Eat Well, Live Well.

AJINOMOTO

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Eat Well, Live Well.

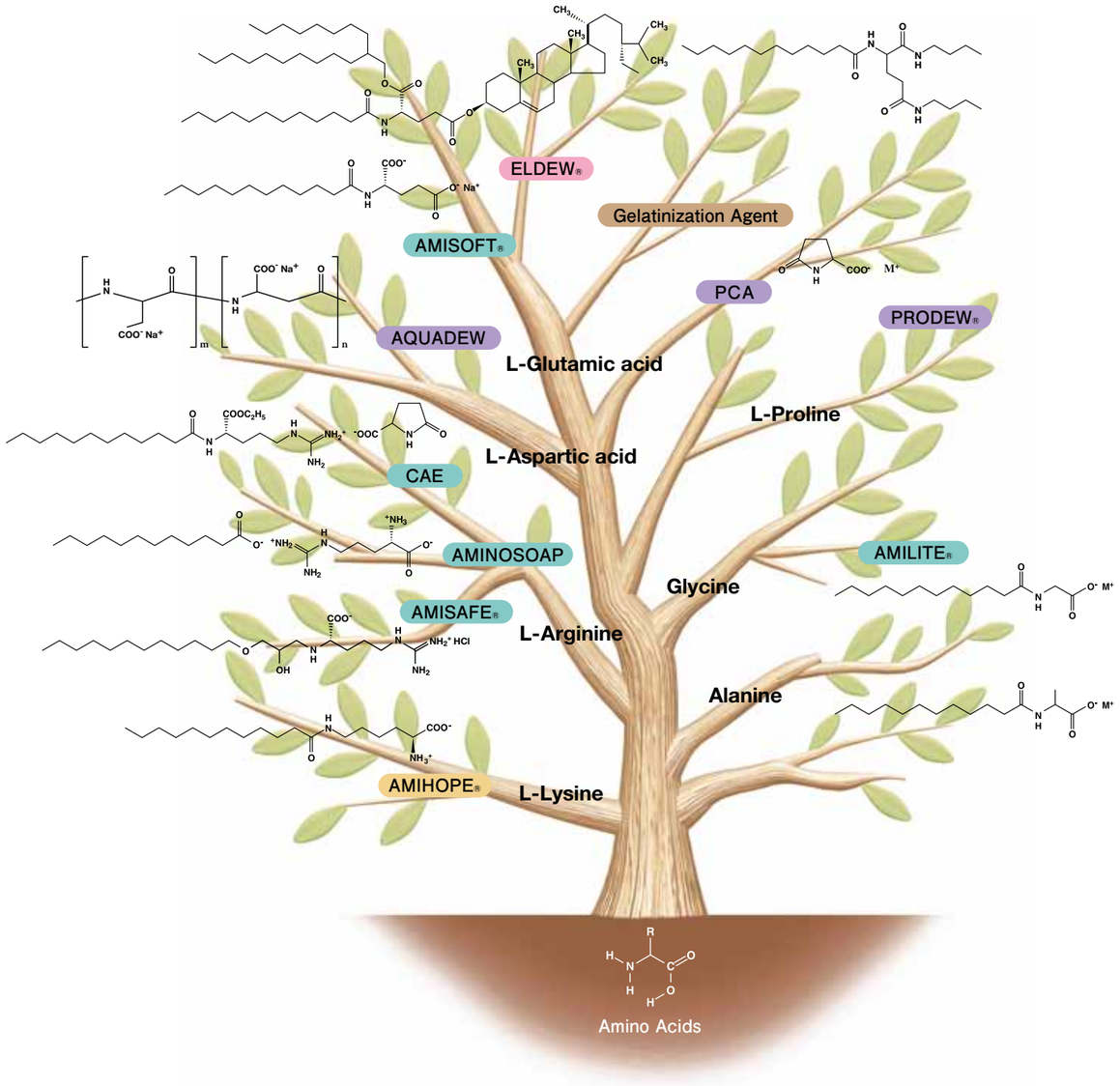
AJINOMOTO

Amino Acid Based Ingredients for Personal Care

Amino Acid Based Ingredients for Cosmetics & Toiletries

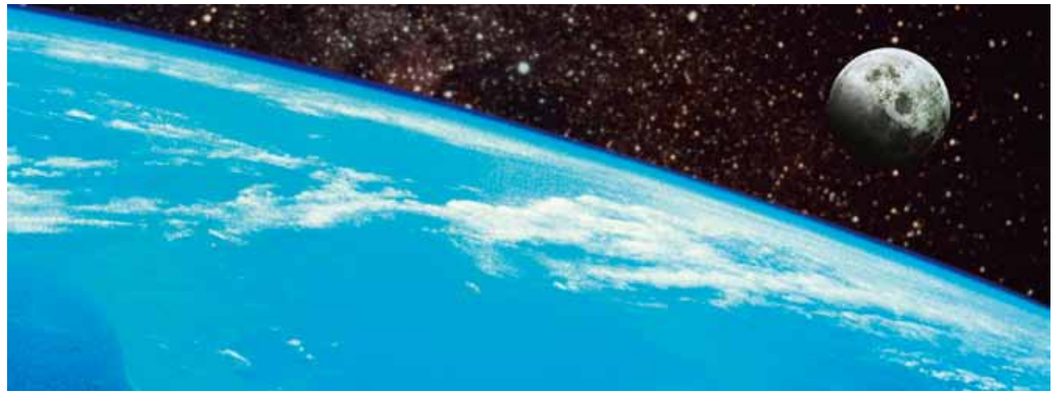
To bring the blessings of the earth and the very essence of life to more people, we develop amino acid based personal care ingredients friendly to people and to the earth.

It's no exaggeration to call amino acids “earth-friendly.” Amino acids are natural materials born of Mother Earth from the very essence of life and closely related to human physiological functions.
Earth-friendly and human-friendly, amino acids have many benefits yet to be explored. The first to market amino acids, Ajinomoto Co. has been a pioneer in personal care ingredients using amino acids, and is committed to exploring the virtually limitless performance characteristics of amino acids and to applying what we learn to the development of ever more beneficial personal care ingredients and products.



The earth and amino acids

When and where did amino acids come from?
Answering this question touches on the origins of the earth.
Amino acids first formed some four billion years ago.
Water, ammonia, methane, and other substances combined while the planet was still young and temperatures were much higher than today.
Amino acids concentrated in tidal pools were transformed into proteins, while base compounds became nucleic acids. These continued to evolve, ultimately leading to the beginning of life.
It's no exaggeration to call amino acids earth-friendly. They are natural materials born of Mother Earth.



Life and amino acids

Amino acids are called the source of life for good reason.
Our bodies' muscles, organs, skin, and hair are all made up of proteins, which are in turn made up of unique combinations of 20 types of amino acids. In the body, amino acids are converted through various metabolic pathways to a multiplicity of useful substances.
As the very essence for maintaining life, amino acids are naturally human-friendly.

Ajinomoto Co.'s personal care ingredients are developed from long-term research on amino acids. Our product lineup fits product concepts for a new era.

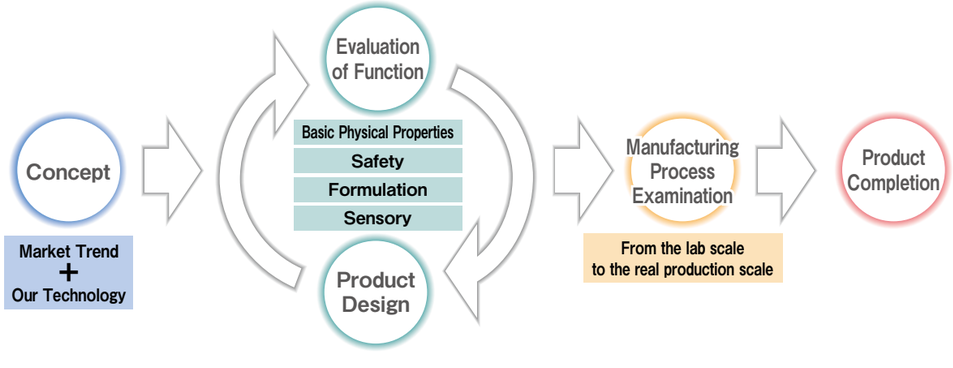
THE ESSENCE OF OUR PERSONAL CARE

Ajinomoto Co. launched the world's first mild amino acid based surfactant – AMISOFT® – in 1972. Its weakly acidic human-friendly features with highly biodegradable environmental-friendly factors added value to facial cleansers, shampoos, and bar soaps. These serve the needs of a new era and contribute to the development of attractive products.
Ajinomoto Co., a pioneer in personal care ingredients using amino acids, has created an original product concept by expanding its product lineup with outstanding techniques and capabilities for developing brand-new unique ingredients.

R&D capabilities based on a comprehensive knowledge of amino acids

On developing ingredients, we look into market needs to determine concepts using amino acids. Then, in product design and function evaluation, we study basic physico-chemical properties, safety, potential combinations, and sensory considerations before proceeding to manufacture. Ajinomoto Co.'s products globally serve customers by advanced R&D abilities of dedicated staff fully familiar with all ingredients involved.

Flow of Material Development



Rich lineup of personal care ingredients based on carefully considered use and development concepts

Ajinomoto Co.'s personal care ingredients combine human-friendly and environmental-friendly amino acids to meet current market needs.

