

Amino Acid Based Humectant

AJIDEW® NL-50



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Introduction

Moisture retention ability of skin and NMF (amino acids and PCA)

The largest component of the human body is water, which is said to account for 60~70% of the body weight. The skin plays an essential role if humans are to survive in a dry atmosphere. Without the skin, moisture would escape from the body very rapidly. The skin has various functions, such as controlling the body temperature and acting as a sense organ and a physical barrier. The outermost layer of the skin (stratum corneum) has a thickness of only about 20 μ m, but assumes the most important role in retaining moisture. (See Fig.1)

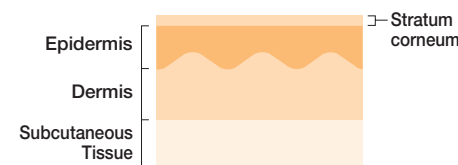


Fig. 1 Structure of the skin

Table 1 Composition of NMF

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

It is well known that the barrier function of intercellular lipids, composed of ceramide, cholesterol, and fatty acids, and the moisture retention effect of natural moisturizing factor (NMF) are important for retention of moisture by the skin. It is extremely important for the stratum corneum to retain moderate amounts of moisture to maintain the flexibility. It is also important from the viewpoint of health and beauty. As shown in Table 1, NMF is composed of amino acids, sodium pyrrolidone carboxylate (Sodium PCA), and other substances.*² It is reported that there is a strong correlation between the concentration of amino acid and Sodium PCA and moisture retention of the stratum corneum. It is also known that amino acid levels and PCA levels are significantly higher in healthy skin than in dry skin.*³ Further, it has been shown that topical application of a model NMF solution (containing Sodium PCA) to the skin promotes the absorption of each component of NMF into the stratum corneum (Fig.2), and thus significantly increases skin moisture and flexibility (Fig.3).

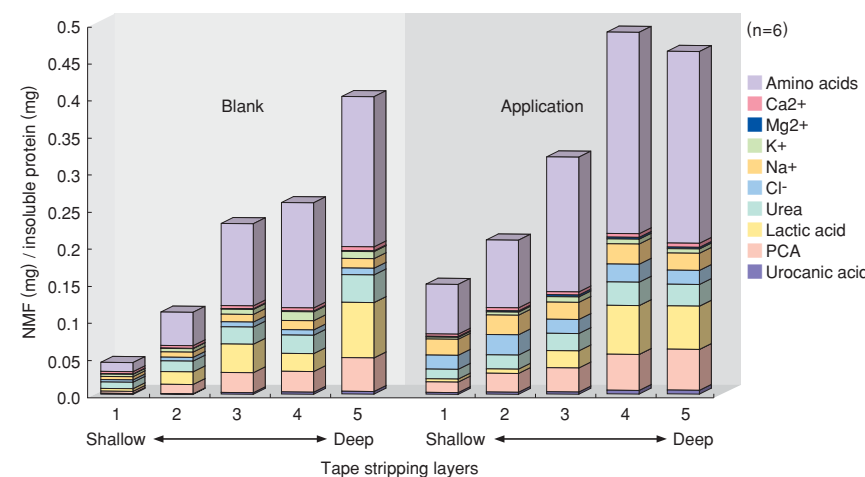


Fig.2 Permeability of NMF
TS data No.3000-0570E

From the fact that the composition of amino acids in NMF is extremely similar to that of the amino acids that constitute the protein known as filaggrin in the cells of the stratum corneum, it can be assumed that filaggrin is degraded in the stratum corneum to produce NMF*^{4,5}. It has also been reported that glutamic acid and glutamic acid residues of filaggrin are transformed to PCA by enzymes after being released as free amino acids.*⁶⁻⁸ Glutamine and sodium glutamate do not promote moisture retention. However, Sodium PCA strongly promotes moisture retention*⁹, suggesting that the body actively synthesizes Sodium PCA with a strong hygroscopic effect.

What is PCA?

PCA and its salts show a high content in the skin as components of NMF. They are also found in plants such as mushrooms*⁷, onions*⁸, wheat*⁹, barley*¹⁰, and soybeans*¹¹.

PCA exists as a white crystalline substance that does not have any moisture absorption or retention effects in its acid form, but its salt shows excellent moisture absorption and retention. Comparison of the absorption and retention of moisture by various moisturizing agents (Fig.4), and the absorption and retention of moisture by various moisturizing agents combined with keratin powder (Fig.5) has shown that Sodium PCA achieves superior moisture absorption and retention ability than the other moisturizing agents.

