

Ceramide VI

Reinforcing the skins natural protective lipid barrier

Intended use

Actives for skin care

Benefits at a glance

- Normalizes the skins natural desquamatory process
- Reinforces the natural lipid barrier of dry and ageing skin
- Repairs and protects damaged hair (mechanical properties, liveliness, combability, shine)
- Human-skin identical molecule
- Natural product with high purity
- Active at low concentrations

INCI (PCPC name)

Ceramide AP

For Chinese SFDA listed as:

Ceramide 6 II

Chemical and physical properties (not part of specifications)

Form	powder
Active matter	approx. 95%

Properties

- Ceramides support the renewal of the skin's natural protective layer and form an effective barrier against moisture loss. These human-

skin-identical molecules are therefore particularly suitable for long term protection and repair of sensitive and dry skin.

- Complementary to its protective role as barrier lipid, Ceramide VI has also other interesting properties. Due to its AHA like structure, Ceramide VI normalizes the skins natural desquamatory process resulting in a smoother, softer complexion. As a natural skin barrier lipid, it is particularly suited as a mild desquamation agent for sensitive skin products. It rejuvenates dull, rough, and tired skin, and reduces the appearance of fine lines.



Fig. 1: Structural formula of Ceramide VI.

Ceramide VI consists of a Phytosphingosine backbone acylated with a long chain alpha-hydroxy stearic acid.

- Our efficacy studies have shown that Ceramide VI is effective starting from 0.05% concentrations. Depending on the type of skin and desired effect, the advised concentration varies between 0.05% – 0.5% or even up-to 1%.
- In hair care formulations Ceramide VI is able to restore damaged hair and to protect hair against chemical and UV damage.

- Ceramides are produced using patented biofermentation processes. In contrast to various pseudo ceramides that are on the market, the ceramides produced according to this process have the same stereo-chemical configuration as the ceramides present in the human skin. This unique configuration is regarded to be crucial for optimal performance.
- The production conditions are strictly standardised and carried out under GMP conditions. Its high purity and constant quality are prerequisites for an optimal safety and efficacy of the end product.

Efficacy studies

The aim of this study was to compare the effect of Ceramide VI formulated in a cream versus a control (same cream without Ceramide VI) on the cohesion and desquamation of dry skins. 6 female volunteers aged 21 to 51 were selected on the criteria "dry skin on the legs". Also the study was conducted during the winter season under increasing dry weather conditions.

The method used to investigate the cohesion/desquamation was the Cohesion Image Analysis (CIA). Samples of the outer layers of the skin are collected on a special adhesive stripper and put under the microscope. Quantification of dead cells are then measured by a QUANTIMET 570 recording 50 fields by sample.

Two zones (one on each leg) were selected and volunteers applied blind samples (2 mg/cm²) of either Ceramide VI or the control once daily for 18 days on each leg.

After 18 days of treatment with Ceramide VI there is a statistically significant improvement of the skin's global cohesion when products with and without Ceramide VI are compared (Fig. 2).

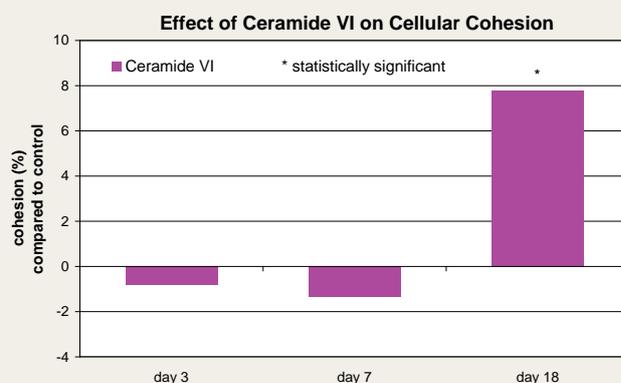


Fig. 2: Effect of Ceramide VI on Cellular Cohesion

Analysis of the vertical and horizontal cohesion shows also a very significant improvement (P= 0.0232) of the vertical cohesion as cellular lamellae ("large flakes") were decreased in skin samples whereas isolated cells ("fine flakes") were not affected.