Ajinomoto Co.'s personal care ingredients are :

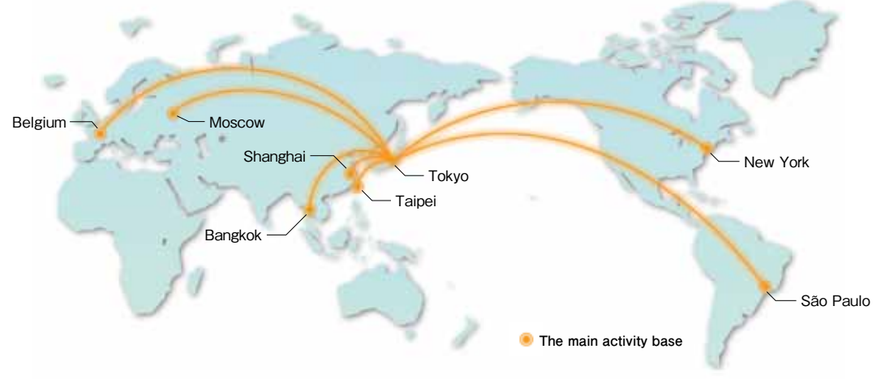
1. Mild ····· Gentle to skin and hair
2. Multifunctional ····· Uniquely functional and beneficial
3. Highly biodegradable ····· Environmentally-friendly
4. Derived from nature ····· Perfect for natural concept

Abundant Lineups of Personal Care Material

Main Function	Trade Name
Cleaning agent	AMISOFT® AMILITE® AMINOSOAP
Conditioning	AMISAFE® CAE
Humectants	PRODEW® AJIDEW® AQUADEW
Emollients	ELDEW®
Functional Ingredient	AMIHOPE®
Gelatinization Agent	EB-21 GP-1

Our high-quality products are provided worldwide through our global network.

As a global pioneer in amino acids and science – AminoScience – Ajinomoto Co. is expanding its R&D, production and sales network to Europe, the US, South America and Asia, thus contributing to the health, nutrition, and beauty of people worldwide. We are continuously developing new ingredients and products of the highest quality.

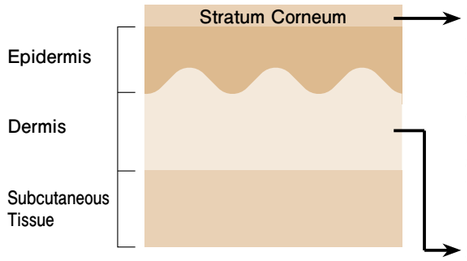


Amino Acids

As a comprehensive manufacturer of amino acids, Ajinomoto Co. not only conducts a multifaceted range of original scientific research into amino acids, we also provide the world with a remarkable variety of amino acids for foods, medicines, feeds and cosmetics. In every area of our business, the Ajinomoto Co. brand is one you can trust for the highest standards of quality and reliability.

Skin and Amino Acids

Structure of Skin



Natural Moisturizing Factor (NMF)

NMF is the natural moisturizing substance which occurs in the stratum corneum of human skin. It plays a essential role in maintaining skin moisture. Amino acids are the most abundant components of NMF. They are the most "natural" of moisturizers.

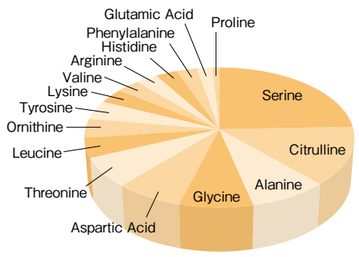
Amino Acids	42%
PCA	12%
Lactic Acid	11%
Urea	7%
Others	28%

Composition of NMF

* H.W.Spier, G.Pascher *Der Hautarzt*, Vol.7, 55-60 (1956)

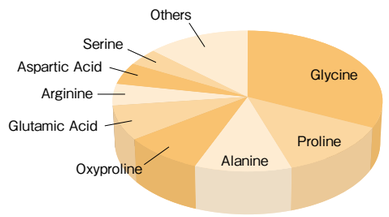
Skin Collagen

Found in the dermis, collagen plays an important role in maintaining skin elasticity.



Amino Acid Composition of NMF

* H.W.Spier, G.Pascher *Der Hautarzt*, Vol.7, 55-60 (1956)



Amino Acid Composition of Human Skin Collagen

* J.E.Eastoe in *Treatise on collagen* Ch.1 p52-53

Hair and Amino Acids

Amino Acids as Components of Hair

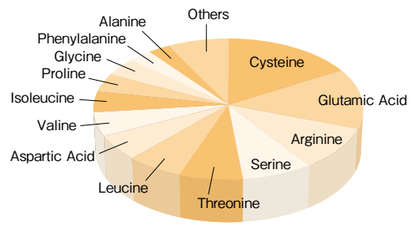
Keratin proteins derived from amino acids account for about 80% of the components which constitute human hair. Other components include water, lipids and melanin.

The Scalp and Amino Acids

Since the scalp is skin, amino acids are essential to keeping it well-nourished and ready to promote healthy hair growth.

Hair Growth Efficacy and Amino Acids

Amino acids such as L-Cyteine, L-Methionine and L-Serine are known to promote hair growth.



Amino Acid Composition of Hair

Cosmetics and Amino Acids

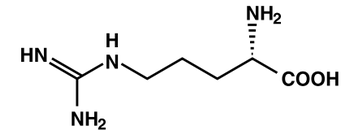
Usage Category	Function	Amino Acids
Cosmetics	Moisturization Neutralization pH buffering Mitigation of irritation potential	Proline, Other Amino Acids Base : Arginine Acid : Glutamic Acid, Aspartic Acid Sodium Glutamate, Glycine, Aspartic Acid, etc. Arginine
Permanent wave	Relaxing	Cysteine
Conditioner	Conditioning	Glycine
Hair nourishment	Hair nourishment*	Serine, Methionine

* *Nogei Kagaku [Agricultural Chemistry]*, Vol.48, No.5 (1974)

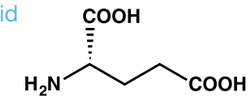
Basic and Acidic Amino Acids

L-Arginine is a typical basic amino acid with cellular activatory effect. L-Arginine is also widely used as a mild natural neutralizer. L-Glutamic acid, on the other hand, is a typical acidic amino acid, widely used as a mild neutralizer or a pH adjuster.

L-Arginine



L-Glutamic acid



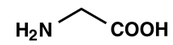
Neutral Amino Acids

Glycine accounts for about one third of the amino acids which make up human skin collagen. Glycine is also well-suited to hair care products since it works to make hair smoother when "finger-combed" as well as in general enhancing hair aesthetics.

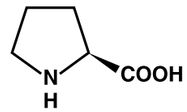
L-Serine, which accounts for about 30% of the amino acids contained in NMF, promotes the formation of the horny layer of the skin.

L-Proline stands out among amino acids for its moisturizing efficacy. Together with L-Serine and PCA, L-Proline is widely used as a moisturizer in skincare products.

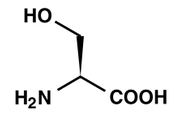
Glycine



L-Proline



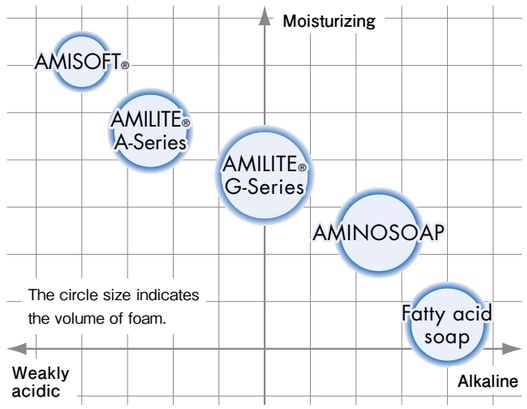
L-Serine



Anionic Surfactants

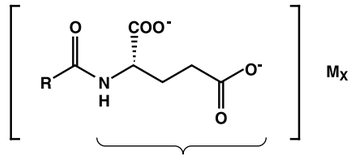
Ajinomoto Co.'s anionic surfactants derived from amino acids include AMISOFT®, notable for its moisturizing effect, and AMILITE® and AMINOSOAP, which contribute a refreshing effect. Since all these products are hypoallergenic and environmentally friendly, they can be safely used in a wide range of ways, from hair care and skin care cosmetics.

Image Map of Cleansing Agents



AMISOFT®

Since Ajinomoto Co. developed AMISOFT®, which is a pioneer product of amino-acid-based weakly acidic surfactant, AMISOFT® has always been at the forefront of mild surfactant. AMISOFT® is derived from L-Glutamic acid (an amino acid) and natural fatty acids. Extremely hypoallergenic and well suited as a mild cleansing agent. Their pHs are similar to that of the skin, therefore, they are very mild to the skin. AMISOFT® doesn't dry out the skin, but leaves it feeling moisturized after washing. AMISOFT® is available in a variety of products including the compounds of potassium salts, sodium salts, non-neutralized forms (acid type), and compounds varying acyl chain length. You can select the compound most suited to your end products, including bar soaps, facial cleansers, liquid cleanser, etc.



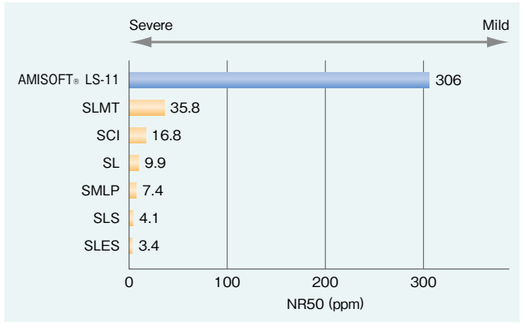
L-Glutamic acid

RCO- : fatty acid residue
M : H, Na, K or TEA
X : 1,2

- Very mild and hypoallergenic
- Weakly acidic similar to the pH level of the skin, leaving the skin no taut feeling.
- Gentle to the hair, without leaving it dry and coarse.

