.5, and 9-10, Brookfield viscosity measurements are obtained. This test will indicate whether the raw material has the potential change viscosity of a finished product under certain pH conditions.

4.14.3 Viscosity at Different Temperatures

This method is used to ascertain the change in viscosity of a water-soluble product at different temperatures in a given formula. At temperatures of 20°C, 30°C, 40°C and 50°C, Brookfield viscosity measurements are obtained. This test will indicate whether a raw material has the potential to change the viscosity of a finished product at elevated temperatures.

4.15 Lipstick Evaluation

A basic lipstick formula was modified to compare the differences among lipsticks containing identical concentrations of jojoba oil, Floraesters 15, Floraesters 20, or Floraesters 30 (Table). In the four formulas, 15% of the castor oil was replaced in each formula with either jojoba oil, Floraesters 15, Floraesters 20, or Floraesters 30 to evaluate their individual effects on the formulation.

Table 17. Lipstick Evaluation Formula

Phase	Trade Name	Jojoba Oil	FE-15	FE-20	FE-30	
A.	Castor Oil (CasChem)	41.0	41.0	41.0	41.0	
	Floraesters Jojoba Oil	15.0	0	0	0	
	Floraesters 15	0	15.0	0	0	
	Floraesters 20	0	0	15.0	0	
	Floraesters 30	0	0	0	15.0	
	Floraesters 70	1.0	1.0	1.0	1.0	
	Carnauba Wax #1 Yellow (Strahl & Pitsch)	4.0	4.0	4.0	4.0	
	Candelilla Wax (Strahl & Pitsch)	5.0	5.0	5.0	5.0	
	Beeswax (Strahl & Pitsch)	3.5	3.5	3.5	3.5	
	Microcrystalline Wax (Strahl & Pitsch)	4.0	4.0	4.0	4.0	
	Propylparaben	0.1	0.1	0.1	0.1	
	Cabosil M-5 (Cabot)	0.2	0.2	0.2	0.2	
	B.	Castor Oil (CasChem)	13.0	13.0	13.0	13.0
		Arlacel P-100 (Uniqema)	0.5	0.5	0.5	0.5
Titanium Dioxide (Noveon)		5.5	5.5	5.5	5.5	
Red Iron Oxide – 3511 (Noveon)		4.0	4.0	4.0	4.0	
Red 30, Noveon – 3130 (Noveon)		2.5	2.5	2.5	2.5	
FD&C Blue #1, Aluminum Lake (Sensient Food Colors)		0.1	0.1	0.1	0.1	
Black Iron Oxide – 3070 (Noveon)		0.5	0.5	0.5	0.5	
C.	Covi-Ox T-70 (Cognis)	0.1	0.1	0.1	0.1	
TOTAL		100.0	100.0	100.0	100.0	

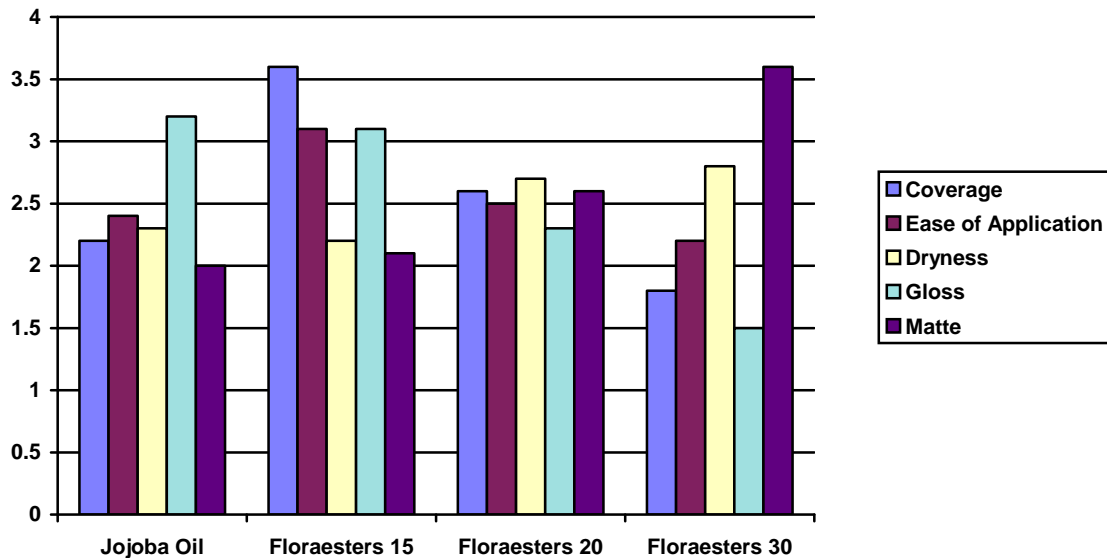
1. Combine ingredients of Phase A and heat to 85°C with moderate agitation.
2. Combine Phase B and pass 2 times through a 3-roll mill. Add Phase B to Phase A with propeller
3. Cool batch to 75°C, add Phase C and mix with propeller agitation. Fill lipstick mold as soon as possible.

