February 6, 2014 rev.

Biologically Active, Plant-Derived Emulsifiers

Distinctive Emul-Lipid Emulsifiers are a unique, "bio-mimetic", oil-in-water emulsifiers and skin care bases that offer a natural choice for improving product stability and performance while minimizing the potential of bio-incompatibility and irritation. They are derived from plant origin and can be formulated into a wide variety of o/w emulsions.



BENEFITS

- Hydrating/Moisturizing
- Cosmetic anti-aging benefits
- Unique sensory properties
- Unique "mini-emulsification" properties
- Improved product stability

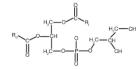
- Rebalances cellular homeostasis
- PEG-free
- Highly skin compliant
- 100% Plant Origin (Non-GMO)
- Protective

Distinctive® Emul-Lipid BA

INCI

ACTIVE STRUCTURES

Polyglyceryl-10 Mono/Dioleate (and) Polyglyceryl-3 Oleate (and) Glycerin (and) Phosphatidylglycerol



A human-identical phosphatidylglycerol lipid supports antiaging through biological signaling of aquaporine 3 and keratinocyte homeostasis. It emulsifies high oil phases, and is excellent for preparing thin emulsions and lotions with a fresh soft skin feel. Human gene expression studies have confirmed activation of skin regenerative, anti-inflammatory and cellular moisture pathways. Distinctive® Emul-lipid BA also can improve delivery of cosmetic active ingredients with its high skin absorbing capabilities.

Distinctive® Emul-Lipid LB

Hydrogenated Lecithin (and) Behenyl Alcohol (and)

Palmitic Acid

A bio-mimicking emulsifier capable of structuring both humectants and oils into crystal-like moisture layers provides barrier protection and sustained hydration for skin. As demonstrated in sensory consumer studies this ingredient is excellent for applications in moisture-rich creams and serums.

Distinctive® Emul-Lipid ST

Glycine Soja (Soybean) Sterols (and) Glyceryl

Cocoate

A low HLB co-emulsifier provides photo-protection and antiaging benefits with plant sterols which naturally mimic skin cholesterol structures. Distinctive® Emul-lipid ST is recommended with use in combination with Distinctive® Emul-lipid BA and it can be formulated with other emulsifiers to improve formulation stability.





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Distinctive® Emul-Lipid BA

Emul-Lipid BA is recommended for use in thin/low-viscosity emulsions where stability may be challenging. It offers unique biological interactions for anti-aging, calming irritated skin, and skin hydration applications enabling the creation of base formulations which re-balance skin's natural regenerative processes, and support delivery of actives ingredients. Emul-Lipid BA contains Phosphatidylglycerol (PG), an important constituent of cell membranes. Research suggests PG offers a regenerative signaling pathway that prompts skin cells regulate cell proliferation and differentiation.

TYPICAL PROPERTIES

Appearance Color Odor Specific Gravity Liquid
Dark Yellow to Light Brown
Characteristic
0.99 – 1.10

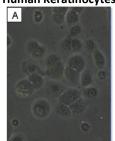
IN-VITRO STUDIES: Emul-lipid BA vs. Emul-lipid Control (No PG)

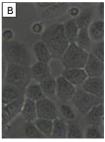
Human Gene Expression of Distinctive® Emul-lipid BA