As dry skins are mainly characterised by a very high level of cellular lamellae in the desquaming skin, these results confirm that Ceramide VI is well suited for the improvement of dry and fragile skins.

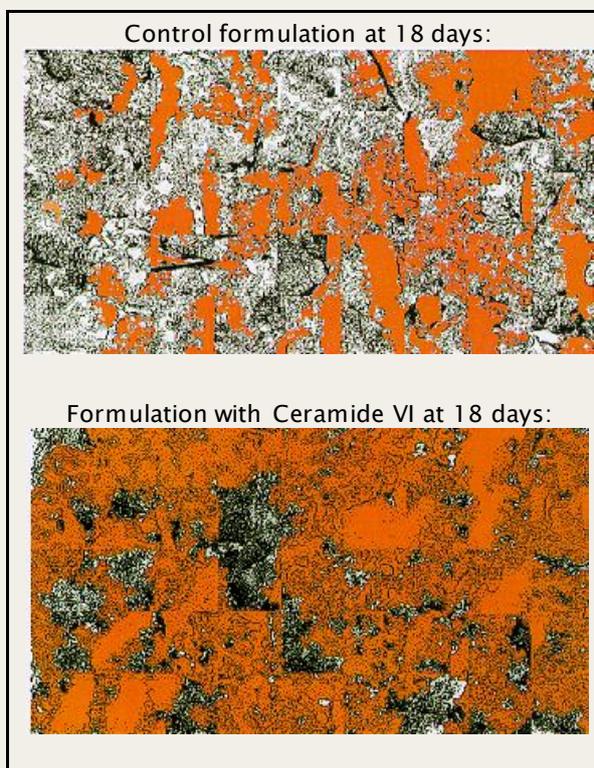


Fig. 3: Cohesion Image Analysis with Ceramide 6
The white spots represent the flakes left on the tape, while the orange spots represent the tape itself.

Other efficacy studies are available on request.

Preparation

Emulsions

Ceramides are amphiphilic molecules and can be incorporated into the lamellar liquid crystalline structures built up by emulsifier and consistency agents in the external water phase of cosmetic O/W emulsions.

In general, ceramides are nearly insoluble in common cosmetic oils at room temperature. They can be clearly solved in most cosmetic oils by heating up to 90°C. The oils differ in the temperature at which the mixture becomes turbid again while cooling. The solubility in the oil phase seems not to be crucial for the stability of the formulation with respect to recrystallisation of ceramide. **It is very important, however, that the ceramide is clearly and completely solved in the oil phase at the beginning of and during the homogenization step.** Towards this end both the water phase and the oil phase should have a temperature of at least 90°C. Oils with a good solvency for ceramides should be chosen, e. g. TEGOSOFT® APM (PPG-3 Myristyl Ether), TEGOSOFT® TN (C12-15 Alkyl Benzoate) and TEGOSOFT® CT (Caprylic/Capric Triglyceride).

To obtain a pleasant skin feel it is suggested to combine those oils with low viscosity oils such as TEGOSOFT® OP (Ethylhexyl Palmitate), TEGOSOFT® DC (Decyl Cocoate) and TEGOSOFT® P (Isopropyl Palmitate).

Ceramide VI, especially at higher concentrations (0.5% and higher), has a strong negative influence on the freeze stability of an O/W emulsion. By choosing polar oils, adding Carbomer and/or increasing the oil phase up to 25% the freeze stability can be optimized.

By following the above mentioned guidelines formulations will have a long-term stability against recrystallisation of ceramide.

Clear aqueous formulations

Ceramide VI shows a very low solubility in water and has a very high melting point. Nevertheless it is possible to develop clear aqueous formulations with Ceramide VI (for example shampoos, clear Leave in Conditioners).

For the solubilization of the ceramides it is necessary to find a suitable solubilizer which can be heated up to a temperature of about 90°C or even higher to ensure that the ceramides are melted completely. During the addition of the other ingredients of the formulation (surfactants, water, conditioners,

thickeners and so on) the temperature must be kept at 80 – 85°C.