A panel of 12 people was requested to evaluate the four lipsticks for the following attributes:

- | | | |
|----------|--------------------------|------------------------|
| a. Gloss | c. Dryness | e. Ease of Application |
| b. Matte | d. Lip Contour Precision | f. Coverage |

A questionnaire was completed by each panelist to document the findings. Figure 1 illustrates the results. This figure demonstrates that if a glossier, more easily applied lipstick with better coverage is desired, then Floraesters 15 and jojoba oil is an ideal candidates. If a longer wearing, matte lipstick with the capability to draw a more precise line is preferred, then Floraesters 30 contributes these desirable attributes.

Figure 1. Lipstick Evaluation



4.16 Solubility

The method for determining solubility (sometimes referred to a “compatibility”) is described in detail in the **New Product Introduction SOP** (2.1.i). Basically, the product to be tested is heated (if not a liquid at room temperature) and mixed at 10:90, 50:50, and 90:10 ratios with the diluent (a matrix of commonly used cosmetic ingredients). If the resulting mixture is clear and single phase, it is considered soluble (●). If the resulting mixture is cloudy but single phase, it is considered partially soluble (Ⓟ). If the resulting mixture is two phases, it is considered not soluble (Ⓢ). Table 18, Table 19, Table 20, Table 21 and Table 22, contain the results available to date.

Table 18. Solubility Results for Floraesters Liquid Oil-Soluble Products

	Floraesters Jojoba Oil			Floraesters 15			Floraesters IPJ		
	10:90	50:50	90:10	10:90	50:50	90:10	10:90	50:50	90:10
Floraesters with:									
Acetone	●	●	●	●	●	●	●	●	●
Butylene Glycol	○	○	○	○	○	○	○	○	○
Caprylic/Capric Triglyceride	●	●	●	●	●	●	●	●	●
Castor Oil	○	●	●	●	●	●	●	●	●
Cyclomethicone	●	●	●	●	●	●	●	●	●
Decyl Glucoside	○	○	○	○	○	○	○	○	○
Decyl Oleate	●	●	●	●	●	●	●	●	●
Dimethicone	○	○	○	○	○	○	○	○	○
Ethyl Acetate	●	●	●	●	●	●	●	●	●
Ethyl Alcohol	○	○	○	○	○	○	●	●	●
Floraesters IPJ	●	●	●	●	●	●	---	---	---
Glycerine	○	○	○	○	○	○	○	○	○
Isononyl Isononanoate	●	●	●	●	●	●	●	●	●
Isopropyl Alcohol	●	●	●	●	●	●	●	●	●
Isopropyl Myristate	●	●	●	●	●	●	●	●	●
Isopropyl Palmitate	●	●	●	●	●	●	●	●	●
Jojoba Oil	---	---	---	●	●	●	●	●	●
Lanolin Oil	●	●	●	●	●	●	●	●	●
Mineral Oil	●	●	●	●	●	●	●	●	●
Mink Oil	●	●	●	●	●	●	●	●	●
Octyldodecyl Stearoyl Stearate	●	●	●	●	●	●	●	●	●
Oleyl Alcohol	●	●	●	●	●	●	●	●	●
Polysorbate 20	○	○	○	○	○	○	○	○	○
Polysorbate 80	○	○	○	○	○	○	●	●	Ⓟ
PPG-15 Stearyl Ether	●	●	●	●	●	●	●	●	●
Propylene Glycol	○	○	○	○	○	○	○	○	○
Sodium Lauryl Sulfate, 30% solution	Ⓟ	Ⓟ	○	○	○	○	○	○	○
Sorbitol	○	○	○	○	○	○	○	○	○
Vegetable Oils:									
Canola Oil	●	●	●	●	●	●	●	●	●
Macadamia Oil	●	●	●	●	●	●	●	●	●
Sunflower Oil	●	●	●	●	●	●	●	●	●
Safflower Oil	●	●	●	●	●	●	●	●	●
Water, pH 2-4 and 10-12	○	○	○	○	○	○	○	○	○

