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NOTE:

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September 2022

**Enhanced
Performance**
Through Applied
Innovation



ELEMENTIS

A global specialty chemicals company



Personal Care Formulary

Performance and Sensorial Modifiers for Sun Care





Introduction

Sunscreen systems are often exposed to extreme conditions, yet must consistently deliver the active ingredient to provide uniform protection.

At the same time, consumers are becoming savvier than ever when it comes to skin care products, and sun care is no exception. Sustainably sourced, natural ingredients in addition to multi-functional benefits like protection from UV and blue lights, smooth skin feel, instant glow, tanning effects and moisturizing are trending.

In response to today's consumers' needs for clean and safe beauty products, Elementis offers ingredients and formulations that allow customers to go beyond just UV protection and solve their formulating challenges.

BENTONE® clay technology offers multiple benefits for today's sun care formulations beyond predictable rheology control and heat stability, such as enhanced SPF protection and water resistance. Furthermore, BENTONE® clays are naturally derived and meet highest sustainability requirements.



Benefits of BENTONE GEL®.
BENTONE® LUXE & BENTONE
HYDROCLAY™

Products of the BENTONE GEL® series form extremely stable W/O emulsions with the ability to create a variety of textures. Formulations apply easily without leaving a greasy film on the skin while enabling very uniform coverage of the skin.

Emulsifying gels of the BENTONE® LUXE series can additionally create cold processable water-in-oil systems with very high oil content, ideal for reaching highest SPF performance. Both systems boost SPF and water resistance of sun care formulations.

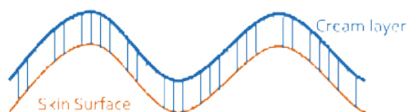
Products of the BENTONE HYDROCLAY™ series are up to 100% natural and address consumer's needs of COSMOS approved and vegan ingredients. They create a strong network that boosts stability of O/W emulsions, making them a natural in suspending mineral UV filters while providing heat resilient rheology.



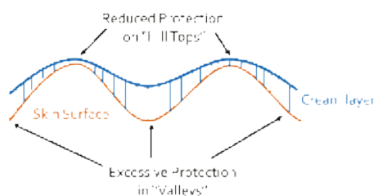
Improved Application

When an emulsion is applied to the skin, it will ideally create a uniform layer covering the skin surface as shown below.

Cream layer immediately after application



Cream layer after "Sagging" or "Slumping"

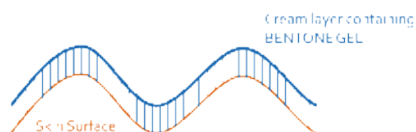


After application, many emulsions begin to pool in valleys, leaving an uneven film on the skin surface. This can be eliminated by the addition of BENTONE® hectorite clay products.

BENTONE® products exhibit shear thinning and thixotropic flow behavior. At low shear rates, the hectorite platelets are in a three-dimensional gel network structure, thus creating a high viscosity medium. With the increase in shear rate, the platelets orientate in the direction of flow, causing a decrease in viscosity. On removal of shear, the reformation of the gel structure occurs at a reduced rate than the deformation, thus producing a system with thixotropic flow



behavior. The thixotropic flow provided by Bentone® hectorite clay products create a uniform layer of protection on the surface of the skin.



For product formulation and processing, BENTONE® technology helps to stabilize products, even at elevated temperatures.

For sunscreens with inorganic actives, it efficiently suspends the particulates. It provides oil and aqueous phase viscosity building, rheology modification and thixotropic flow. Its rheological properties allow sunscreen formulators to create products giving thick and even skin coverage, ultimately leading to enhanced sun protection and water resistance performance.



Raw material approved by
ECOCERT GREENLIFE
in accordance with
the COSMOS standard.