Cell Toxicity Test

AMISOFT® has been proven to show very low cell toxicity. After highly toxic cleansing agent contacts cells, it causes the destruction of the cell membrane and will eventually cause cell death. The cell toxicity test is used to determine the potential harshness of the cleansing agent.

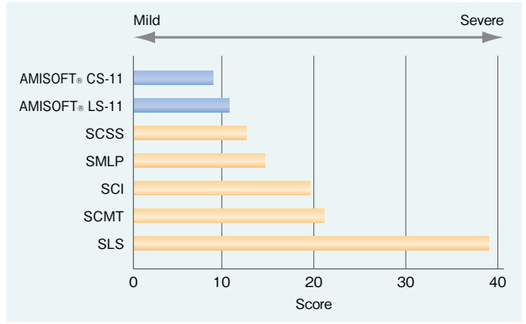


Cell Toxicity Test Using Keratinocyte

Irritation

AMISOFT® has been proven to be mild. Especially, it demonstrates mildness to eye.

5.0 wt.%A.I.

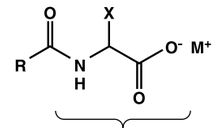


Evaluation by Using EYTEX™

AMISOFT® CS-11 : Sodium Cocoyl Gultamate AMISOFT® LS-11 : Sodium Lauroyl Gultamate SLMT : Sodium Methyl Lauroyl Taurate SCI : Sodium Cocoyl Isethionate SL : Sodium Laurate
SMLP : Sodium Lauryl Phosphate SLS : Sodium Lauryl Surfate SLES : Sodium Laureth Sulfate SCSS : Sodium Cocoyl Sulfosuccinate SCMT : Sodium Methyl Cocoyl Taurate

AMILITE®

AMILITE® is available in two versions : the Glycine-type, which is produced from Glycine and natural fatty acids, and Alanine-type, which is produced from Alanine and natural fatty acids. AMILITE®'s main characteristic is its high foaming ability. It produces creamy rich foam. It is notable for leaving the skin feeling fresh without making it feel taut.



Glycine (X=H) or Alanine (X=CH₃)

RCO- : cocoyl
M : Na, K or TEA
X : H or CH₃

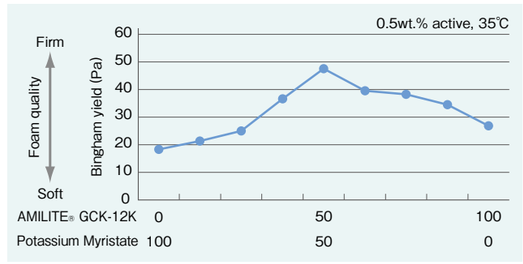
- Glycine and Alanine, both the main components of AMILITE®, are amino acids rich in human collagen and silk proteins, respectively.

AMILITE® G Series

The Glycine-type exhibits a synergistic effect with fatty acids. Consequently, yielding higher quality of elasticity as well as the volume of foam. This effect makes it most suitable for body shampoos or facial cleansing foams.

- Creamy foam which leaves the skin feeling fresh.
- Due to the synergistic effect with fatty acids, the volume maintenance and elasticity of the foam are improved.

Foam Quality Improvement by AMILITE® GCK-12K in Combination with Fatty Acid Soap



TS data 0115-0470E

Fatty Acids Improve Foamability of AMILITE® GCS-11

AMILITE® GCS-11 provides rich foam quantity and excellent foam quality when combined with fatty acids. It is recommended to use approximately 10% fatty acids on the weight basis of AMILITE® GCS-11 in order to obtain the most optimized effects.

AMILITE® GCS-11	10.0%
Lauric acid	0.3%
Myristic acid	0.7%
Water	balance
Citric acid	q.s.
	pH=7.0

TS data 0115-0350E

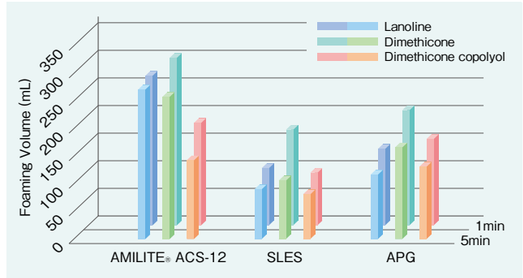
AMILITE® A Series

AMILITE® ACS-12 is a mild cleansing agent derived from Alanine and Coconut fatty acid, and is suitable for hair shampoos. It has good conditioning ability in the presence of cationic polymer, and it imparts pleasant moisturizing feel after drying.

- The Alanine-type maintains high foaming ability even in the presence of oils such as silicone oil.

Foaming Power of AMILITE® ACS-12 in the presence of oil materials

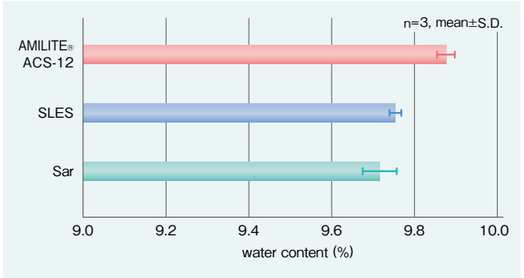
AMILITE® ACS-12 has good foaming ability even in the presence of oil materials.



TS data 0115-0680E

Effect of AMILITE® ACS-12 on Hair Moisture Content

AMILITE® ACS-12 keeps water content and moisturizes the hair.

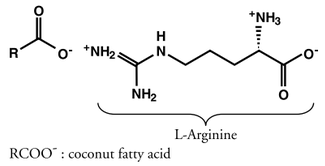


TS data 0115-0600E

AMILITE® GCK-12K : Potassium Cocoyl Glycinate AMILITE® GCS-11 : Sodium Cocoyl Glycinate AMILITE® ACS-12 : Sodium Cocoyl Alaninate SLES : Sodium Laureth Sulfate (3E.O.)
APG : Decyl Glucoside Sar : Sodium Lauroyl Sarcosinate

AMINOSOAP

AMINOSOAP is an amino-acid soap consisting of L-Arginine derived from plants, and coconut fatty acid. AMINOSOAP helps to alleviate the irritation of the skin when combined with ordinary soaps. It foams quickly, even in the presence of oil and is easily rinsed off leaving the skin feeling clean and refreshed.

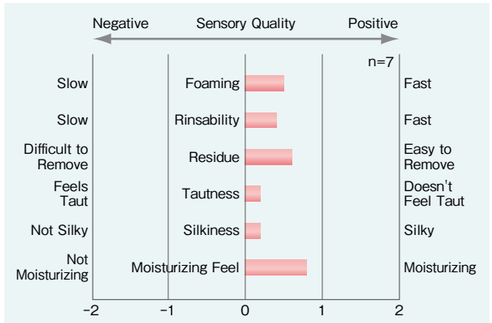


$RCOO^-$: coconut fatty acid

- Plant-derived amino-acid soap.
- High foaming ability.
- Easily rinsed off, without making the skin taut after washing.
- Hypoallergenic, suited for the combination with ordinary soap.

Outstanding Sensory Feeling

AMINOSOAP leaves a more superior feeling to the skin than the conventional soaps, with a moisturized feeling after washing.

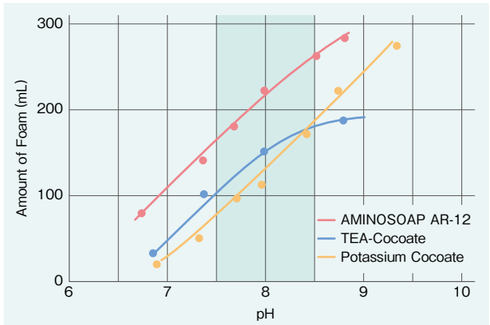


Evaluation of AMINOSOAP AR-12 on the Basis of Potassium Cocoate as 0

Methods : The test was performed using an expert panel and the blind method. The concentration used for the test was 20%.

Foaming Ability

AMINOSOAP AR-12 has excellent foaming ability even in a weakly alkaline pH range, which allows formulation at lower pHs than that of conventional soap.



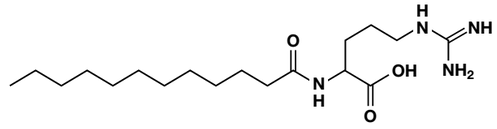
pH Dependence of Various Fatty Acid Salts

Methods : Each aqueous solution of various surfactants (0.5% wt. A.I.) was stirred for 5 seconds using a household electric mixer, left for 1 minute, and then the amount of the foam was measured.
AMINOSOAP AR-12 : Arginine Cocoate

Other Surfactants

AMISAFE® AL-01 Amphoteric Surfactant

AMISAFE® AL-01 is an amino acid based amphoteric surfactant derived from L-Arginine and fatty acid. AMISAFE® AL-01 formulated in hair conditioners adsorbs to the hair and improves smoothness, moisturized feel and control of dry hair. These effects are more prominent on hair with severe damage.



Alleviation of unruly hair

AMISAFE® AL-01 alleviates unruly hair to leave hair controlled. This effect is more prominent on hair with severe damage.