Suitable solubilizers for the ceramides are TAGAT® CH 40 (PEG-40 Hydrogenated Castor Oil), TEGOSOFT® PC 31 (Polyglyceryl-3 Caprate), TEGOSOFT® PC 41 (Polyglyceryl-4 Caprate) or Sodium Lauroyl Lactylate.

For a clear Leave in Conditioner TAGAT® CH 40 (PEG-40 Hydrogenated Castor Oil) is especially suitable, for a shampoo formulation TEGOSOFT® PC 31 (Polyglyceryl-3 Caprate) or TEGOSOFT® PC 41 (Polyglyceryl-4 Caprate) also can be used.

Another problem of shampoo formulations may be the tendency of Ceramide VI to crystallise after 1 – 3 months. This crystallisation can be avoided if a combination of two or more different ceramides (Ceramide III, IIIB, VI) are used.

Emulsion based Hair care formulation

The production of an emulsion based hair care formulation (for example hair rinses or cream conditioners) is comparable to that described before for an O/W-Emulsion. The water phase and the oil phase (emulsifier, consistency enhancer, ceramides and possible small amounts of emollients) must be heated up to 90°C to ensure that the ceramides are clearly solubilized.

Monomeric Quats, for example VARIOSOFT®-Types, or Sodium Lauroyl Lactylate are especially suitable to improve the stability of hair rinses with ceramides:

Application

Consequently Ceramide VI has a wide range of applications, such as

- O/W creams and lotions of the segments:
 - Moisturizing
 - Anti-ageing
 - Skin repair
 - Facial mask
 - Ethnic skin
 - Rejuvenating skin
 - Sun care
- Hair care preparations
 - Hair Rinses
 - Leave-in Conditioners

- Conditioning Shampoos

Recommended usage concentration

0.05 –1.0% Ceramide VI

Packaging

0.25 kg package

2.50 kg bag

Hazardous goods classification

Information concerning

- classification and labelling according to regulations for transport and for dangerous substances
- protective measures for storage and handling
- measures in accidents and fires
- toxicity and ecological effects

is given in our material safety data sheets.

Guideline formulations

Deep Conditioning Repair Mask		
UP 17/00		
Phase A		
TEGINACID® C	(Ceteareth-25)	0.5%
TEGO® Alkanol 1618	(Cetearyl Alcohol)	1.5%
TEGIN® M Pellets	(Glyceryl Stearate)	1.0%
ABIL® Wax 9801	(Cetyl Dimethicone)	2.0%
TEGOSOFT® liquid		2.0%
(Cetearyl Ethylhexanoate)		
Ceramide VI		0.1%
Phase B		
VARISOFT® PATC		2.0%
(Palmitamidopropyltrimonium Chloride)		
ABIL® B 8852		1.0%
(PEG/PPG-14/12 Dimethicone)		
Glycerin		2.0%
Water		87.9%
Citric Acid (30%)		pH = 4
Preservative, Perfume		q.s.
Preparation:		
1. Heat phase A and B to 85 – 90°C.		
2. Add phase B to phase A and homogenize.		
3. Cool down to 30°C under stirring.		

Skin Repair Cream with Ceramide III and VI WR 2/00-11	
Phase A	
TEGO® Care 450 (Polyglyceryl-3 Methylglucose Distearate)	3.00%
TEGO® Alkanol 18 (Stearyl Alcohol)	2.10%
TEGIN® M Pellets (Glyceryl Stearate)	0.90%
TEGOSOFT® HP (Isocetyl Palmitate)	5.00%
TEGOSOFT® OS (Ethylhexyl Stearate)	8.80%
Avocado (Persea Gratissima) Oil	3.00%
Tocopheryl Acetate	1.00%
Ceramide III (Ceramide 3)	0.07%
Ceramide VI	0.13%
Phase B	
Propylene Glycol	3.00%
Allantoin	0.10%
Water	72.9%
Preservative, Perfume	q.s.
Preparation:	
<ol style="list-style-type: none"> Heat phase A and B separately to approx. 90°C. Add phase A to phase B with stirring.¹⁾ Homogenize. Cool with gentle stirring. 	
¹⁾ Important:	
If phase A has to be charged into the vessel first, phase B must be added without stirring .	