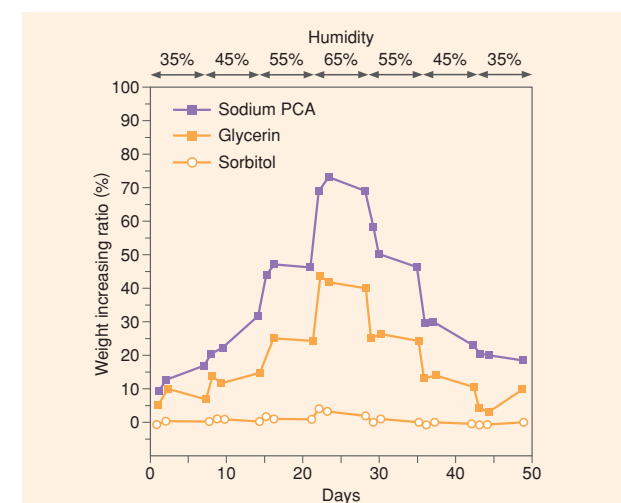


Fig.4 Hygroscopicity and moisturizing proterty of Sodium PCA (25°C)

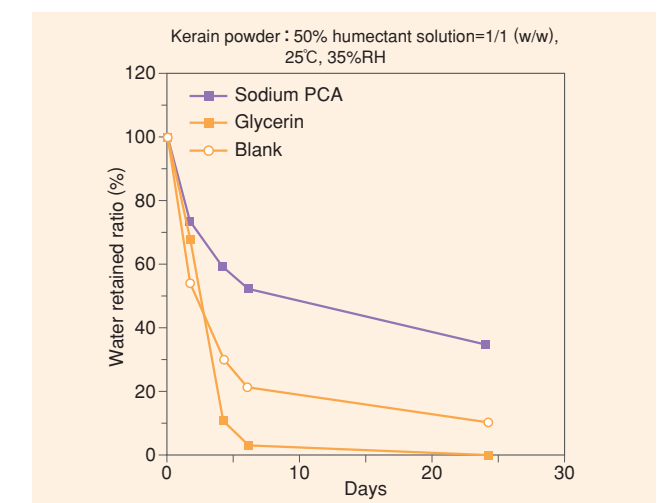


Fig.5 Moisturizing effect on keratin powder

PCA mostly exists in its salt form at pH 5~6 in the skin. It promotes moisture retention and flexibility of the stratum corneum and is known to have a stronger effect than glycerin or sorbitol. Besides Sodium PCA shows a high biodegradability (Fig.6) and it can be said that it has high environmental compatibility.

We, AJINOMOTO, manufacture and sell Sodium PCA as the raw materials for cosmetics. It is produced from glutamic acid that is obtained by fermentation of sugar cane. It has been found that Sodium PCA promotes moisture retention as well as having various other useful effects for skin and hair. Its multiple functions are introduced next, based on the data obtained by our experiments.

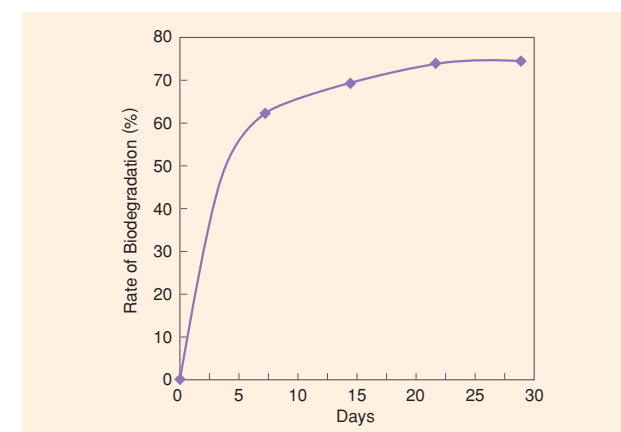


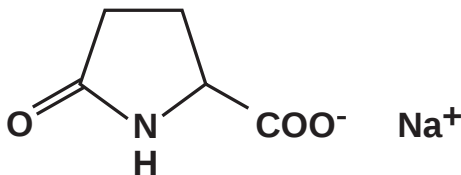
Fig.6 Biodegradability of Sodium PCA (in accordance with OECD-modified-MITI-method)
TS data No. 1001-0101E

Material Introduction

AJIDEW® NL-50

Sodium PCA (Sodium Pyrrolidone Carboxylate) 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 fresh-looking.

Molecular Structure



AJIDEW® NL-50	
Chemical Name	Sodium L-Pyrrolidonecarboxylate
CAS	28874-51-3
PCPC INCI Name	Sodium PCA

Characteristics

Concept

Because of its plant origin,its high safety and high degradability, it is able to help the concept of your cosmetic products.

Function

- hair

It improves finger gliding during rinsing, and moisture feeling and control of hair after dried.
- skin

It keeps the moisture and flexibility of skin even under lower humidity.



Major Application

Hair care products	●Shampoos	●Hair conditioners	●Hair color products
	●Hair styling products	●Permanent wave lotions	
Skin care products	●Body shampoos	●Creams	●Lotions
Home care products	●Kitchen detergent		

Recommended concentration

- Hair care

: Around 1~3% (Rinse off product)
Around 1% (Leave on product)
- Skin care

: Around 1~3% (Rinse off product)
Around 1% (Leave on product)



Efficacy on hair

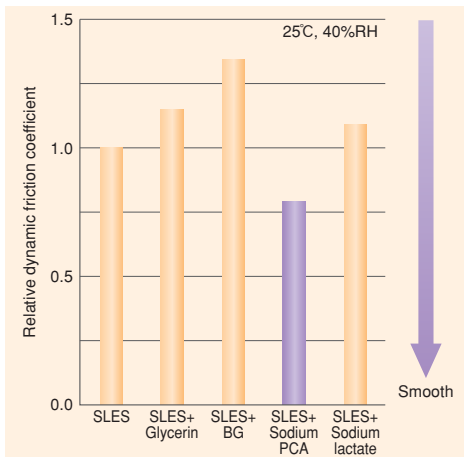
Additive effect for hair care products on AJIDEW® NL-50

Hair shampoo

Reduction of wet friction of hair by Sodium PCA /shampoo

By addition of Sodium PCA into SLES hair shampoo wet hair friction is reduced.