			·
TABLE II	Modulation of wr	t pathway genes by	0.05% EMU-BA with phosphatidylglycerol, as compared to EMU-CTR (without phosphatidylglycerol).
Position on array	Symbol	Fold Regulation vs. EMU CTR	Comments
C06	FRAT1	3.6	Activator of Wnt canonical signaling through inhibition of GSK-3.
C10	FZD2	2.0	Increased in differentiated tissues (Choi et al., 2008). Accordingly, Frizzled 2 increases the intracellular Ca^{2+} level, consistently with the role of this ion in keratinocyte differentiation (Niu et al., 2012).
D03	FZD8	7.3	Frizzled 8 decreases with age in progenitor cells. Its upregulation may "rejuvenate" these cells, making them more capable of tissue regeneration (Brunt et al., 2012).
D06	JUN	2.4	Jun is a target of Wnt canonical pathway. Jun is an early differentiation marker (Blatti & Scott, 1992; Murray et al., 2013) and an effector of TGF-beta – a key effector in skin homeostasis.
D07	KREMEN1	-2.1	Kremen 1 (Krm1) is a negative regulator of the canonical Wnt signaling pathway.
E09	SFRP1	2.2	SFRP1 Induces differentiation, inhibits proliferation of epithelial cells and negatively regulates Wnt pathway.
F10	WNT10A	2.1	Induced by TGF-beta. Activator of WNT/β-catenin signaling. WNT10A, in addition to the formation of teeth and hair follicles, is of importance for the formation of nails, regeneration of the epidermis, papillae of the tongue and sweat gland function. Loss of function results in dry skin, abnormal hair patterns and nail malformations (Nawaz et al., 2009).
G10	WNT7B	2.0	Wnt7b plays an important role in stem cell homeostasis and in the tissue repair and regeneration (Lin et al., 2010; Kandyba et al., 2013).

8 out of 84 genes on the Wnt PCR array panel were differentially expressed by Emul-lipid BA. The directionality of the modulation indicates a controlled increase of expression of Wnt genes involved in proliferative/proregenerative progenitor cell homeostasis (FZD8, WNT7b, WNT10a), as well as cell differentiation (FZD2, JUN), consistent with morphological changes observed microscopically (Fig. 2). This increase may be balanced by the negative regulator SFRP1, itself a powerful pro-differentiation effector. In conclusion, Emul-lipid BA is a bioactive material with progenitor (basal layer stem) cell - normalizing and skin -regenerative benefits, which could result in improved overall skin homeostasis.

Epidermal Human Keratinocytes Grown to a Differentiated State





Epidermal human keratinocytes grown in the presence of (A) Control and (B) Emullipid BA . Note the organized tight junctions between cells grown in the presence of Emul-lipid BA suggestive of a differentiated state, while cells in (A) are more scattered and isolated from each other, possibly geared towards further migration and/or proliferation (original mag. X100).



IN-VITRO STUDIES: Emul-lipid BA vs. Polysorbate 80

Collagen I Stimulation & Mitochondrial Metabolism in Human Dermal Fibroblasts

TABLE II Test Material	Type I Collagen (% Control)	p value	Mitochondrial Metabolism (% Control)	p value
H2O	100	1	100	1.000
Emu-BA 0.5% (5mg/ml)	60	0.000	84	0.028
Emu-BA 0.1% (1mg/ml)	51	0.000	81	0.007
Emu-BA 0.02% (200µg/ml)	102	0.712	107	0.202
PS80 0.5% (5mg/ml)	3	0.000	N/A	0.000
PS80 0.1% (1mg/ml)	3	0.000	12	0.000
PS80 0.02% (200µg/ml)	4	0.000	42	0.000
MAP	156	0.000	111	0.069

Emul-lipid BA is a non-disruptive emulsifier

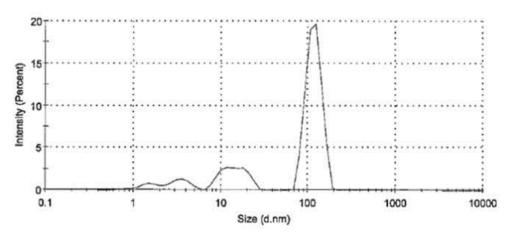
Modulating Hydration Related and Inflammatory Genes

TABLE II Gene expression in EMU-BA relative to EMU-CTR	,		
	AQP3	COX1	COX2 (PGS2)
Fold regulation	1.68	-1.07	-2.0

While the constitutively-expressed COX1 was not affected by Emul-lipid BA, the inducible proinflammatory COX2 was inhibited by Emul-lipid BA, while AQP3 was upregulated, as compared to the phosphatidylglycerol-free placebo Control