● = Soluble, Ⓟ = Partially Soluble, ○ = Insoluble

Table 19. Solubility Results for Floramac and Florasun Liquid Oil-Soluble Products

Floramac/Florasun with:	Floramac Macadamia Oil			Floramac 10			Florasun 90		
	10:90	50:50	90:10	10:90	50:50	90:10	10:90	50:50	90:10
Acetone	●	●	●	●	●	●	●	●	●
Butylene Glycol	○	○	○	○	○	○	○	○	○
Caprylic/Capric Triglyceride	●	●	●	●	●	●	●	●	●
Castor Oil	●	●	●	●	●	●	●	●	●
Cyclomethicone	●	●	●	●	●	●	●	●	●
Decyl Glucoside	○	○	○	●	○	○	○	○	○
Decyl Oleate	●	●	●	●	●	●	●	●	●
Dimethicone	○	○	○	●	●	○	○	○	○
Ethyl Acetate	●	●	●	●	●	●	●	●	●
Ethyl Alcohol	○	○	○	●	●	●	○	○	○
Floraesters IPJ	●	●	●	●	●	●	●	●	●
Glycerine	○	○	●	○	○	○	○	○	○
Isononyl Isononanoate	●	●	●	●	●	●	●	●	●
Isopropyl Alcohol	●	●	●	●	●	●	●	●	●
Isopropyl Myristate	●	●	●	●	●	●	●	●	●
Isopropyl Palmitate	●	●	●	●	●	●	●	●	●
Jobba Oil	●	●	●	●	●	●	●	●	●
Lanolin Oil	●	●	●	●	●	●	●	●	●
Mineral Oil	●	●	●	●	●	●	●	●	●
Mink Oil	●	●	●	●	●	●	●	●	●
Octyldodecyl Stearoyl Stearate	●	●	●	●	●	●	●	●	●
Oleyl Alcohol	●	●	●	●	●	●	●	●	●
Polysorbate 20	○	○	○	●	○	○	○	○	○
Polysorbate 80	●	○	○	●	●	○	●	○	○
PPG-15 Stearyl Ether	●	●	●	●	●	●	●	●	●
Propylene Glycol	○	○	○	○	○	○	○	○	○
Sodium Lauryl Sulfate, 30% solution	○	○	○	○	○	○	○	○	○
Sorbitol	○	○	○	○	○	○	○	○	○
Vegetable Oils:									
Canola Oil	●	●	●	●	●	●	●	●	●
Macadamia Oil	---	---	---	●	●	●	●	●	●
Sunflower Oil	●	●	●	●	●	●	---	---	---
Safflower Oil	---	---	---	---	---	---	---	---	---
Water, pH 2-4 and 10-12	○	○	○	○	○	○	○	○	○