Test Formulation	Control Without AMISAFE® AL-01	TR-LG9 With AMISAFE® AL-01
Steartrimonium Chloride (63%)	2.0	2.0
AMISAFE® AL-01	-	0.2
Hexyldecyl Isostearate	4.0	4.0
Cetearyl Alchol	2.0	2.0
Lactic Acid (9%)	0.1	0.1
Water	91.9	91.7
Total	100.0	100.0

Control
Without AMISAFE® AL-01

Hair frizz is emphasized, the hair tip end is unruly and looks uncontrolled.

TR-LG9
With AMISAFE® AL-01

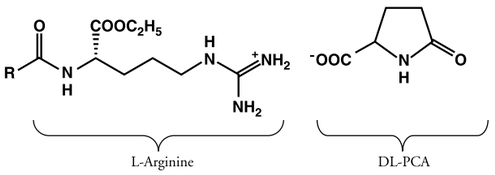
Hair is in straight line and the hair tip end is more aligned.

Test Method : The severely damaged hair tress was treated with hair conditioner formulations, TR-LG9 and Control (See the front page), brushed and dried naturally.

TS data 0125-0531E

CAE Cationic Surfactant

CAE is an amino acid based cationic surfactant derived from L-Arginine, DL-Pyrrolidone Carboxlic Acid, and fatty acid. CAE is a very safe ingredient suitable for cosmetic products. CAE is adsorbed to the hair and acts as a hair conditioner. CAE is biodegradable unlike most cationic surfactants.



RCO- : cocoyl

Minimum inhibitory concentration (MIC)

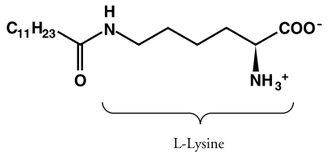
Strains	Minimum inhibitory concentration (MIC)
Escherichia coli	250
Pseudomonas aeruginosa	250
Staphylococcus aureus	7.8
Streptococcus mutans	3.9
Propionibacterium acnes	31.3
Candida albicans	250
Aspergillus niger	500
Trichophyton rubrum	62.5

CAE : 1% Solution (μg/mL)

Functional Powder

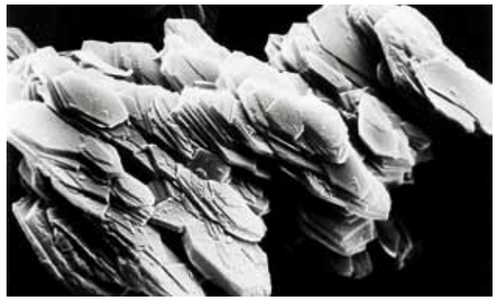
AMIHOPE® LL Functional Powder

AMIHOPE® LL is an amino acid based functional powder derived from L-Lysine (an amino acid) and a fatty acid. It is insoluble in both water and oil. Its flat, hexagonal, and crystalline structure gives AMIHOPE® LL a very smooth, soft, and silky feel, making it an ideal ingredient for cosmetic products. In addition to these qualities, it can be adsorbed to the surface of inorganic powders to improve physicochemical properties. AMIHOPE® LL can be used as a pigment-dispersing agent or a texture improver in makeup, skin care, and hair care products.

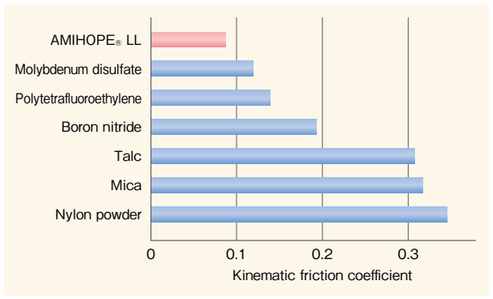


L-Lysine

A Flat Hexagonal Crystal



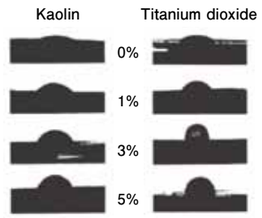
High Lubricity of AMIHOPE® LL

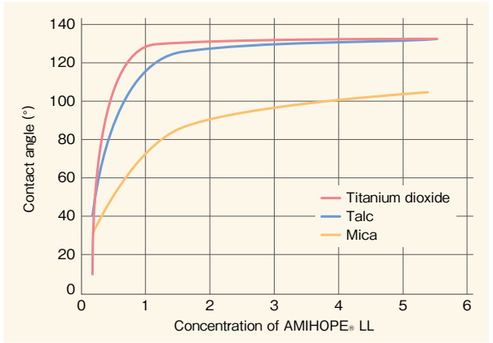


Kinematic friction coefficient of various powders

Water repellence

AMIHOPE® LL possesses excellent hydrophobicity and strongly repels water.
It covers the surface of hydrophilic inorganic powders and becomes water repellent, preventing blotching or running due to sweat or water.





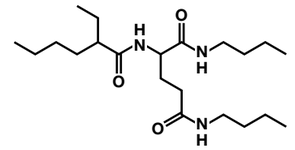
Contact angle changes by addition of AMIHOPE® LL

Gelatinization Agent

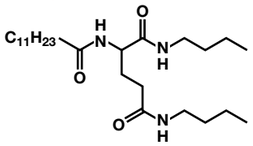
Gelatinization Agent EB-21・GP-1

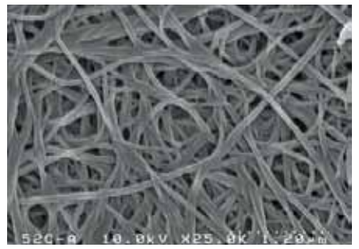
Gelatinization Agent EB-21 and GP-1 are derived from an amino acid L-Glutamic acid and are highly effective small molecular oil gelators. After being dissolved in oils, they form a fiber network of microscopic size upon cooling, which traps oils to turn the liquids into “solid oils” of unique texture. Due to the fact that only 0.5-5% of the agents are required to form oil gels and that size of the fiber structure is very small, EB-21 and GP-1 virtually do not change sensory aspects of the original oils.

Gelatinization Agent EB-21



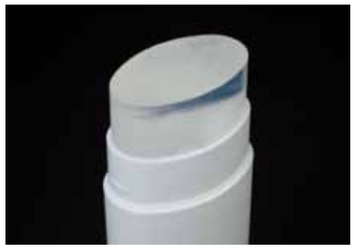
Gelatinization Agent GP-1





* EB-21 1wt.%
Mineral Oil 99wt.%

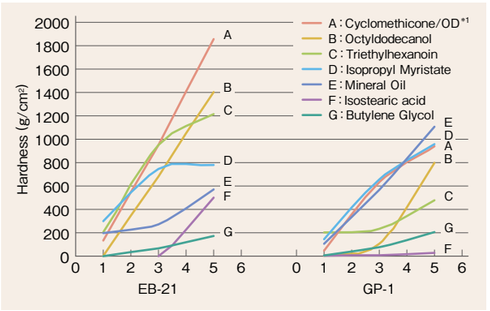
Fiber network of Oil Gel. (SEM)



EB-21 2wt.%,
GP-1 2wt.%,
Cyclomethicone 60wt.%,
Mineral Oil 21wt.%,
Octyldodecanol 15wt.%

Gel Hardness

The hardness of oil gel with EB-21 and GP-1



* 1 Cyclomethicone/Octyldodecanol=80/20 (wt./wt.)
Hardness : Pudding 40g/cm², Shea oil : 1000g/cm²

Transparent Oil Gel with EB-21 and GP-1 mixture

EB-21 and GP-1 can make the transparent oil gel.

Total concentration of Gelatinization Agent 1wt.%
Oil : Mineral Oil

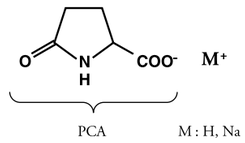
EB-21 EB-21/GP-1=1/1 GP-1

Humectants

Ajinomoto Co.'s humectants grew out of research into the skin's natural moisturizing factors (NMFs). These products protect the skin from dryness, moisturize, promote elasticity and help keep skin healthy and fresh-looking. Ranging from amino acids to polymers, each with its own particular characteristics. As a result, the most suitable product can be selected to meet the usage demands of a wide range of skincare and hair care products.

AJIDEW® NL-50, A-100

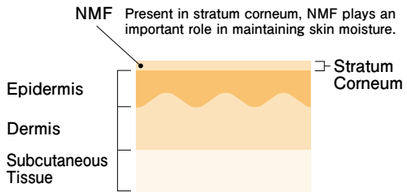
Sodium PCA (Sodium Pyrrolidonecarboxylate) is a natural humectant derived from L-Glutamic acid. Known to be abundant in human skin as a component of NMF (Natural Moisturizing Factor). This humectant helps keep skin and hair looking fresh.



Composition of NMF

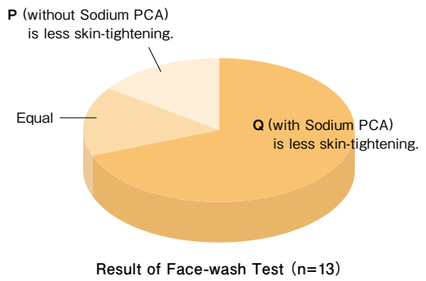
Amino Acids	42%
PCA	12%
Lactic Acid	11%
Urea	7%
Others	28%

* H.W.Spier, G.Pascher Der Hautarzt. Vol.7, 55-60 (1956)



An efficacy on skin

Sodium PCA reduces skin tightness caused by a soap-base cleansing formula.