TS data No.1001-0072E



Relative dynamic friction coefficient

Methods:

Test materials:0.25wt.% active of a moisturizer was added into a SLES solution of 1wt.% active.

Shampoo process:a fixed hair piece (20 hair fibers) was stirred for 30 seconds in the mixed solution.

Rinse process:the fixed hair piece was immersed in warm water (35~40°C) and stirred further for 30 seconds.

These shampoo and rinse processes were repeated twice on each hair piece, then wet friction was measured (25°C, 40%RH) by a friction tester (KES-SE, KATO TECH). Three hair pieces were subjected for each test material. Relative dynamic friction coefficient was determined as following

$$\text{Relative dynamic friction coefficient} = \frac{\text{dynamic friction coefficient}_{\text{SLES + moisturizer}}}{\text{dynamic friction coefficient}_{\text{SLES only}}}$$

Methods:

Treatment with shampoo and wet combability measurement

Two mL of each shampoo was applied to a previously wetted hair tress, then rubbed for one minute and rinsed for one minute. The swatch was combed with a wide-toothed comb once and wet combability was measured. (ENIC DL 2000 tensiletester)

Dry combability measurement and determination of ΔEnergy

The tresses were allowed to dry in a conditioned room (22°C, 55%RH) for 14 hours. Combability of dry hair tresses was measured. Five hair tresses were subjected to treatment with each shampoo. Change of work (ΔEnergy) for each tress was determined as follows:

$$\text{Change of work (}\Delta\text{Energy)} = \text{Energy}_{\text{treated}} - \text{Energy}_{\text{initial}}$$

Test formulas

	Control	Cationic Guar	0.5% Sodium PCA	0.25% Sodium PCA	Cationic Guar Sodium PCA
Na Laureth sulfate (27%) ^{*1}	28.00	28.00	28.00	28.00	28.00
Cocamidopropyl betaine (30%) ^{*2}	4.00	4.00	4.00	4.00	4.00
Guar hydroxypropyl trimonium chloride ^{*3}	—	0.25	—	—	0.10
Sodium PCA	—	—	0.50	0.25	0.25
Pearlizing agent premix ^{*4}	4.00	4.00	4.00	4.00	4.00
Preservative ^{*5}	0.15	0.15	0.15	0.15	0.15
NaCl	←	to 5,500mPa·s	→		
Citric acid	←	to pH 5.8	→		
Water	balance	balance	balance	balance	balance
Total	100.00	100.00	100.00	100.00	100.00

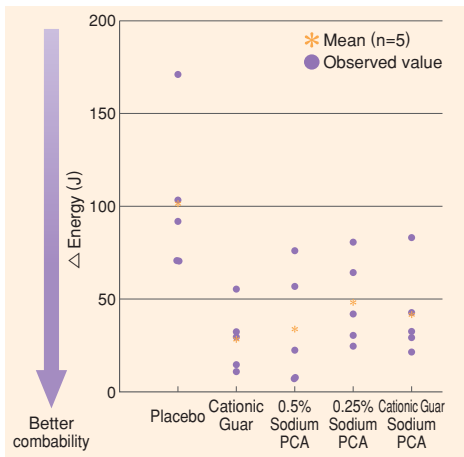
^{*1} Texapon HBN Cognis
^{*2} Dehyton KB Cognis
^{*3} Cosmedia Guar C261N Cognis
^{*4} Euperlan PK 771 Cognis
^{*5} Kathon CG Rhom & Haas

Wet and dry combability /shampoo

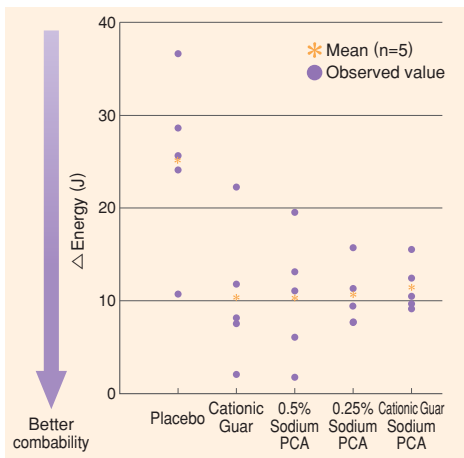
Sodium PCA improves wet and dry combability. The amount of Cationic Guar could be reduced by applying Sodium PCA in a combination with Cationic Guar. By reducing the amount of cationic Guar,the reduction of the sticky feeling caused by cationic Guar can be expected.