IN-VITRO STUDIES: Evaluation of Droplet Size in Emulsion





Emul-lipid BA produces stable miniemulsions



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THIN SERUM Formula: RON19-44					
PHASE	INGREDIENT	% BY WEIGHT			
A A A B B B B B B B	Water Cetyl Hydroxyethylcellulose Glycerin Xanthan Gum Butylene Glycol Distinctive® Emul-Lipid BA (RON) Cetyl Alcohol Dimethicone Butyrospermum Parkii (Shea) Butter Caprylic/Capric Triglyceride Vegelight 1214LC (RON) Dicaprylyl Ether Distinctive® Emul-Lipid ST (RON) Diocide	qs 0.15 3.00 0.20 3.00 4.00 2.00 2.00 3.00 3.00 5.00 1.00 1.00	 To the main vessel, add water and begin mixing with a propeller mixer Add Cetyl Hydroxyethylcellulose and heat to 70°C-75°C. Premix Glycerin, Butylene Glycol and Xanthan Gum and add to batch In a side container, combine Phase B ingredients and heat to 75-80°C Add Phase B to Phase A, mix 15 minutes, until uniform Begin cooling batch. At 40°C, add Phase C. Mix until uniform. Cool to Room Temperature Viscosity: 3600 cps 		



DISTINCTIVE® EMUL-LIPID BA SUNSCREEN Formula: RON20-30					
PHASE	INGREDIENT	% BY WEIGHT			
A A A A B B B B B B B C D	Water Cetyl Hydroxyethylcellulose Glycerin Xanthan Gum Disodium EDTA Citric Acid (25% solution) Distinctive® Emul-Lipid BA (RON) C12-15 Alkyl Benzoate Ethylhexyl Methoxycinnamate Butyl Methoxydibenzoylmethane Homosalate Ethylhexyl Salicylate Vegelight 1214LC (RON) Glyceryl Cocoate Behenyl Behenate Cetyl Alcohol Tocopheryl Acetate Phenoxyethanol (and) Ethylhexylglycerin	q.s. 0.15 3.00 0.20 0.10 0.04 6.00 4.00 7.50 2.00 10.00 3.00 3.00 0.70 0.50 0.50 0.50 1.00 100.00	• • • • • • • • • • • • • • • • • • • •	To the main vessel, add water and begin mixing with a propeller mixer Add Cetyl Hydroxyethylcellulose and heat to 70°C-75°C. Mix at 75°C until fully hydrated Premix Glycerin, Butylene Glycol and Xanthan Gum and add to batch. Add Disodium EDTA In a side container, combine Phase B ingredients and heat to 75-80°C Add Phase B to Phase A, mix 5 – 10 minutes, until uniform. Homogenize batch for 5 minutes at 75°C Switch to propeller mixer and begin cooling batch At 40°C, add Phase C. Mix until uniform At 40°C, add Phase D. Mix until uniform Cool to Room Temperature Viscosity: 3500 – 4000 cps pH: 5.00 – 5.50	



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Distinctive® Emul-Lipid LB

Ecocert compliant, Distinctive® Emul-Lipid LB is the natural choice for improving product stability and performance. It is compatible with liposomes and allows the formulation of stable cosmetic formulations without the use of additional emulsifiers, surfactants, gums or thickeners. Ideal for the formulation of O/W emulsions, Distinctive® Emul-Lipid LB provides for a luxurious, full bodied product. By forming a complex of lipids, fatty acids and fatty alcohols, it facilitates the coating and stabilization of oil droplets with the formation of sheet-like structures. This lamellar network in the continuous phase offers improved stability and creates a unique, rich texture.

TYPICAL PROPERTIES

Appearance Solid wax

Color Off-white to light brown

Phospholipids 18.0-22.0%
Peroxide Value 3.0 meq/g Max.
Acid Value 62 mg/g Max.
Iodine Value 3 mg/g Max.
Moisture 2.0% Max.
pH (4%) 4.5-6.5

FORMULATION GUIDELINES

Recommended use level

Add to water phase and heat to 75-80°C. Do not heat above 85°C, as this may cause product to

darken.