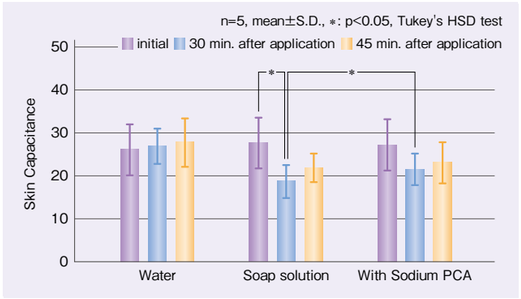


Result of Face-wash Test (n=13)

TS data 1001-0831E

Effects of Sodium PCA in a Cleansing Formulation

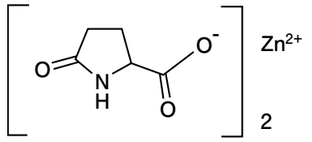
Sodium PCA incorporated into a soap-base formulation suppresses reduction of the skin capacitance caused by cleansing.



TS data 1001-0860E

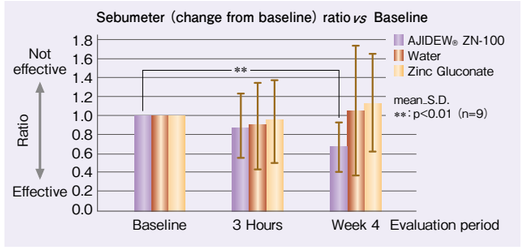
AJIDEW® ZN-100

AJIDEW® ZN-100, Zinc salt of L-Pyrrolidonecarboxylate (Zinc PCA), is part of Ajinomoto Co.'s line of nature-based functional ingredients. With the combination of zinc and NMF, it suppresses excess sebum secretion, leaving skin feeling clean and refreshed. AJIDEW® ZN-100 is ideal for the wide range of health and beauty products.



Freshness to Skin

1wt.% AJIDEW® ZN-100 solution exhibits a statistically significant decrease in sebum levels on the treated skin at week 4 compared to baseline.



PRODEW® 500

PRODEW® 500 is the amino acid blend, developed to achieve a new technology for hair care. Unlike the case of the skin, the presence and the role of naturally occurring free amino acids in hair are not well known, but amino acids applied externally are known to interact with the hair to produce various cosmetic effects, such as moisturizing, strengthening structure, color-protect on the repair of surface damage. The amino acid component in PRODEW® 500 is modeled after the constituent amino acids of protein existing in CMC (Cell Membrane Complex).

Components	Concentration	Effects
Sodium PCA	20%	Moisturizing, Conditioning, Improvement of Color Retention
Arginine	7%	Moisturizing, Conditioning, Improvement of PCA adsorption
Amino Acids Mix	7%	Damage Care
Sodium Lactate	12%	Moisturizing
Aspartic Acid	4%	pH adjustment
Water	50%	

* The Composition of Amino Acids Mix
The composition of "Amino Acids Mix." is modeled after the constituent amino acids of protein in Cell Membrane Complex (CMC)

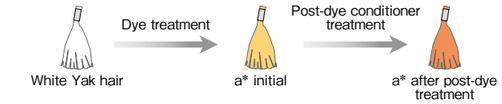
Effects of Sodium PCA for Oxidative Color

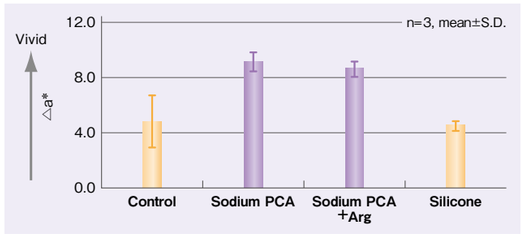
Color development of red semi permanent hair dye was improved by post-dye treatment with a hair conditioner containing Sodium PCA.

Test Formulation: Hair Conditioners	Control	Sodium PCA	Sodium PCA +Arg	Silicone
Cetrimonium Chloride (active)	2.5	2.5	2.5	2.5
Ceteareth-20	0.5	0.5	0.5	0.5
Cetyl alcohol	4.0	4.0	4.0	4.0
Sodium PCA	-	2.0	1.0	-
Arginine	-	-	0.4	-
Amodimethicone. emulsion*	-	-	-	2.0
Methylpraben	0.2	0.2	0.2	0.2
Citric acid	pH3.0	pH3.0	pH3.0	pH3.0
Water	balance	balance	balance	balance
Total	100.0	100.0	100.0	100.0

* Dow Coming 2-8177 Emulsion

△a* = a* after post-dye treatment - a* initial





TS data 1001-0680E

Improvement of Hair Gloss Measurement

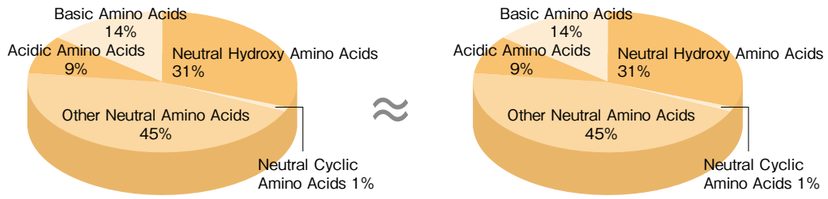
PRODEW® 500 imparts luster and brilliant appearance to hair.

Japanese hair tress (bleached 4 times) was immersed in a test solution (100g) for 10 minutes at 35°C, rinsed in 100mL of deionized water (35°C) for 1 minute and dried overnight.

Hair Tresses Treated with PRODEW® 500

PRODEW® 600

PRODEW® 600 is a highly effective moisturizer formulated with NMF (Natural Moisturizing Factor) components.
The amino acid composition of PRODEW® 600 is almost the same as the amino acid composition in NMF.
PRODEW® 600 gives the moisturizing effect to the skin by supplying amino acids to the stratum corneum. In addition, since preservatives, such as Parabens, are not used, it is possible to formulate PRODEW® 600 into personal care products with preservative-free concept.



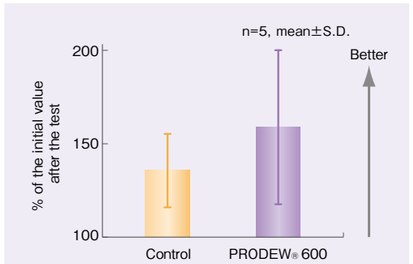
Free Amino Acid Composition of NMF

Free Amino Acid Composition of PRODEW® 600

Improvement of Skin Condition ; Long-term test (Cheeks)

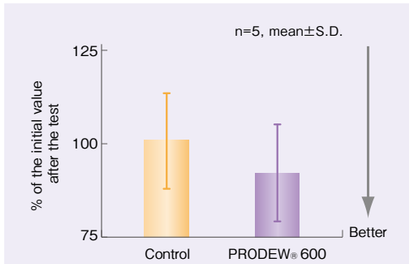
Skin capacitance and skin barrier function are improved by a skin toner and a skin cream including PRODEW® 600.

Water content of stratum corneum



TS data 1002-0380

Transepidermal water loss (TEWL)



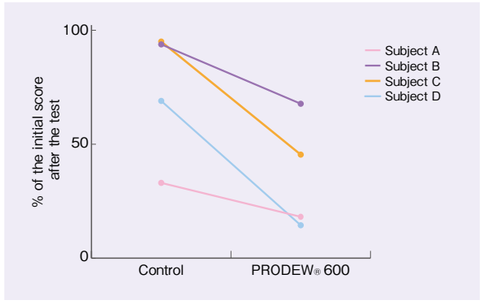
TS data 1002-0390

Method : Skin toner and skin cream had been applied to cheeks every morning and evening for 2 weeks.
Control : Skin toner and skin cream without PRODEW® 600
PRODEW® 600 : Skin toner with 5wt% PRODEW® 600, Skin cream with 2wt% PRODEW® 600

Anti-wrinkle effect ; Long-term test (Cheeks)

Fine wrinkles are decreased by a skin toner and a skin cream including PRODEW® 600.

Wrinkle Score



TS data 1002-0400

Appearance

Before　　After 2 weeks

TS data 1002-0410

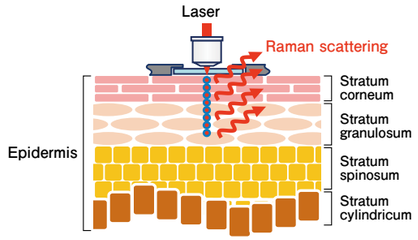
Method : Skin toner and skin cream had been applied to cheeks every morning and evening for 2 weeks. Wrinkle score and appearance were measured by VISIA® Evolution.
Control : Skin toner and skin cream without PRODEW® 600
PRODEW® 600 : Skin toner with 5wt% PRODEW® 600, Skin cream with 2wt% PRODEW® 600

Penetration into stratum corneum

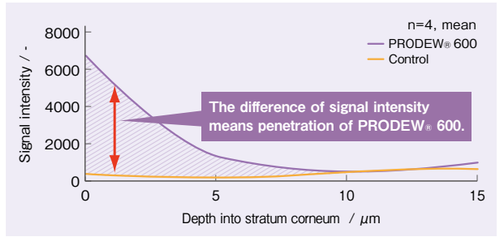
Raman peak derived from PRODEW® 600 is detected from the skin surface to the depth of the stratum corneum around 10μm.

Figure of confocal raman spectroscopy

Since Raman scattered light of the target component can be measured at each depth of the skin by in vivo confocal Raman spectroscopy, it is possible to evaluate the skin penetration of applied substances.