TS data No.1001-0610E

TS data No.1001-0620E



Wet Combability

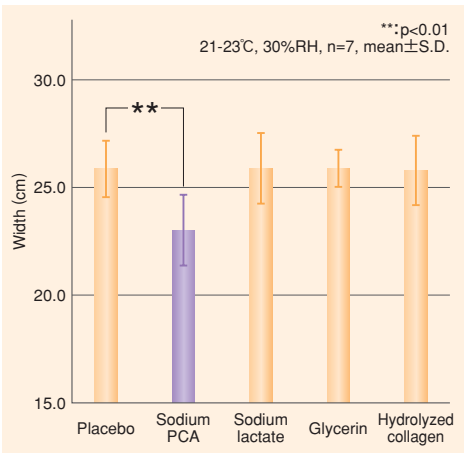


Dry Combability

Hair control/shampoo

Shampoo incorporated with Sodium PCA reduces hair fly, resulting in improved hair control. It is known to have a stronger effect than other moisturizers.

TS data No.1001-0501E
TS data No.1001-0521E



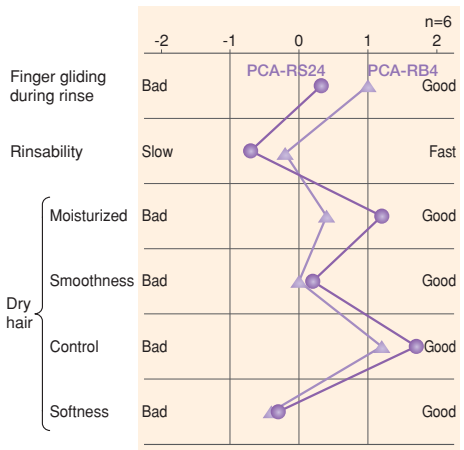
Unity inclination of hair by various humidity agent

Hair Conditioner

Sensory evaluation /hair conditioner

Sodium PCA in a hair conditioner improves finger gliding during rinse, moisturized feel of dry hair and control of hair.

TS data No.1001-0421E



Sensory evaluation

Methods:

Hair tress:18cm in length, 4.5g in weight, European natural hair
1.Hair piece was washed with shampoo (applying 1mL of shampoo for 1 minute) and rinsed with tap water of 40°C for 1 minute.
2.After combing out the tangles, the tress was dried overnight.
3.The tress was quickly combed 20 times and the width of the tip end was measured. (23°C / 40%RH)

Test formulas

	Placebo	Combined with Sodium PCA
SLES (2E.O.) (27%)*1	40.00	40.00
Cocamidopropyl betaine (30%)*2	8.00	8.00
Lauramide IPA*3	0.50	0.50
Citric acid	0.05	0.05
Moisturizers (A.I.)	—	1.50
Antiseptic	0.40	0.40
Water	balance	balance
Total	100.00	100.00

*1 TEXAPON HS Cognis Japan
*2 Genamin B3267-J Clariant Japan
*3 Amisol PLME Kawaken Fine Chemicals

Hair control /hair conditioner

Sodium PCA in a hair conditioner improves hair control.

TS data No.1001-0431E



Methods:

The wig hair was washed with a commercially available shampoo. A half side was treated with a hair conditioner without Sodium PCA (Placebo) and a conditioner with Sodium PCA was applied to the other. After rinsed thoroughly with warm water, it was blow-dried.

Test formulas (See RS24-H1L)

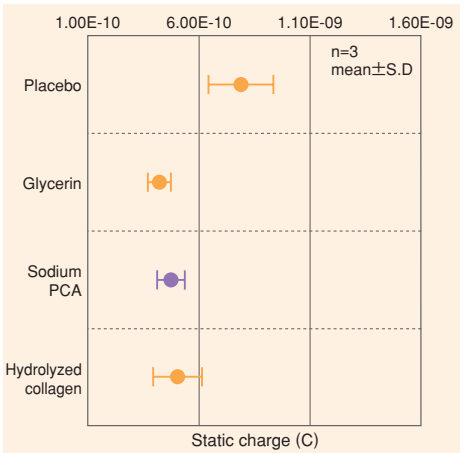
	Placebo	Hair Conditioner with Sodium PCA
Stearammonium chloride*1	2.00	2.00
Cetyl alcohol*2	4.00	4.00
Hexyldecyl isostearate*3	2.00	2.00
Lactic acid (10%)	0.10	0.10
Methylparaben	0.20	0.20
EDTA-2Na	0.05	0.05
Sodium PCA	—	2.00
Dimethicone*4	2.00	2.00
Water	balance	balance
Total	100.00	100.00

*1 Quaternium 86P Kao
*2 Kalcyl 6098 Kao
*3 ICIS Kokyu Alcohol Kogyo
*4 TSF451-1M Toshiba Silicon

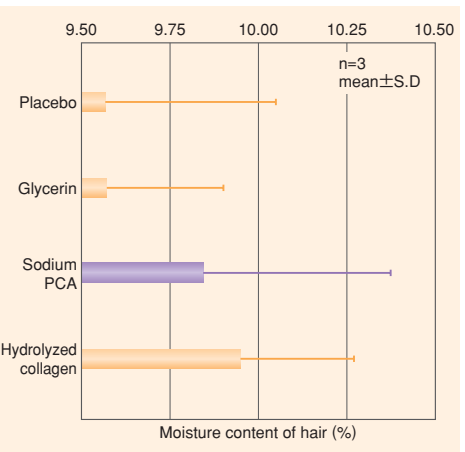
Antistatic and moisturizing effect /hair conditioner

Sodium PCA in a hair conditioner exhibits good anti static effect and moisture retention.