HYDROPHILIC CLAYS

BENTONE HYDROCALY™ 550
BENTONE HYDROCLAY™ 900
BENTONE HYDROCLAY™ 1100
BENTONE HYDROCLAY™ 2000
BENTONE HYDROCLAY™ 2100

Magnesium Aluminum Silicate
Hectorite, Hydroxyethylcellulose
Magnesium Aluminum Silicate
Hectorite
Hectorite

LIPOPHILIC CLAYS

BENTONE GEL® GTCC

Caprylic/Capric Triglyceride, Stearalkonium Hectorite,
Propylene Carbonate

BENTONE GEL® HS V

C13-15 Alkane, Distearidimonium Hectorite, Alcohol

BENTONE GEL® TN V

C12-15 Alkyl Benzoate, Stearalkonium Hectorite, Propylene
Carbonate

For more BENTONE GEL® products, please consult our selector guide

SPECIALTY EMULSIFYING CLAY SYSTEMS

BENTONE® LUXE WN

Caprylic/Capric Triglyceride, Stearalkonium Hectorite,
Polyglyceryl-3 Diisostearate, Polyglyceryl-3 Polyricinoleate

BENTONE® LUXE WO

Polyglyceryl-6 Polyricinoleate, Polyglyceryl-3 Diisostearate,
Distearidimonium Hectorite

BENTONE® LUXE WS

Cyclopentasiloxane, PEG-10 Dimethicone, Distearidimonium
Hectorite

BENTONE® LUXE XO

C13-15 Alkane, Distearidimonium Hectorite, Polyglyceryl-3
Polyricinoleate

ACTIVE INGREDIENTS

MEADOWESTOLIDE®

Meadowfoam Estolide

MEADOWLACTONE®

Meadowfoam Delta-Lactone

Day Damage Defense Cream SPF 25 (predicted), PA+++

F-2066-02

Thanks to BENTONE HYDROCLAY™ 2100, which stabilizes the emulsions and suspends actives, this daily wear facial cream has a light sensory texture allowing a smooth and even application while giving a dry touch after-feel. The cream has a proposed SPF 25 with PA+++, which helps to protect damage from the sun.

Phase	Ingredient	INCI	%w/w
A	1,2 Propandiol	Propandiol	4.00
	BENTONE HYDROCLAY™ 2100 ¹	Hectorite	1.50
B		Deionized Water	52.50
C	Eusolex 2292 ²	Ethylhexyl Methoxycinnamate	7.00
	Eusolex OCR ²	Octocrylene	4.50
	Eusolex OS ²	Ethylhexyl Salicylate	4.50
	KF-96-L 2CS ³	Dimethicone	4.00
	Tegin Pellets MB ⁴	Glyceryl Stearate SE	4.00
	Finsolv TN ⁵	C12-15 Alkyl Benzoate	3.00
	Eusolex 9020 ²	Butyl Methoxydibenzoylmethane	2.50
	Tego Alkanol 1618 ⁴	Cetearyl Alcohol	1.50
	Euxyl PE 9010 ⁶	Phenoxyethanol (and) Ethylhexylglycerin	1.00
D			
E		Citric Acid	q.s.

1 Elementis 2 Merck 3 Shin Etsu 4 Evonik 5 Innospec 6 Schülke Mayr

SPECIFICATIONS

Viscosity: DV-II. Spindle 6, 10 rpm, 42,000 cp

Appearance: White cream, pH: 6.8-7.2

PROCEDURE:

1. Premix Phase A.
2. Add Phase A to Phase B with propeller stirring and heat to 75°C.
3. Combine Phase C and heat to 75°C.
4. Add Phase C to combine Phase A/B with propeller stirring.
5. Homogenize for a few seconds.
6. Add Phase C with propeller mixing.
7. Cool to room temperature with propeller stirring.
8. Add Phase D.
9. Adjust pH using Phase E.



Marshmallow Melt Sunscreen SPF 15 (predicted)

S-2010-02

This melty marshmallow cream provides a light application and broad-spectrum sunscreen giving daily protection and moisturization. It has an in vitro SPF of 15 and FDA Broad UVA protection. BENTONE HYDROCLAY™ 900 provides stability, body and texture, while giving a smooth glide onto the skin. MEADOWESTOLIDE® improves the moisture barrier of the skin.