Signal intensity of each depth

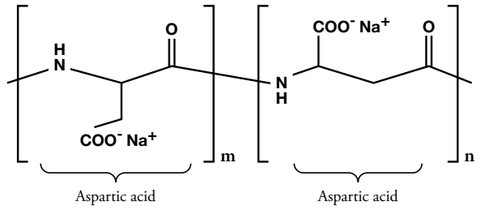


TS data 1002-0430

Method : Skin toner was applied 3 hours before measurement. The signal intensity was measured by in vivo confocal raman spectroscopy.
Control : Skin toner without PRODEW® 600
PRODEW® 600 : Skin toner with 5wt% PRODEW® 600

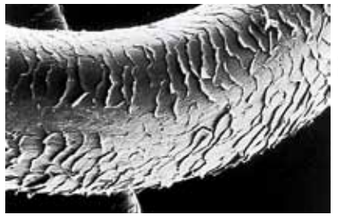
AQUADEW SPA-30B

AQUADEW SPA-30B is an anionic polymeric humectant derived from Aspartic acid. It is superior to other humectants in its hygroscopic properties as well as its moisturizing efficacy, AQUADEW SPA-30B affinity for skin is so strong, it can actually be felt. AQUADEW SPA-30B leaves skin feeling moist, smooth to the touch and completely unsticky. It also moisturizes hair and increases manageability, AQUADEW SPA-30B protects cuticles and helps prevent hair breakage and splitting.



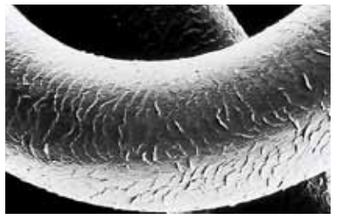
Hair Protection Effect of AQUADEW SPA-30B

AQUADEW SPA-30B protects cuticles and helps reduce hair breakage and spliting.



Treatment procedure :
Hair was treated with 1 wt.%A.I. at 40℃ for two minutes, dried at 25℃ 40% RH, then bent and observed.

Without treatment



Treated with 1 wt.%A.I., AQUADEW SPA-30※

Efficacy of AQUADEW SPA-30B for Manageability

AQUADEW SPA-30B prevents hair fly.

After washing hair with LES (weather : rainy)

After treatment with 0.5 wt.%A.I. of AQUADEW SPA-30※(weather : rainy)

※AQUADEW SPA-30 is the predecessor of AQUADEW SPA-30B and consists of 30% sodium polyaspartate and 70% water.

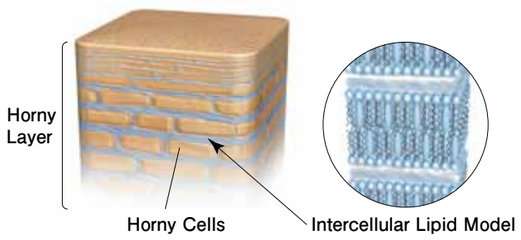
Emollients

Ajinomoto Co.'s emollients arose out of research into amino acids and the mechanisms of skin moisturization. In healthy skin, an appropriate moisture balance is maintained by NMF, a hydrophilic component, and intercellular lipids or lipophilic components in the horny layer. These two components work according to two different moisturizing mechanisms. Intercellular lipids form lamella liquid crystals with a two-molecular membrane to function as a barrier, maintaining moisture and preventing invasion of foreign bodies from the outside.

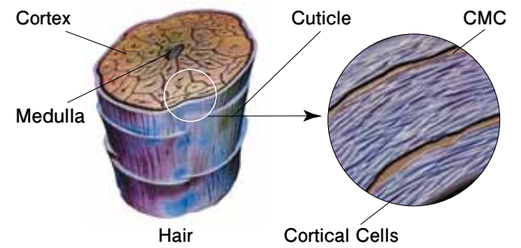
Many scientists believe that Cell Membrane Complex (CMC) – a substance found between the cortical cells in the inter-cuticle cortex – also plays an important role in conditioning and maintaining healthy hair.

At Ajinomoto Co., we designed a new series of amino acid emollients based on intercellular lipid model of skin and Cell Membrane Complex (CMC) of hair. We call it ELDEW®.

Schematic of Intercellular Lipid Model

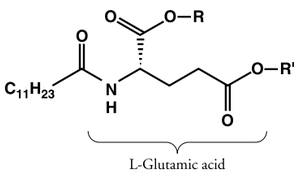


Schematic of Hair Cell Membrane Complex (CMC)



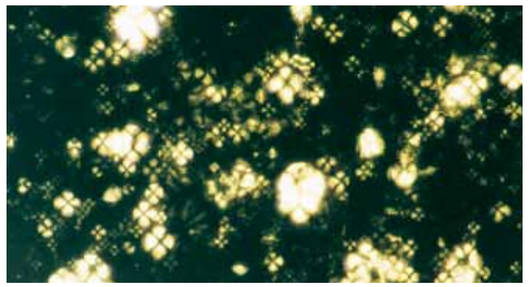
ELDEW® PS Series, CL Series

The ELDEW®s are emollient derived from L-Glutamic acid, natural fatty acid, higher alcohol and phytosterol or cholesterol. Our research has confirmed that ELDEW® forms lamella liquid crystals identical to ceramide. As a result, ELDEW®, a ceramide-like amino acid derivative, yields emollient efficacy comparable to that of a ceramide.



R, R' : Phytosteryl or Cholesteryl, Behenyl, Octyldodecyl

Polarization Microscope Image of a Model of Intercellular Lipids Combined with ELDEW®



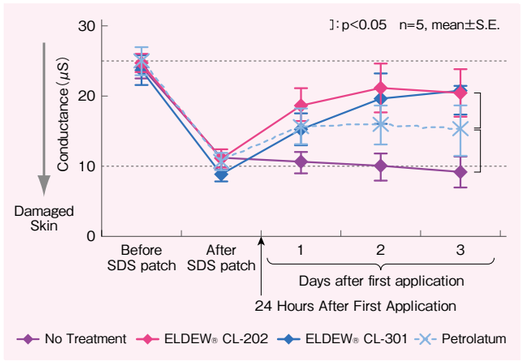
Components

Intercellular Lipid Model	wt.%A.I.
ELDEW® PS-203	18
Squalene	7
Triolein	25
Cholesterol Sulfate	2
Cholesterol	14
Phosphatidylethanolamine	5
Pristane	4
Fatty Acid Mixture	25

Skin and ELDEW®

Rough-skin Recovery Efficacy of ELDEW®

Because of its high affinity for the skin, ELDEW® starts to moisturize effectively as soon as it is applied. Further, this efficacy persists over long periods of time. Applied to SDS-induced rough skin, ELDEW® helps skin recover its ability to retain moisture, thus improving rough skin conditions.

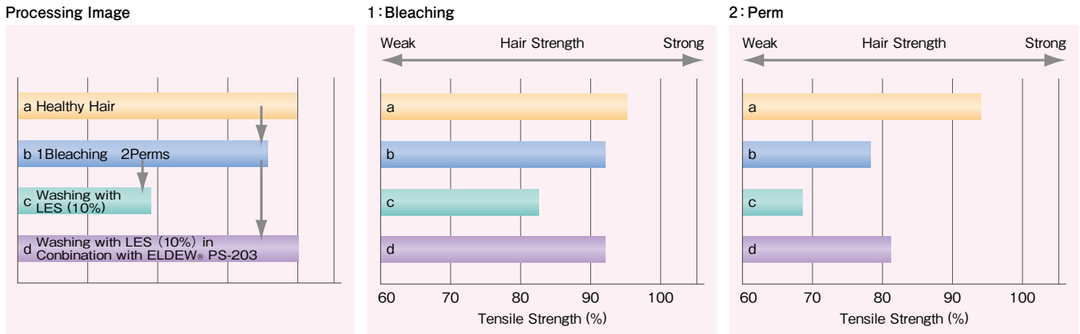


SDS : Sodium Lauryl Sulfate

Hair and ELDEW®

Efficacy of ELDEW® for Improving Hair Strength (Tensile Strength)

Working as a CMC-like substance, ELDEW® conditions and maintains healthy hair as well as helping to repair hair that has been damaged due to coloring or perming.



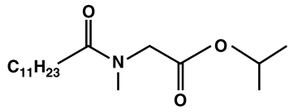
Applications

ELDEW® offers a wide variety of cosmetic applications. Its emollient efficacy makes it suitable for skincare products such as emulsions and essences, while its conditioner efficacy makes it a candidate for hair care products such as rinses and treatments. In addition, the high pigment dispersibility of ELDEW® results in applications that include makeup products such as foundations and lipsticks. ELDEW® improves the “feel” of a wide range of products.

ELDEW® is a product co-developed with Nippon Emulsion Co., Ltd.

ELDEW® SL-205

ELDEW® SL-205 is a new, highly polar emollient derived from amino acids and based on our proprietary amino acid technology. Possessing the ability to readily to dissolve challenging substances, such as organic UV filters and active ingredients, ELDEW® SL-205 delivers a soft but not oily feeling. All these properties combine to give formulators greater flexibility in developing new types of formula and product.



Dissolving Property Ⅰ

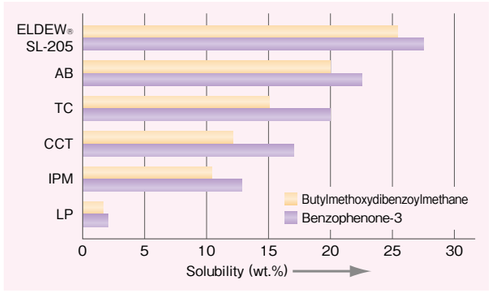
ELDEW® SL-205 can dissolve low-solubility ceramide, etc.