TS data No.1001-0451E
TS data No.1001-0461E



Static charge of hair



Moisture content of hair

Methods:

Treatment:Bleached hair was treated with hair conditioner and wrapped with plastic film to be left at 40°C for 15 minutes. After the film was removed and rinsed thoroughly, it was rinsed with deionized water lightly, blow-dried and left at 25°C / 40%.

Measurement:The static charge of hair was measured by a comb electrode. Moisture content of the hair was determined by a Karl Fischer with a water vaporizing unit (CA-06 • VA-06, Mitsubishi Chemistry). About 30mg of hair cut into 1mm length was subjected to one measurement.

Test formulas (See RS24-H1L)

	Placebo	Hair Conditioner with moisturizer
Stearammonium chloride*1	2.00	2.00
Cetyl alcohol*2	4.00	4.00
Hexyldecyl isostearate*3	2.00	2.00
Lactic acid (10%)	0.10	0.10
Methylparaben	0.20	0.20
EDTA-2Na	0.05	0.05
Moisturizer (A.I.)	—	2.00
Dimethicone*4	2.00	2.00
Water	balance	balance
Total	100.00	100.00

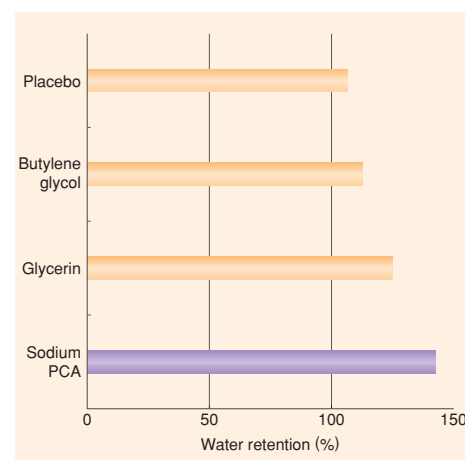
*1 Quaternium 86P Kao
*2 Kalcyl 6098 Kao
*3 ICIS Kokyu Alcohol Kogyo
*4 TSF451-1M Toshiba Silicon

●Permanent-Wave

Moisturizing effect by sodium PCA /Permanent-Wave

Sodium PCA prevents hair from drying during permanent-wave treatment.

TS data No.1001-0163E

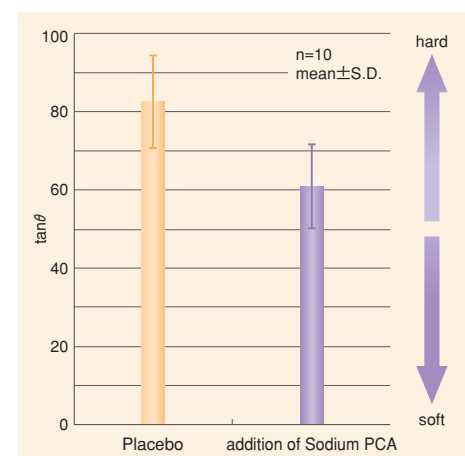


Moisturizing effect of Sodium PCA

Hair softening effect by Sodium PCA /Permanent-Wave

When Sodium PCA is incorporated into waving lotion, hair fibers are softer.

TS data No.1001-0201E



Permanent wave solution combined with Sodium PCA

Odor Suppression by Sodium PCA /Permanent-Wave

Sodium PCA reduces ammonia odor of a cysteine-base waving lotion.

TS data No.1001-0212E

<Result of sensory evaluation>

All of 5 panelists answered that formula placebo had stronger odor.

Methods:

The weight of hair tresses of 50 hair fibers each were measured with accuracy (initial). They were immersed in a waving lotion for 3 minutes. After being kept at 25°C / 40%RH for 30 minutes, their weight were measured again.

$$\text{Water retention (\%)} = \frac{\text{Weight 30 minutes after}}{\text{Weight initial}} \times 100$$

Test formulas

Permanent-Wave waving lotion	Placebo	With moisturizer
Ammonium thioglycolate (50%)	10.0	10.0
Ammonia solution (28%)	3.0	3.0
Moisturizer (A.I.)	0	5.0
Water	balance	balance
Total	100.0	100.0

Methods:

After treated with the waving lotion and the neutralizer three times each, tensile test was conducted on a Rheometer (NRM-2010J, Fudo Kogyo). The indicator of softness, $\tan \theta$, was calculated from the resulting stress-strain curve.

$$\tan \theta = \frac{\text{Stress to the Hookean limit}}{\text{Extension to the Hookean limit (g/mm)}} \quad (\text{See Technical Data Sheet No.1001-0191E})$$

Test formulas

Permanent-wave waving lotion	Placebo	With Sodium PCA
Sodiumthioglycolate (50%)	10.0	10.0
Ammonia (28%)	3.0	3.0
Sodium PCA	—	5.0
Water	balance	balance
Total	100.0 (wt.%)	100.0 (wt.%)

Methods:

Sensory evaluation by 5 experienced panelists.