4-6%

SELF ASSESSMENT CONSUMER STUDY

A panel of 108 consumers completed a survey after using the Moisture Intense Serum (RON 15-96-1)

Use Period: 2 weeks Age Range: all with 75.9% between 30-49 years old

Ethnicity: all with 75.5% Caucasian Skin Type: all with 55.1% normal/combination, and 40.2% dry to very dry

Results:

- The Moisture Intense Serum is gentle to my skin: Over 97 % of respondents Agree or Strongly Agree that the Serum is Gentle on skin
- After using the Moisture Intense Serum, my skin feels well hydrated: Over 94 % of respondents Agree or Strongly Agree that skin was Well Hydrated after using the Serum
- After using the Moisture Intense Serum, my skin feels smoother and softer: Over 94% of respondents Agree or Strongly Agree that skin feels Smoother and Softer
- Based on my experience with the Moisture Intense Serum, I would recommend it to friends and family: Over 93% of respondents Agree or Strongly Agree that they would share the news
- Overall how satisfied are you with the performance of the Moisture Intense Serum: Over 94% of respondents are Extremely or Somewhat Satisfied with the Serum performance
- Compared to other serums that you have tried in the past, the Moisture Intense Serum gave you results that are:
 Over 72% of respondents found the serum Somewhat or Significantly Better than Serums they've tried in the past

Conclusion: The findings strongly support that the Moisture Intense Serum formulated with Distinctive® Squalane Butter 45 is a highly desirable product for gentleness, sensory, and hydration skin care benefits yielding a very high overall panelist satisfaction score of over 94%



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	MOISTURE I	NTENSE SERUM	Formula: RON15-96-1
PHASE	INGREDIENT	% BY WEIGHT	
A A A A B B B B B	Water Propanediol Xanthan Gum Glycerin Distinctive® Emul-Lipid LB (RON) Dimethicone Cetyl Alcohol Isododecane Distinctive® Squalane Butter 45 (RON) Butyrospermum Parkii (Shea) Butter C12-15 Alkyl Benzoate Preservative	qs 3.00 0.30 10.00 4.00 1.00 0.50 4.00 5.00 2.00 2.00 qs 100.00	 To the main veropropeller mixer Premix Propane Begin heating to While heating, a At 75-80°C, add for 20 minutes hydrated In a side contain 75-80°C Add Phase B to P Begin cooling bat to room temperate

- To the main vessel, add water and begin mixing with a propeller mixer
- Premix Propanediol and Xanthan Gum and add to batch. Begin heating to 75-80°C
- While heating, add Glycerin
- At 75-80°C, add Distinctive® Emul-Lipid LB. Mix at 75-80°C for 20 minutes or until Distinctive® Emul-Lipid LB is fully
- In a side container, combine Phase B ingredients and heat to 75-80°C
- Add Phase B to Phase A, mix 15 minutes, until uniform.
- Begin cooling batch. At 40°C, add Phase C ingredients. Cool to room temperature



EXFOLIATING CLEANSER Formula: RON16-29-4					
PHASE	INGREDIENT	% BY WEIGHT			
A A A B B C D E	Water Aloe Barbadensis Powder Xanthan Gum Glycerin Distinctive® Emul-Lipid LB (RON) Canola Oil Cetearyl Alcohol Distinctive® Squalane Butter 45 (RON) Sodium Cocoyl Isethionate Sodium Polyacrylate Preservative Fragrance Scrubbing Beads/Exfoliant	qs 0.10 0.20 8.00 5.00 1.50 3.00 2.00 2.00 0.80 qs qs qs qs 100.00	 To the main vessel, add water and begin mixing with a propeller mixer Begin heating to 75-80°C. Premix Xanthan Gum and Glycerin. While heating, add Phase A ingredients, one at a time Mix at 75-80°C for 20 minutes or until Distinctive® Emul-Lipid LB is fully hydrated. In a side container, combine Phase B ingredients and heat to 75-80°C Add Phase B to Phase A, mix 15 minutes, until uniform. Begin cooling batch At 35°C, add Phase C. Mix until uniform At 30°C, add Phase D. Mix until uniform. Homogenize, if necessary before adding Phase F ingredients Add Phase F ingredients. Mix until uniform 		