Phase	Ingredient	INCI	%w/w
A		Deionized Water	66.00
	1.2 Propandiol ¹	1.2 Propandiol	1.00
	Edeta BD ²	Disodium EDTA	0.10
	SunCroma Red 40 ³	CI 16035 (1% in Water)	0.10
B	Eusolex HMS ⁴	Homosalate	9.00
	Cetiol CC ²	Dicaprylyl Carbonate	5.00
	Eusolex OS ⁴	Ethylhexyl Salicylate	5.00
	Emulgade 1000 NI ²	Cetearyl Alcohol, Ceteareth-20	4.00
	Eusolex OCR ⁴	Octocrylene	3.00
	Eusolex 9020 ²	Butyl Methoxydibenzoylmethane	2.00
	BENTONE HYDROCLAY™ 900⁵	Hectorite, Hydroxyethylcellulose	1.50
	Tegin M Pellets ⁶	Glyceryl Stearate	1.00
	MEADOWESTOLIDE®⁵	Meadowfoam Estolide	0.20
C	1% HyaCare in Water ⁶	Sodium Hyaluronate	1.00
	Euxyl PE9010 ⁷	Phenoxyethanol, Ethylhexylglycerin	1.00
	Candy Girl ⁸	Perfume	0.10

1 Alfa Aesar 2 BASF 3 Sun Chemical 4 Merck 5 Elementis 6 Evonik 7 Schülke Mayr 8 Spinnrad

SPECIFICATIONS

Viscosity: DVII, Spindle 6, 20 rpm, 15,800 cP

Appearance: Pink cream, pH: 5.5-6.0

PROCEDURE:

1. Combine Phase A and heat to 75-80°C with stirring.
2. Heat Phase B to 75-80°C and add to Phase A using a Silverson homogeniser. Mix for 10 minutes, maintaining temperature.
3. Transfer to a Propeller stirrer and cool to below 30°C.
4. Add Phase C and mix until uniform.
5. At ambient temperature, adjust the pH if necessary to 5.5-6.0



Solar Skin Frosting, SPF 15 (predicted), PA++

S-2006-02

The SPF 15 Solar Skin Frosting features a light, bouncy texture and applies beautifully to the skin. In this formulation, BENTONE® LUXE WN acts as the sole emulsifier, allowing cold-processability. Its excellent suspension of UV-filters boosts SPF and water resistance.

Phase	Ingredient	INCI	%w/w
A	Eusolex 2292 ¹	Ethylhexyl Methoxycinnamate	5.00
	Finsolv TN ²	C12-15 Alkyl Benzoate	5.00
	Eusolex OCR ¹	Octocrylene	3.10
	Cetiol CC ³	Dicaprylyl Carbonate	1.80
	Uvinul A Plus Granular ⁴	Diethylamino Hydroxybenzoyl Hexylbenzoate	1.50
B	BENTONE® LUXE WN⁵	Caprylic/Capric Triglyceride, Stearalkonium Hectorite, Polyglyceryl-3 Diisostearate, Polyglyceryl-3 Polyricinoleate	10.00
C		Deionized Water	68.00
	1.2 Propanediol ⁶	Propanediol	2.00
	Euxyl PE 9010 ⁷	Phenoxyethanol, Ethylhexylglycerin	0.50
		Sodium Chloride	0.50
	FD&C Red No. 40 SunCroma C37-4393 ⁸	CI 16035 (1% Solution in Water)	0.40
D	Cherry Blossom ⁹	Fragrance	0.20

1 Merck 2 Innospec 3 BASF 4 Shin Etsu 5 Elementis 6 VWR 7 Schülke Mayr 8 Sun Chemical 9 Spinnrad

SPECIFICATIONS

Viscosity: DV-II Spindle 6 2.5 rpm, 230,000 cp

Appearance: Thick, pink cream

PROCEDURE:

1. Combine Phase A and heat to 75°C with stirring until completely dissolved. Remove from heat.
2. Add Phase B to A with propeller mixing until homogenous.
3. Combine Phase C and mix until completely dissolved.
4. Add Phase C to A/B slowly and in small portions with propeller mixing.
5. Add Phase D with propeller mixing.