Test formulas

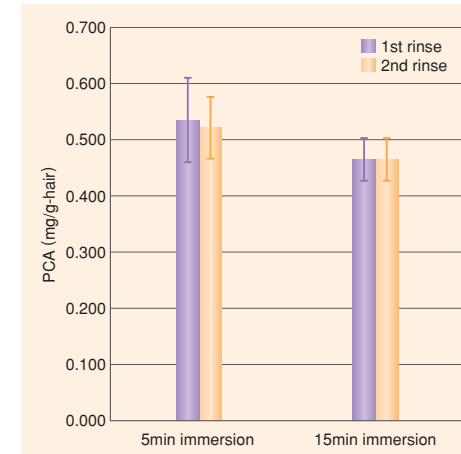
Formulation No.	Placebo	CPW-2P
L-Cysteine	4.0	4.0
Ammonia solution (28%)	4.0	4.0
Ammonium thioglycolate (50%)	1.5	1.0
Sodium PCA	—	1.0
Water	balance	balance
Total	100.0	100.0 (wt.%)

●Quantity remaining of sodium PCA on hair

Sodium PCA remains on hair after rinsing.

Remaining sodium PCA on hair gives several efficacy for hair.

TS data No.1001-0670E



Quantity remaining of Sodium PCA on hair

Methods:

Hair (1g weighed accurately) was immersed in 100mL of Sodium PCA solution for 5 or 15 minutes at 25°C.

It was rinsed by shaking in 100mL of ion-exchange water at 25°C. The weight of PCA in the solution was determined by HPLC and PCA remaining on hair was calculated using the following formula.

$$\text{Remaining PCA weight} = (W - W') \times C' - \sum w_n \cdot c_n$$

Sodium PCA solution Initial weight = W
Sodium PCA solution Initial Concentration = C
Sodium PCA solution Weight after immersion (after removal of hair) = W'
Sodium PCA solution Concentration after immersion (after removal of hair) = C'
nth rinse solution Weight after rinsing (after removal of hair) = W'_n
nth rinse solution Concentration after rinsing (after removal of hair) = C_n

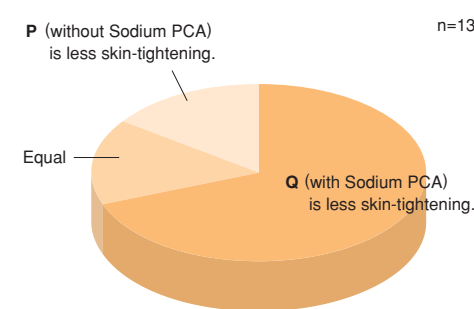
Efficacy on skin

Additive effect for skin care products on Sodium PCA

Efficacy on skin

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

TS data No.1001-0831E



Result of face-wash test

Procedure:

1. Half face was washed with 1.0mL of P, and the other half face was washed with Q.
2. Rinsed with tap water, and dried with towel.
3. After five minutes, sensory feeling of both half faces was compared (23°C, 40% RH).

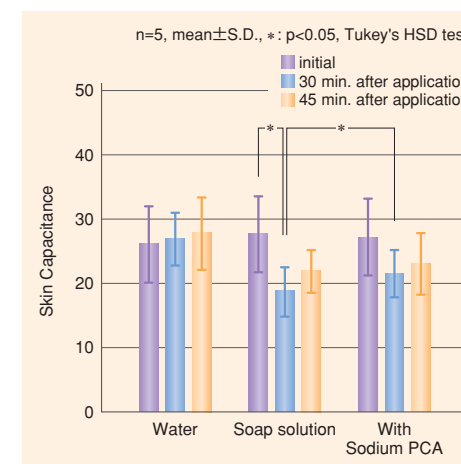
Test formulas

	P without Sodium PCA	Q with Sodium PCA
Lauric Acid	5.0	5.0
Myristic Acid	3.0	3.0
Palmitic Acid	1.0	1.0
Sodium PCA	—	4.0
KOH (85%)	to pH 9.0	to pH 9.0
Water	Balance	Balance
Total	100.0	100.0

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 No.1001-0860E



Skin capacitance / Soap-base system

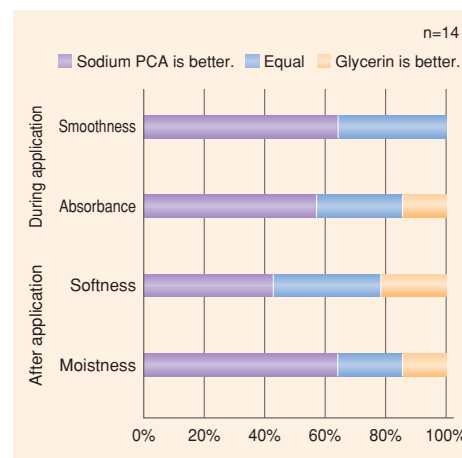
Methods:

1. A forearm skin was rinsed with 3L of luke-warm water and dried. Then the subjects were acclimatized at 23°C, 40% RH for 30 minutes. Then initial skin capacitance of the forearm skin 4cm x 4cm areas were measured by a Corneometer (CM 825, Courage + Khazaka).
2. A plastic ring with radius 12.5mm was placed on the skin and 2mL of the test solution was applied in it for 5 minutes with shaking (cleansing process). Water was also applied to the nearby skin area in the same way as control.
3. The test solution was removed and 2mL of water was applied in the cup for 30 seconds (rinsing process).
4. After removal of the rinsing water the skin was swabbed with a tissue paper and acclimatized under 23°C, 40% RH for 30 minutes.
5. The skin capacitance were measured again.