	Ceramide (mixture)			γ-Orizanol			Cholesterol		
	0.05 %	0.10 %	0.15 %	2.0 %	5.0 %	10.0 %	2.0 %	5.0 %	10.0 %
ELDEW® SL-205	S	S	S	S	S	S	S	S	S
CCT	I	I	I	S	S	I	S	I	I
IPM	I	I	I	S	I	I	S	I	I
LP	I	I	I	I	I	I	I	I	I

CCT : Caprylic/Capric Acid Triglyceride, (S : Soluble I : Insoluble)
IPM : Isopropyl Myristate, LP : Liquid Parrafin
Ceramide, γ-Orizanol and Cholesterol were solubilized at 80-90℃, then each solution was stood for 3 days at 5℃. Solubility was observed visually.

Dissolving Property Ⅱ

ELDEW® SL-205 can dissolve low-solubility organic UV filters.

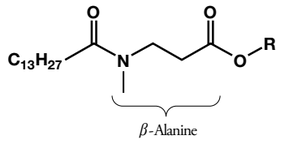


Ts data 1035-0222E

AB : C12-15 Alkyl Benzoate Crodamol AB Croda
TC : Tricaprylin Myritol 880 Cognis
CCT : Caprylic/Capric Triglyceride Myritol 318 Cognis
IPM : Isopropyl Myristate
LP : Mineral Oil
＊Each filter was mixed into emollient and vigorously stirred overnight at 25℃
Solubility was determined by HPLC.

ELDEW® APS-307

Ajinomoto Co. has been researching and developing cosmetic ingredients using our extensive knowledge of amino acids and skin science. Ajinomoto Co. first developed the ELDEW® CL series and the PS series which are efficacious emollients, derived from L-Glutamic acid and sterols. We then developed ELDEW® APS-307 light, waxy emollient derived from β-Alanine and phytosterol. It has an excellent moisturizing skin feel without stickiness.



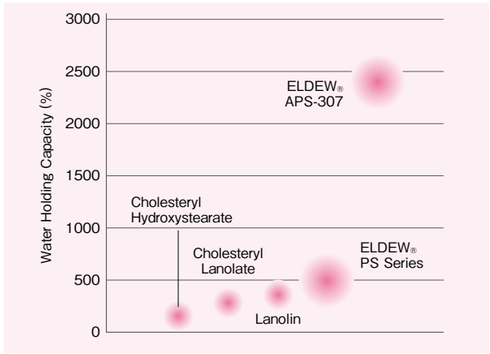
R : Phytosteryl, Decyltetradecyl

Water-holding capacity

ELDEW® APS-307 has a significant water-holding capacity giving it excellent moisturizing properties and making it suitable for a variety of cosmetic applications.

ELDEW® APS-307 after mixing with water.

Method : Water was gradually mixed into 10g of the sample until homogeneous. Sample was left overnight at room temperature and then excess water was eliminated. The amount of water in the 10g sample was measured.



Amino Acid-Based Ingredients for Personal Care

■Anionic Surfactant

Product Name	Product Code	Chemical Name	CAS No.	Physical Form	Packaging	PCPC INCI Name	Composition (%)
AMISOFT®	CT-12 CT-12S	Triethanolamine N-Cocoyl-L-Glutamate, Water	68187-29-1	30% Aqueous Solution	18kg Can 200kg Drum 1t Container	TEA-Cocoyl Glutamate	30.0
						Water	70.0
	LT-12	Triethanolamine N-Lauroyl-L-Glutamate, Water	53576-49-1 31955-67-6	30% Aqueous Solution	18kg Can	TEA-Lauroyl Glutamate	30.0
						Water	70.0
	CK-22	Potassium N-Cocoyl-L-Glutamate, water	–	30% Aqueous Solution	18kg Can	Potassium Cocoyl Glutamate	28.8
						Water	71.2
	CS-22	Sodium N-Cocoyl-L-Glutamate, Water	68187-30-4 (Disodium)	25% Aqueous Solution	18kg Can 200kg Drum 1t Container	Disodium Cocoyl Glutamate	20.0
			68187-32-6 (Sodium)			Sodium Cocoyl Glutamate	5.0
						Water	75.0
	ECS-22SB	Sodium N-Cocoyl-L-Glutamate, Water	68187-30-4	30% Aqueous Solution	25kg Drum 220kg Drum	Disodium Cocoyl Glutamate	30.0
						Water	70.0
	ECS-22W	Sodium N-Cocoyl-L-Glutamate, Water	68187-30-4	30% Aqueous Solution	25kg Drum 220kg Drum	Disodium Cocoyl Glutamate	30.0
						Water	70.0
	CS-11 CS-11 (F)	Sodium N-Cocoyl-L-Glutamate	68187-32-6	Powder, Flake	15kg Carton	Sodium Cocoyl Glutamate	100.0
	CK-11 (F)	Potassium N-Cocoyl-L-Glutamate	287735-37-9	Flake	15kg Carton	Potassium Cocoyl Glutamate	100.0
	LK-11 (F)	Potassium N-Lauroyl-L-Glutamate	89187-78-0	Flake	15kg Carton	Potassium Lauroyl Glutamate	100.0
	LS-11 LS-11 (F)	Sodium N-Lauroyl-L-Glutamate	29923-31-7 42926-22-7	Powder, Flake	15kg Carton	Sodium Lauroyl Glutamate	100.0
	MK-11 MK-11 (F)	Potassium N-Myristoyl-L-Glutamate	72716-26-8	Powder, Flake	15kg Carton	Potassium Myristoyl Glutamate	100.0
	MS-11 MS-11 (F)	Sodium N-Myristoyl-L-Glutamate	38517-37-2 71368-20-2	Powder, Flake	15kg Carton	Sodium Myristoyl Glutamate	100.0
	GS-11P	Sodium N-Acyl-L-Glutamate	38517-23-6 (Stearoyl)	Powder	15kg Carton	Sodium Stearoyl Glutamate, Sodium Cocoyl Glutamate	100.0
			68187-32-6 (Cocoyl)				
	GS-11P (F)	Sodium N-Acyl-L-Glutamate	38517-23-6 (Stearoyl)	Flake	15kg Carton	Sodium Palmoyl Glutamate	100.0
			68187-32-6 (Cocoyl)				
	HS-11P HS-11P (F)	Sodium N-Stearoyl-L-Glutamate	38517-23-6	Powder, Flake	15kg Carton	Sodium Stearoyl Glutamate	100.0
	HS-21P	Disodium N-Stearoyl-L-Glutamate	38079-62-8	Powder	15kg Carton	Disodium Stearoyl Glutamate	100.0
	LA-D	N-Lauroyl-L-Glutamic Acid	3397-65-7	Powder	20kg Carton	Lauroyl Glutamic Acid	100.0
	MA	N-Myristoyl-L-Glutamic Acid	53576-52-6	Powder	20kg Carton	Myristoyl Glutamic Acid	100.0
	HA-P	N-Stearoyl-L-Glutamic Acid	3397-16-8	Powder	20kg Carton	Stearoyl Glutamic Acid	100.0
AMILITE®	ACT-12	Triethanolamine N-Cocoyl-DL-Alaninate, Water	301341-05-9	30% Aqueous Solution	18kg Can 200kg Drum	TEA-Cocoyl Alaninate	30.0
						Water	70.0
	ACT-12L	Triethanolamine N-Cocoyl-L-Alaninate, Water	301341-05-9	30% Aqueous Solution	18kg Can 200kg Drum	TEA-Cocoyl Alaninate	30.0
						Water	70.0
	ACS-12	Sodium N-Cocoyl-L-Alaninate, Water	90170-45-9	30% Aqueous Solution	18kg Can 200kg Drum 1t Container	Sodium Cocoyl Alaninate	30.0
						Water	70.0
	GCK-11	Potassium N-Cocoyl Glycinate	301341-58-2	Powder	15kg Carton	Potassium Cocoyl Glycinate	100.0
	GCK-12K	Potassium N-Cocoyl Glycinate, Water	301341-58-2	30% Aqueous Solution	18kg Can 200kg Drum 1t Container	Potassium Cocoyl Glycinate	30.0
						Water	70.0
	GCK-12H	Potassium N-Cocoyl Glycinate, Potassium Cocoate, Water	1170699-53-2	30% Aqueous Solution	25kg Drum 220kg Drum	Potassium Cocoyl Glycinate	21.0
						Potassium Cocoate	9.0
						Water	70.0
	GCS-11	Sodium N-Cocoyl Glycinate	90387-74-9	Powder	15kg Carton	Sodium Cocoyl Glycinate	100.0
	GCS-12K	Sodium N-Cocoyl Glycinate, Water	90387-74-9	30% Aqueous Solution	18kg Can 200kg Drum 1t Container	Sodium Cocoyl Glycinate	30.0
						Water	70.0

Product Name	Product Code	Chemical Name	CAS No.	Physical Form	Packaging	PCPC INCI Name	Composition (%)
AMILITE®	ET-CS-12	Sodium N-Cocoyl-L-Glutamate	68187-30-4	25% Aqueous Solution	18kg Can 200kg Drum	Disodium Cocoyl Glutamate	16
			68187-32-6			Sodium Cocoyl Glutamate	4
		Sodium N-Cocoyl-L-Threoninate	90583-79-2			Sodium Cocoyl Threoninate	5
		Water	–			Water	75
AMINOSOAP	AR-12	L-Arginine, Coconut Acid, Potassium Hydroxide, Water	61788-47-4 (Coconut Acid)	30% Aqueous Solution	18kg Can	Arginine Cocoate	30.2
			74-79-3 (Arginine)			Water	69.8
			1310-58-3 (Potassium Hydroxide)				