● = Soluble, ○ = Insoluble

Table 20. Solubility Results for Solid Floraesters Oil-Soluble Products

Floraesters with:	Floraesters 20			Floraesters 30			Floraesters 60			Floraesters 70		
	10:90	50:50	90:10	10:90	50:50	90:10	10:90	50:50	90:10	10:90	50:50	90:10
Acetone	○	○	○	○	○	○	○	○	○	○	○	○
Butylene Glycol	○	○	○	○	○	○	○	○	○	○	○	○
Caprylic/Capric Triglyceride	●	●	●	●	●	●	●	●	●	●	●	●
Castor Oil	○	●	●	○	●	●	○	○	○	○	○	○
Cyclomethicone	●	●	●	●	●	●	●	●	●	●	●	●
Decyl Glucoside	○	○	○	○	○	○	○	○	○	○	○	○
Decyl Oleate	●	●	●	●	●	●	●	●	●	●	●	●
Dimethicone	○	○	○	○	○	○	○	○	○	○	○	○
Ethyl Acetate	○	○	○	○	○	○	○	○	○	○	○	○
Ethyl Alcohol	○	○	○	○	○	○	○	○	○	○	○	○
Floraesters IPJ	●	●	●	●	●	●	●	●	●	●	●	●
Glycerine	○	○	○	○	○	○	○	○	○	○	○	○
Isononyl Isononanoate	●	●	●	●	●	●	●	●	●	●	●	●
Isopropyl Alcohol	○	○	○	○	○	○	○	○	○	○	○	○
Isopropyl Myristate	●	●	●	●	●	●	●	●	●	●	●	●
Isopropyl Palmitate	●	●	●	●	●	●	●	●	●	●	●	●
Joboba Oil	●	●	●	●	●	●	●	●	●	●	●	●
Lanolin Oil	●	●	●	●	●	●	○	○	○	●	●	●
Mineral Oil	●	●	●	●	●	●	●	●	●	●	●	●
Mink Oil	○	○	○	○	○	○	○	○	○	○	○	○
Octyldodecyl Stearoyl Stearate	●	●	●	●	●	●	●	●	●	●	●	●
Oleyl Alcohol	●	●	●	●	●	●	●	●	●	●	●	●
Polysorbate 20	○	○	○	○	○	○	○	○	○	○	○	○
Polysorbate 80	○	○	○	○	○	○	○	○	○	○	○	○
PPG-15 Stearyl Ether	●	●	●	●	●	●	●	●	●	●	●	●
Propylene Glycol	○	○	○	○	○	○	○	○	○	○	○	○
Sodium Lauryl Sulfate, 30% solution	○	○	○	○	○	○	○	○	○	○	○	○
Sorbitol	○	○	○	○	○	○	○	○	○	○	○	○
Vegetable Oils:												
Canola Oil	●	●	●	●	●	●	●	●	●	●	●	●
Macadamia Oil	●	●	●	●	●	●	●	●	●	●	●	●
Sunflower Oil	●	●	●	●	●	●	●	●	●	●	●	●
Safflower Oil	●	●	●	●	●	●	●	●	●	●	●	●
Water, pH 2-4 and 10-12	○	○	○	○	○	○	○	○	○	○	○	○

● = Soluble, ○ = Insoluble

Table 21. Solubility Results for K-Series

	<u>K-20 W Jojoba</u>			<u>K-100 Jojoba</u>		
	10:90	50:50	90:10	10:90	50:50	90:10
Butylene Glycol	Ⓟ	○	○	○	○	○
Caprylic/Capric/ Triglyceride	Ⓟ	○	○	○	○	○
Castor Oil	○	○	○	○	○	○
Cyclomethicone	○	○	○	○	○	○
Decyl Glucoside	●	Ⓟ	○	○	○	○
Decyl Oleate	○	○	○	○	○	○
Dimethicone	○	○	○	○	○	○
Ethyl Alcohol	●	●	○	●	●	Ⓟ
Floraesters IPJ	Ⓟ	Ⓟ	○	●	●	○
Glycerine	●	●	○	●	○	○
Isononyl Isononanoate	Ⓟ	○	○	○	○	○
Isopropyl Alcohol	●	●	●	○	●	●
Isopropyl Myristate	Ⓟ	○	○	○	○	○
Isopropyl Palmitate	○	○	○	○	○	○
Jojoba Oil	○	○	○	○	○	○
Lanolin Oil	○	○	○	○	○	○
Mineral Oil	○	○	○	○	○	○
Mink Oil	○	○	○	○	○	○
Octyldodecyl Stearoyl Stearate	○	○	○	○	○	○
Oleyl Alcohol	○	○	○	●	●	○
Polysorbate 20	●	●	○	●	Ⓟ	○
Polysorbate 80	●	○	Ⓟ	●	Ⓟ	○
PPG-15 Stearyl Ether	○	○	○	○	○	○
Propylene Glycol	●	Ⓟ	○	●	●	○
Sodium Laureth Sulfate 30% soln.	●	Ⓟ	○	○	○	○
Sorbitol	●	○	○	○	○	○
Vegetable Oil: Canola Oil	○	○	○	○	○	○
Water:	Ⓟ	Ⓟ	Ⓟ	○	○	○