Lotion with Ceramide III and VI WR 4/00-2	
Phase A	
TEGO® Care 215 (Ceteareth-15; Glyceryl Stearate)	2.50%
TEGO® Alkanol 18 (Stearyl Alcohol)	1.00%
TEGOSOFT® OS (Ethylhexyl Stearate)	5.00%
TEGOSOFT® CR (Cetyl Ricinoleate)	3.00%
TEGOSOFT® HP (Isocetyl Palmitate)	2.00%
ABIL® 350 (Dimethicone)	0.50%
Ceramide III (Ceramide 3)	0.07%
Ceramide VI	0.13%
Phase B	
Glycerin	3.00%
Water	81.4%
Phase C	
TEGO® Carbomer 141 (Carbomer)	0.20%
TEGOSOFT® OS (Ethylhexyl Stearate)	0.80%
Phase D	
Sodium Hydroxide (10% in water)	0.40%
Preparation:	
<ol style="list-style-type: none"> Heat phase A and B separately to approx. 90°C. Add phase A to phase B with stirring.¹⁾ Homogenize. Cool with gentle stirring to approx. 60°C and add phase C. Homogenize for a short time. Cool with gentle stirring and add phase D below 40°C. 	
¹⁾ Important:	
If phase A has to be charged into the vessel first, phase B must be added without stirring .	

Anti-Wrinkle Cream with Ceramide IIIB and VI F 38/00-3		
Phase A		
TEGIN® 41 00 Pellets (Glyceryl Stearate)		2.50%
TEGO® Alkanol 18 (Stearyl Alcohol)		1.50%
Stearic Acid		1.00%
Ceramide IIIB (Ceramide 3)		0.07%
Ceramide VI		0.13%
TEGOSOFT® liquid (Cetearyl Ethylhexanoate)		9.80%
TEGOSOFT® OP (Ethylhexyl Palmitate)		5.00%
TEGOSOFT® CT (Caprylic/Capric Triglyceride)		3.00%
TEGOSOFT® DC (Decyl Cocoate)		2.00%
Phase B		
TEGO® Care CG 90 (Cetearyl Glucoside)		1.00%
Glycerin		3.00%
Water		70.50%
Phase C		
TEGO® Carbomer 134 (Carbomer)		0.10%
TEGOSOFT® liquid (Cetearyl Ethylhexanoate)		0.40%
Phase D		
Sodium Hydroxide (10% in water)		q.s.
Preservative, Perfume		q.s.
Preparation:		
<ol style="list-style-type: none"> Heat phase A and B separately to approx. 90°C. Add phase A to phase B with stirring.¹⁾ Homogenize. Cool with gentle stirring to approx. 60°C and add phase C. Homogenize for a short time. Cool with gentle stirring and add phase D below 40 °C. 		
¹⁾ Important:		
If phase A has to be charged into the vessel first, phase B must be added without stirring .		

Skin Repair Cream with Ceramide III and VI WR 2/00-14		
Phase A		
TEGO® Care 450 (Polyglyceryl-3 Methylglucose Distearate)		3.00%
TEGO® Alkanol 18 (Stearyl Alcohol)		2.00%
TEGIN® M Pellets (Glyceryl Stearate)		0.90%
TEGOSOFT® HP (Isocetyl Stearate)		5.00%
TEGOSOFT® OS (Ethylhexyl Stearate)		8.80%
Avocado (Persea Gratissima) Oil		3.00%
Tocopheryl Acetate		1.00%
Ceramide III (Ceramide NP)		0.07%
Ceramide VI		0.13%
Phase B		
Propylene Glycol		3.00%
Allantoin		0.10%
Water		72.90%
Preservative, Parfum		q.s.
Preparation:		
<ol style="list-style-type: none"> Heat phase A and B separately to approx. 90°C. Add phase A to phase B with stirring.¹⁾ Homogenize. Cool with gentle stirring. 		
¹⁾ Important:		
If phase A has to be charged into the vessel first, phase B must be added without stirring .		

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Especially concerning Active Ingredients

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