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SHIMMERING CREAM Formula: RON16-31-2					
PHASE	INGREDIENT	% BY WEIGHT			
A A B B B C C D	Water Glycerin Distinctive® Emul-Lipid LB (RON) DC Odyssey Oil (RON) Helianthus Annuus (Sunflower) Seed Oil Coco-Caprylate/Caprate Cetearyl Alcohol Distinctive® Squalane Butter 45 (RON) Distinctive® Oat (RON) Preservative Fragrance Sodium Polyacrylate	q.s. 5.00 5.00 3.00 2.00 2.00 2.30 4.00 3.00 q.s. q.s. 0.45	 To the main vessel, add water and begin mixing with a propeller mixer Begin heating to 75-80°C. While heating, add Phase A ingredients, one at a time Mix at 75-80°C for 20 minutes or until Distinctive® Emul-Lipid LB is fully hydrated In a side container, combine Phase B ingredients and heat to 75-80°C. Add Phase B to Phase A, mix 15 minutes, until uniform Begin cooling batch At 35°C, add Phase C ingredients. Mix until uniform. At 30°C, add Phase D. Mix until uniform Cool to Room Temperature 		



FACE FINISHING MOISTURIZER Formula: RON16-37 PHASE INGREDIENT % BY WEIGHT Water Α • To the main vessel, add water and begin mixing with a Α Glycerin 4.00 propeller mixer. Begin heating to 75-80°C. While heating, Distinctive® Emul-Lipid LB (RON) Α 4.00 add Phase A ingredients, one at a time. В Cetyl Palmitate 1.50 Mix at 75-80°C for 20 minutes or until Distinctive® Emul-Lipid В Coco-Caprylate/Caprate 2.00 LB is fully hydrated В Helianthus Annuus (Sunflower) Seed Oil 2.00 In a side container, combine Phase B ingredients and heat to В Cetearyl Alcohol 2.00 75-80°C В Distinctive® Squalane Butter 45 (RON) 2.00 Add Phase B to Phase A, mix 15 minutes, until uniform. C Distinctive® Oat (RON) 2.00 Begin cooling batch C **Gransil PSQ (RON)** 2.00 At 35°C, add Phase C ingredients, one at a time, mixing well C Sodium Polyacrylate (and) Dimethicone (and) 2.00 between each addition. Mix until uniform. Cyclopentasiloxane (and) Trideceth-6 (and) At 30°C, add Phase D. Mix until uniform PEG/PPG-18/18 Dimethicone At 30°C, add Phase E. Mix until uniform D DC Instalift Goji (RON) 1.00 At 30°C, add Phase F. Mix until uniform. Homogenize if Ε Preservative qs necessary Ammonium Acryloyldimethyltaurate/VPCopolymer 0.45 100.00



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	LIQUID CRYST	AL SQUALANE CREA	VI Formula: RON15-73
PHASE	INGREDIENT	% BY WEIGHT	
Α	Water	qs	To the main ver
Α	Propanediol	3.00	propeller mixer.
Α	Xanthan Gum	0.30	 Premix Propaneo
Α	Glycerin	10.00	Begin heating to
Α	Distinctive® Emul-Lipid LB (RON)	5.00	 While heating, a
В	Dimethicone	1.00	• At 75-80°C, add
В	Cetyl Alcohol	0.50	for 20 minutes of
В	Isododecane	4.00	hydrated
В	Distinctive® Squalane Butter 45 (RON)	5.00	• In a side contain
В	Butyrospermum Parkii (Shea) Butter	2.00	to 75-80°C. Add
В	C12-15 Alkyl Benzoate	2.00	uniform. Begin co
С	Preservative	<u>qs</u> 100.00	• At 35°C, add

- To the main vessel, add water and begin mixing with a propeller mixer.
- Premix Propanediol and Xanthan Gum and add to batch. Begin heating to 75-80°C
- While heating, add Glycerin
- At 75-80°C, add Distinctive® Emul-Lipid LB. Mix at 75-80°C for 20 minutes or until Distinctive® Emul-Lipid LB is fully hydrated
- In a side container, combine Phase B ingredients and heat to 75-80°C. Add Phase B to Phase A, mix 15 minutes, until uniform. Begin cooling batch
- At 35°C, add Phase C ingredients. Cool to room temperature