Dry Touch Mineral Sunscreen SPF 25, PA+++

S-2012-02

Say bye-bye to greasy, sticky sunscreen! The outstanding stabilizing power of our BENTONE® LUXE XO, in combination with the high oil content, utilizes particle suspension, providing this Dry Touch Mineral Sunscreen a light texture and excellent wear resistance.

Phase	Product	Ingredient	%w/w
A	Cetiol CC ¹	Dicaprylyl Carbonate	20.00
	Jolee 7750 ²	Isoamyl Laurate	15.00
B	Z-Cote HP-1 ³	Zinc Oxide, Triethoxycaprylsilane	15.00
	Parsol TX ⁴	Titanium Dioxide, Silica, Dimethicone	1.80
C	BENTONE® LUXE XO⁵	C13-15 Alkane, Polyglyceryl-3 Polyricinaoleate, Disteardimonium Hectorite	10.00
D		Deionized Water	30.00
		Propandiol	1.00
	Geogard 221 ⁶	Dehydroacetic Acid, Benzyl Alcohol	1.00
		Sodium Chloride	0.50

1 BASF 2 Oleon 3 BASF 4 DSM 5 Elementis 6 Arxada

SPECIFICATIONS

Viscosity: DV-II, Spindle 6, 10 rpm, 16,400 cP

Appearance: Thick white cream

PROCEDURE:

1. Combine Phase A and mix until uniform.
2. Add Phase B to Phase A with Silverson homogenizer and mix for 5 minutes.
3. Add Phase C to Phase A/B using a Silverson homogenizer and mix for 5 minutes until uniform.
4. Combine Phase D and mix until dissolved.
5. Transfer Phase A/B/C to a propeller stirrer and add Phase D slowly a little at a time, ensuring uniform mixing in between addition of more. Continue mixing for 5-10 minutes after the entire phase has been added.



Hybrid Sun Lotion SPF 50+, PA+++

S-2015-02

The Hybrid Sun Lotion glides on the skin, offering utmost protection by using globally approved UV-filters. BENTONE® LUXE XO is the sole emulsifier, allowing for hot and cold processing. It is providing excellent stabilization from low to extremely high oil load systems.

Phase	Product	Ingredient	%w/w
A	Palmester 3575 ¹	Caprylic/Capric Triglyceride	19.50
	Eusolex OCR ²	Octocrylene	10.00
	Eusolex OS ²	Ethylhexyl Salicylate	5.00
	Eusolex 2292 ²	Ethylhexyl Methoxycinnamate	3.00
B	Z-Cote HP-1 ³	Zinc Oxide, Triethoxycaprylylsilane	25.00
C	BENTONE® LUXE XO⁴	C13-15 Alkane, Polyglyceryl-3 Polyricinoleate, Disteardimonium Hectorite	10.00
D		Deionized Water	25.00
		Propandiol	1.00
	Geogard 221 ⁵	Dehydroacetic Acid, Benzyl Alcohol	1.00
		Sodium Chloride	0.50

1 KLK Oleon 2 Merck 3 BASF 4 Elementis 5 Arxada

SPECIFICATIONS

Viscosity: DV-II+, Spindle 6, 10 rpm, 16,800 cP

Appearance: White lotion

PROCEDURE:

1. Combine Phase A and mix until uniform.
2. Add Phase B to Phase A with a Silverson homogenizer and mix for 15 minutes.
3. Add Phase C to Phase A/B and Silverson homogenize until uniform.
4. Combine Phase D and mix until Sodium Chloride has dissolved.
5. Transfer to a propeller stirrer and add Phase D to Phase A/B/C slowly a little at a time, ensuring uniform mixing in between addition.
6. Continue stirring for 15 minutes.