Sensory Test of Sodium PCA

Smoothness during application, absorbance and moisturized skin feel of sodium PCA are excellent in comparison with glycerin.

TS data No.1001-0820E

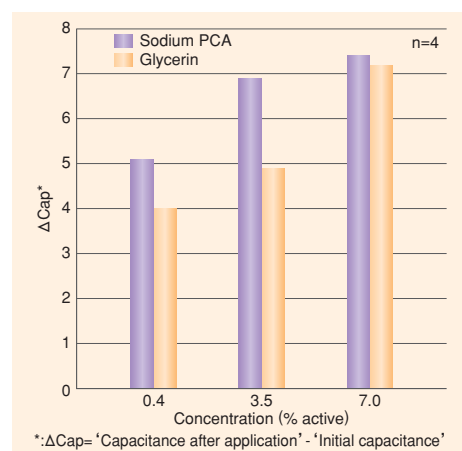


Comparison with Glycerin

Moisture evaluation of Sodium PCA

Skin capacitance was increased by application of Sodium PCA.

TS data No.1001-0581E

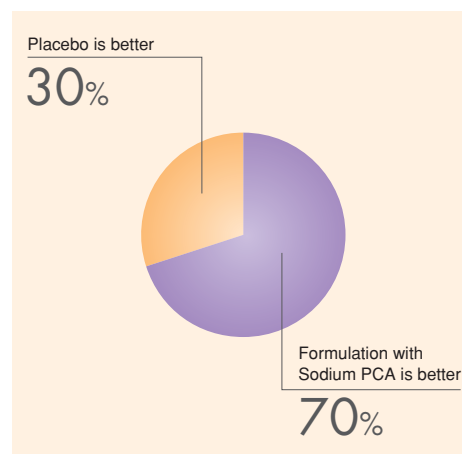


Skin capacitance by occlusive patch

Skin moisturization by Sodium PCA

A significant difference in terms of softness and velvety skin-feel was perceived between a formulation with Sodium PCA.

TS data No.1001-0590E



Skin softness / Velvety skin-feel (n=30)

Methods:

10% Glycerin solution (pH 5.5)
10% Sodium PCA solution (pH 5.5)
pH of the solutions were adjusted with Citric acid or NaOH.

Methods:

- Subjects were acclimatized under 23°C, 40%RH for 30 minutes. Then, initial skin capacitances of the forearm skin 3cm x 3cm areas were measured by using a COR-NEOMETER CM825 (Courage+Khazaka). The measurement for each area was performed nine times. The seven values in the middle of the nine were employed to obtain the average value.
- A test sample in volume of 450μL was applied onto each area occlusively for an hour.
- The area was swabbed with a tissue paper and the skin capacitance was measured again at 23°C, 40%RH after 30 minutes acclimatization.

Methods:

The forearm was treated with 1mL of test product for 30 seconds, and rinsed with running tap water for 30 seconds, followed by drying gently with a towel. The evaluation on dry skin feel was performed 15 minutes after the application.

Test formulas

	Sodium PCA (wt.%)	Placebo (wt.%)
Aqua	82.4	83.4
Sodium laureth sulfate	9.65	9.65
Cocamidopropyl betaine	2.70	2.70
Decyl glucoside	2.25	2.25
Sodium PCA	1.00	0.00
PEG-200 Hydrogenated glyceryl palmate	0.65	0.65
Lactic acid	0.48	0.48
Phenoxyethanol	0.40	0.40
PEG-7 Glyceryl cocoate	0.26	0.26
Diazolidinyl urea	0.20	0.20
Sodium Hydroxide	0.03	0.03
CI 42090	0.0003	0.0003
Total	100	100

The effect in formulations

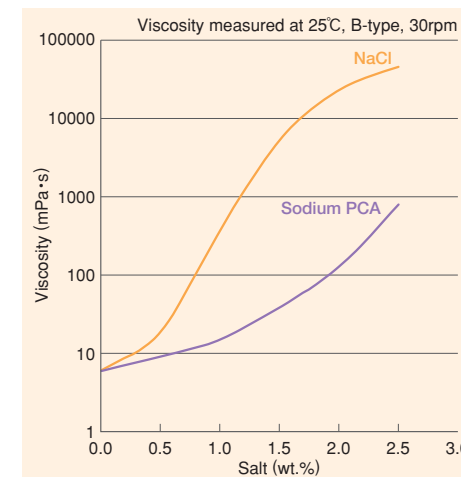
The effect of Sodium PCA in formulations