■Cationic Surfactant

CAE	–	DL-Pyrrolidonecarboxylic Acid Salt of L-Cocoyl Arginine Ethyl Ester	95370-65-3	Powder	1kg Carton 5kg Carton	PCA Ethyl Cocoyl Arginate	100.0

■Amphoteric Surfactant

AMISAFE®	LMA-60	N-[3-Alkyl (12,14) Oxy-2-Hydroxypropyl]-L-Arginine Hydrochloride, Ethanol, Water	205486-69-7 (C12-form)	60% Solution	17kg Can	Hydroxypropyl Arginine Lauryl/Myristyl Ether HCl	60.0
			205815-33-4 (C14-form)			Alcohol	20.0
			64-17-5 (Ethanol)				
			7732-18-5 (Water)			Water	20.0
	AL-01	N^{α}-Lauroyl-L-Arginine	42492-22-8	Powder	3kg Carton	Lauroyl Arginine	100.0
	LL-DS-22	Disodium Nα, Nα'-sebacoylbis (N^{ε}-Lauroyl-L-Lysinate)	–	10% Aqueous Solution	18kg Poly Can	Disodium Sebacoyl Bis-Lauramidolysine	10.0
						Water	90.0

■Functional Powder

AMIHOPE®	LL	N^{ε}-Lauroyl-L-Lysine	52315-75-0	Powder	1kg and 10kg Cartons	Lauroyl Lysine	100.0
	OL	N^{ε}-Capryloyl-L-Lysine	23735-96-8	Powder	1kg and 10kg Cartons	N-Capryloyl Lysine	100.0

■Gelatinization Agent

Gelatinization Agent	EB-21	N-2-Ethylhexanoyl-L-Glutamic acid Dibutylamide	861390-34-3	Powder	1kg Carton 15kg Carton	Dibutyl Ethylhexanoyl Glutamide	100.0
	GP-1	N-Lauroyl-L-Glutamic acid Dibutylamide	63663-21-8	Powder	1kg Carton 15kg Carton	Dibutyl Lauroyl Glutamide	100.0

■Humectant

AJIDEW®	A-100	DL-Pyrrolidone Carboxylic Acid	149-87-1	Powder	25kg Fiber Drum	PCA	100.0
	NL-50	Sodium L-Pyrrolidonecarboxylate, Water	28874-51-3	50% Aqueous Solution	25kg Drum 250kg Drum	Sodium PCA	50.0
						Water	50.0
	ZN-100	Zinc Salt of L-Pyrrolidonecarboxylate	15454-75-8	Powder	4kg Carton 25kg Fiber Drum	Zinc PCA	100.0
AQUADEW	SPA-30B	Sodium Polyaspartate	94525-01-6	Aqueous Solution	20kg Can	Sodium Polyaspartate	30.0
		1,3-Butylene Glycol	107-88-0			Butylene Glycol	8.0
		Ethylenediaminetetraacetic acid, disodium salt	139-33-3			Disodium EDTA	0.1
		Water	7732-18-5			Water	61.9
PRODEW®	P-DS-12	Sodium N-Decanoyl-L-Prolinate, Water	1364318-34-2	30% Aqueous Solution	18kg Can	Sodium Caproyl Prolinate	30.0
						Water	70.0
	300	Sodium Lactate	72-17-3	50% Aqueous Solution	25kg Drum	Sodium Lactate	29.0
		Sodium DL-Pyrrolidone Carboxylate	54571-67-4			Sodium PCA	10.55
		Sorbitol	50-70-4			Sorbitol	7.56
		L-Proline	147-85-3			Proline	2.9
		Methyl p-Hydroxybenzoate	99-76-3			Methylparaben	0.1
		Propyl p-Hydroxybenzoate	94-13-3			Propylparaben	0.005
		Water	7732-18-5			Water	balance

Product Name	Product Code	Chemical Name	CAS No.	Physical Form	Packaging	PCPC INCI Name	Composition (%)
PRODEW®	400	Trimethylglycine	107-43-7	50% Aqueous Solution	22kg Drum	Betaine	30.0
		Sodium DL-Pyrrolidone Carboxylate	54571-67-4			Sodium PCA	10.0
		Sorbitol	50-70-4			Sorbitol	4.2
		L-Serine	56-45-1			Serine	1.5
		Glycine	56-40-6			Glycine	1.0
		L-Glutamic Acid	56-86-0			Glutamic Acid	0.75
		L-Alanine	56-41-7			Alanine	0.40
		L-Lysine	56-87-1			Lysine	0.35
		L-Arginine	74-79-3			Arginine	0.35
		L-Threonine	72-19-5			Threonine	0.1
		L-Proline	147-85-3			Proline	0.1
		Methyl p-Hydroxybenzoate	99-76-3			Methylparaben	0.2
		Propyl p-Hydroxybenzoate	94-13-3			Propylparaben	0.005
		Water	7732-18-5			Water	balance
	500	Sodium L-Pyrrolidone Carboxylate	28874-51-3	50% Aqueous Solution	25kg Drum	Sodium PCA	15.00
		Sodium Lactate	72-17-3			Sodium Lactate	12.00
		L-Arginine	74-79-3			Arginine	8.00
		L-Aspartic Acid	56-84-8			Aspartic Acid	5.20
		L-Pyrrolidonecarboxylic Acid	98-79-3			PCA	4.27
		Glycine	56-40-6			Glycine	1.28
		L-Alanine	56-41-7			Alanine	1.20
		L-Serine	56-45-1			Serine	0.80
		L-Valine	72-18-4			Valine	0.64
		L-Proline	147-85-3			Proline	0.40
		L-Threonine	72-19-5			Threonine	0.40
		L-Isoleucine	73-32-5			Isoleucine	0.40
		L-Histidine	71-00-1			Histidine	0.16
		L-Phenylalanine	63-91-2			Phenylalanine	0.16
		Water	7732-18-5			Water	balance
	600	Trimethylglycine	107-43-7	50% Aqueous Solution	22kg Drum	Betaine	26.87
		Sodium L-Pyrrolidone Carboxylate	28874-51-3			Sodium PCA	9.75
		Sodium Lactate	72-17-3			Sodium Lactate	5.00
		DL-Pyrrolidone Carboxylic Acid	149-87-1			PCA	3.78
		L-Serine	56-45-1			Serine	1.12
		L-Alanine	56-41-7			Alanine	1.06
		Glycine	56-40-6			Glycine	1.00
		L-Glutamic Acid	56-86-0			Glutamic Acid	0.43
		L-Lysine Hydrochloride	657-27-2			Lysine HCl	0.34
		L-Threonine	72-19-5			Threonine	0.32
		L-Arginine	74-79-3			Arginine	0.29
		L-Proline	147-85-3			Proline	0.04
		Water	7732-18-5			Water	balance

■Emollient

ELDEW®	CL-301	Di (Cholesteryl・Behenyl・Octyldodecyl) N-Lauroyl-L-Glutamate	245443-08-7	Wax	1kg Plastic Bottle 15kg Can	Cholesteryl/Behenyl/ Octyldodecyl Lauroyl Glutamate	100.0
	CL-202	Di (Cholesteryl・Octyldodecyl) N-Lauroyl-L-Glutamate	245443-07-6	Liquid	1kg Plastic Bottle 15kg Can	Cholesteryl/ Octyldodecyl Lauroyl Glutamate	100.0
	PS-203	Di (Phytosteryl・2-Octyldodecyl) - N-Lauroyl-L-Glutamate	220465-88-3	Liquid	1kg Plastic Bottle 15kg Can	Phytosteryl/ Octyldodecyl Lauroyl Glutamate	100.0
	PS-203R	Di (Phytosteryl・2-Octyldodecyl) - N-Lauroyl-L-Glutamate	220465-88-3	Liquid	1kg Plastic Bottle 15kg Can	Phytosteryl/ Octyldodecyl Lauroyl Glutamate	100.0
	PS-304	Di (Phytosteryl・Behenyl・2-Octyldodecyl) -N-Lauroyl-L-Glutamate	245443-09-8	Wax	1kg Plastic Bottle 15kg Can	Phytosteryl/Behenyl/ Octyldodecyl Lauroyl Glutamate	100.0
	PS-306	Di (Phytosteryl・Behenyl・2-Octyldodecyl) -N-Lauroyl-L-Glutamate	245443-09-8	Wax	1kg Plastic Bottle 15kg Can	Phytosteryl/Behenyl/ Octyldodecyl Lauroyl Glutamate	100.0
	PS-306R	Di (Phytosteryl・Behenyl・2-Octyldodecyl) -N-Lauroyl-L-Glutamate	245443-09-8	Wax	1kg Plastic Bottle 15kg Can	Phytosteryl/Behenyl/ Octyldodecyl Lauroyl Glutamate	100.0
	SL-205	Isopropyl N-Lauroyl Sarcosinate	230309-38-3	Liquid	15kg Can	Isopropyl Lauroyl Sarcosinate	100.0
	APS-307	(Phytosteryl・Decyltetradecyl) -N-Myristoyl-N-Methyl-β-Alaninate	1085852-72-7	Wax	1kg Plastic Bottle 15kg Can	Phytosteryl/Decyltetradecyl Myristoyl Methyl Beta-Alaninate	100.0

ELDEW® CL Series, PS Series and APS Series contain 0.01% of Tocopherol.