Mineral UV Shield Broad Spectrum SPF 30 (predicted)

S-4001-04

A pure mineral sunscreen cream in W/O format that gives broad spectrum UV protection. This water in oil formulation utilizes the BENTONE GEL® TN V for external phase thickening to stabilize the Zinc Oxide, while using BENTONE HYDROCLAY™ 2100 in the internal water phase to help ensure an even distribution of the Titanium Dioxide.

Phase	Ingredient	INCI	%w/w
A		Water	30.90
	Eusolex T-EASY ¹	Titanium Dioxide, Silica, Cetyl Phosphate	7.50
		Magnesium Sulfate	0.70
B	Glycerin USP 99.5 PCT ²	Glycerin	4.00
	BENTONE HYDROCLAY™ 2100³	Hectorite	0.50
	Keltrol CG-T ⁴	Xanthan Gum	0.10
C	Euxyl PE 9010 ⁵	Phenoxyethanol, Ethylhexylglycerin	0.80
		Citric Acid (10% Water Solution)	q.s.
D	Cetiol AB ⁶	C12-15 Alkyl Benzoate	20.00
	Cetiol CC ⁶	Dicaprylyl Carbonate	10.00
	BENTONE GEL® TN V³	C12-15 Alkyl Benzoate, Stearalkonium Hectorite, Propylene Carbonate	5.00
	Emulium Illustro ⁷	Polyglyceryl-6 Polyhydroxystearate, Polyglyceryl-6 Polyricinoleate	4.50
	Antaron V-216 ⁵	VP/Hexadecene Copolymer	1.00
E	Z-Cote HP1 ⁶	Zinc Oxide, Triethoxycaprylsilane	15.00

1 Merck KGaA 2 Palmedia 3 Elementis 4 CP Kelco 5 Ashland 6 BASF 7 Gattefossé

SPECIFICATIONS

Viscosity: DV-II. Spindle T-D @ 6rpm 107,000 cps

Appearance: White cream

PROCEDURE:

1. Combine Phase A, homogenize for 5 minutes until uniform.
2. Combine Phase B. Add Phase B to Phase A using a propeller mixer and mix at a high speed until uniform.
3. Add Phase C to Phase A/B.
4. Combine Phase D using a propeller mixer and mix at a high speed until uniform. Add Phase E to Phase D, homogenize for 5 minutes until uniform.
5. Add Phase D/E to Phase A/B/C under strong homogenizing until uniform.



Sunscreen Paste SPF 30 (predicted)

S-3000-03

This cold process, minimalist formulation has a predicted SPF 30. With a smooth, non-greasy feel, this paste also provides water resistance. COSMOS approved THIXCIN® R PC is an oil phase rheology modifier that is responsible for viscosity building and rheology control acting in this formulation as the single viscosity enhancer agent.

Phase	Product	Ingredient	%w/w
A	Tegosoft CT ¹	Caprylic/Capric Triglyceride	68.50
	FANCOR® MEADOWFOAM SEED OIL²	Limnanthes Alba (Meadowfoam) Seed Oil	2.00
	MEADOWESTOLIDE®²	Meadowfoam Estolide	0.50
B	Parsol ZX ³	Zinc Oxide, Triethoxycaprylsilane	14.00
	Parsol TX ³	Titanium Dioxide, Silica, Dimethicone	10.00
C	THIXCIN® R PC²	Trihydroxystearin	5.00

1 Evonik 2 Elementis 3 DSM

SPECIFICATIONS

Viscosity: DV-II. Spindle 6, 0.1 rpm 2,000,000 cps

Appearance: High viscosity off-white cream

PROCEDURE:

1. Combine Phase A and mix until uniform.
2. Add Phase B ingredients to Phase A under high shear until the powder is completely dispersed.
3. Add Phase C to batch and continue mixing under high shear for 20 minutes.
4. Full viscosity will build overnight.