COOLING CRÈME Formula: RON16-40					
PHASE	INGREDIENT	% BY WEIGHT			
A A A A B B B C C C C D	Water Aloe Barbadensis Leaf Juice Distinctive® Oat (RON) Glycerin Distinctive® Emul-Lipid LB (RON) Stearic Acid Dimethicone Cetyl Palmitate Coco-Caprylate/Caprate Butyrospermum Parkii (Shea) Butter Caprylic/Capric Triglyceride Tocopheryl Acetate Gransil PSQ (RON) Preservative Fragrance Liquid Ice BG (RON) Ammonium Acryloyldimethyltaurate/VP Copolymer	q.s. 0.10 1.50 3.00 4.00 0.90 1.50 1.00 2.00 1.50 0.50 0.80 q.s. q.s. 1.00	 To the main vessel, add water and begin mixing with a propeller mixer Begin heating to 75-80°C. While heating, add Phase A ingredients, one at a time Mix at 75-80°C for 20 minutes or until Distinctive® EmulLipid LB is fully hydrated In a side container, combine Phase B ingredients and heat to 75-80°C Add Phase B to Phase A, mix 15 minutes, until uniform. Begin cooling batch At 35°C, add Phase C ingredients. Mix until uniform At 30°C, add Phase D ingredients. Mix until uniform Cool to Room Temperature 		
		100.00			



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Distinctive® Emul-Lipid ST

Emul-Lipid ST is a unique "bio-mimetic" moisturizer, rich in phytosterols and humectants. Phytosterols, or plant sterols, are fat-like compounds found in plant oils. In personal care, these naturally-occurring substances mimic the effects of cholesterol to condition and repair damaged skin and hair. Studies show that phytosterols are effective in preventing the formation of wrinkles. By inhibiting matrix metalloproteinases (MMPs), phytosterols protect and encourage new collagen production while normalizing turnover of skin cells. They provide anti-oxidant protection and help restore the skin barrier properties to prevent against drying, photo-ageing and damage from other environmental aggressors.

SOYBEAN PHYTOSTEROLS AND SKIN BARRIER RECOVERY*

Percentage of barrier recovery (P.B.R.) obtained one day, three days, and seven days after tape stripping for stripped skin sites treated with white and SPS formulations or not treated (control)



Spectrophotometric evaluation of skin barrier recovery was conducted after topical application of soybean phytosterols. Results clearly show positive benefits on skin repair after damage.

TYPICAL PROPERTIES

Appearance Color Odor Soft Wax Orange - Yellow Characteristic

SQUALANE BARRIER MILK Formula: RON19-63					
PHASE	INGREDIENT	% BY WEIGHT			
PHASE A A B B C C D D E E E	Water Cetyl Hydroxyethylcellulose Glycerin Xanthan Gum Butylene Glycol Lexgard Natural Sodium Benzoate Citric Acid 25% solution Distinctive® Emul-Lipid BA (RON) C14-C22 Alkane Dicaprylyl Ether	9.5. 0.15 1.00 0.10 5.00 1.20 0.20 0.15 6.00 8.00 8.00	•	To the main vessel, add water and begin mixing with a propeller mixer Add Cetyl Hydroxyethylcellulose and heat to 70-75°C Premix Phase B ingredients and add to batch at 75°C Add Phase C ingredients and mix until uniform. Add Phase D and mix until uniform In a side container, combine Phase E ingredients and heat to 70-75°C Add Phase E to main vessel mix 5 - 10 minutes, until uniform Homogenize batch for 5 minutes at 70°C	
E	Squalane	5.00	•	Switch to propeller mixer and begin cooling batch Cool to Room Temperature	
E	Farnesol	3.00	•	Cool to Room Temperature	
E	Distinctive® Emul-Lipid ST (RON)	0.70			

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100.00



^{*}Reference: In vivo spectrophotometric evaluation of skin barrier recovery after topical application of soybean phytosterols, .J Cosmet Sci. 2008 May-Jun;59(3):217-24.