● = Soluble, Ⓟ = Partially Soluble, ○ = Insoluble

Table 22. Solubility Results for Water-Soluble Florasolvs Products

Florasolvs PEG-150:	PEG-10 Sunflower			PEG-16 Macadamia			PEG-80 Jojoba			PEG-120 Jojoba			PEG-150 Jojoba		
	10:90	50:50	90:10	10:90	50:50	90:10	10:90	50:50	90:10	10:90	50:50	90:10	10:90	50:50	90:10
	@ 25°C			@ 25°C			@ 65°C			@ 65°C			@ 65°C		
Acetone	●	●	●	●	●	●	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	●	●	●
Butylene Glycol	○	○	●	○	○	●	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	●	●	●
Caprylic/Capric Triglyceride	○	○	●	Ⓟ	Ⓟ	●	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	○	○	●
Castor Oil	●	●	●	●	●	●	●	Ⓟ	Ⓟ	●	Ⓟ	Ⓟ	●	●	●
Cyclomethicone	○	○	Ⓟ	○	○	○	○	○	○	○	○	○	○	○	○
Decyl Glucoside	●	●	○	●	●	Ⓟ	●	Ⓟ	Ⓟ	Ⓟ	Ⓟ	○	●	●	○
Decyl Oleate	○	●	●	○	○	●	Ⓟ	Ⓟ	Ⓟ	○	○	○	○	○	○
Dimethicone	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Ethyl Acetate	●	●	●	●	●	●	Ⓟ	Ⓟ	○	Ⓟ	Ⓟ	Ⓟ	●	●	●
Ethyl Alcohol	●	●	●	●	●	●	Ⓟ	Ⓟ	○	Ⓟ	Ⓟ	Ⓟ	●	●	●
Floraesters IPJ	○	Ⓟ	●	○	Ⓟ	●	○	○	○	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ
Glycerine	○	○	○	○	○	○	●	●	○	Ⓟ	Ⓟ	Ⓟ	●	●	●
Isononyl Isononanoate	○	Ⓟ	●	Ⓟ	●	●	○	○	○	○	○	○	○	○	●
Isopropyl Alcohol	●	●	●	●	●	●	●	Ⓟ	○	Ⓟ	Ⓟ	Ⓟ	●	●	●
Isopropyl Myristate	○	○	●	Ⓟ	●	●	○	○	○	○	○	○	○	○	●
Isopropyl Palmitate	○	○	●	○	●	●	○	○	○	○	○	○	○	○	○
Jojoba Oil	○	○	●	○	○	Ⓟ	○	○	○	○	○	○	○	○	○
Lanolin Oil	●	●	●	○	○	○	Ⓟ	○	○	○	○	○	○	○	○
Mineral Oil	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Octyldodecyl Stearoyl Stearate	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○
Oleyl Alcohol	●	●	●	●	●	●	●	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	●	●	●
Polysorbate 20	●	●	●	●	●	●	●	●	Ⓟ	Ⓟ	Ⓟ	Ⓟ	●	●	●
Polysorbate 80	●	●	●	●	●	●	●	●	Ⓟ	Ⓟ	Ⓟ	Ⓟ	●	●	●
PPG-15 Stearyl Ether	●	●	●	●	●	●	○	○	○	○	○	○	○	○	○
Propylene Glycol	Ⓟ	●	●	Ⓟ	●	●	●	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	●	●	●
Sodium Lauryl Sulfate, 30% solution	●	●	●	●	●	●	●	●	Ⓟ	●	Ⓟ	Ⓟ	●	○	○
Sorbitol	●	○	Ⓟ	○	○	○	Ⓟ	Ⓟ	○	○	○	○	○	○	○
Sunflower Oil	○	○	●	○	○	●	Ⓟ	○	○	○	○	○	●	●	●
Water	○	○	●	●	●	●	●	●	Ⓟ	●	●	Ⓟ	●	●	●

● = Soluble, Ⓟ = Partially Soluble, ○ = Insoluble