Thickening of liquid cleansing formula

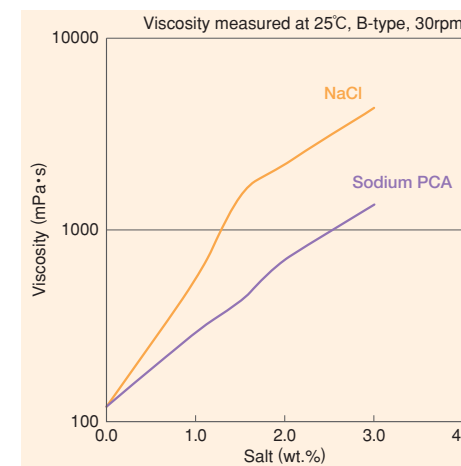
Sodium PCA is an organic salt, and as well as an inorganic salt such as sodium chloride, it can build viscosity of a liquid cleansing formula, which consists of anionic surfactants.

TS data No.1001-0530E

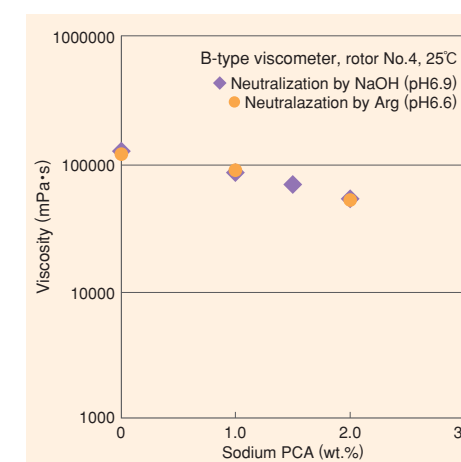
TS data No.1001-0560E



Thickening of a SLES system



Thickening of a soap system



Carbopol gel including Sodium PCA

Test formulas

	wt.%	pH 5.6
Sodium laureth sulfate ^{*1}	40.0	
Cocamidopropyl betaine ^{*2}	10.0	
Sodium PCA or NaCl	0.0~2.5	
PEG-150 Distearate ^{*3}	0.2	
Preservatives	q.s.	
Citric acid	q.s.	
Water	balance	
Total	100.0	

^{*1} Texapon HS (27%)

Cognis

^{*2} MIRATAINE BET C-30 (30%)

Rhodia

^{*3} Emalex 6300-di-ST

NihonEmulsion

Test formulas

	wt.%
Lauric acid ^{*1}	6.0
Myristic acid ^{*2}	4.0
Palmitic acid ^{*3}	2.0
Potassium hydroxide (85%)	3.9
Cocamidopropyl betaine ^{*4}	20.0
AMISOFT® CS-22 (25%)	3.0
Lauramide MEA ^{*5}	3.0
Sodium PCA or NaCl	0.0 - 3.0
Propylene glycol	6.0
Glycol distearate ^{*6}	2.0
Water	balance
Total	100

^{*1} NAA-122

NOF

^{*2} NAA-142

NOF

^{*3} NAA-160

NOF

^{*4} Softazoline CPB

Kawaken Fine Chemical

^{*5} Amisol LME

Kawaken Fine Chemical

^{*6} Emalex EG-di-SE

Nihon Emulsion

Methods:

- After Carbopol ETD2020 was added into water and dispersed, NaOH or arginine was added stirring well (A layer). B layer was mixed all and dissolved.
- B layer was added into A layer stirring slowly.

Test formulas

	wt.%
Carbopol ETD2020 [*]	0.8
NaOH (18wt.% solution)	0.6
or Arginine (18wt.% solution)	2.6
Water	89.6
PG	1.8
NaOH (18wt.% solution)	1.0
or Arginine (18wt.% solution)	4.4
Sodium PCA	0~3.0
Methylparaben	0.2
Water	balance
Total	100.0

^{*}NOVEON

Reference Formulations

* The information is provided based upon our technical data and present knowledge. However, we make no warranties, expressed or implied, and assume no liabilities in connection with any use of the information with respect to specific property, safety and suitability for a specific application. It is also not guaranteed that use of the information does not fall within the scope of any intellectual property rights.

●CG-79NSB

HAIR SHAMPOO <TRANSPARENT> CG-79NSB

This is the SLES/Cocamidopropyl Betaine hair shampoo with AJIDEW® NL-50, which improves finger gliding during rinse and moisture feel of dry hair.

	(wt.%)
A POLYQUATERNIUM-10 *1	0.2
B WATER	10.0
C SODIUM LAURETH SULFATE *2	40.0
COCAMIDOPROPYL BETAINE *3	10.0
AMISOFT® ECS-22SB (30%) (AJINOMOTO)	7.0
LAURETH-2 *4	2.0
PEG-7 POLYGLYCERYL COCOATE *5	2.0
AJIDEW® NL-50 (50%) (AJINOMOTO)	2.0
PRESERVATIVE	q.s.
WATER	balance
D FRAGRANCE	q.s.
E CITRIC ACID	q.s.
	100.0

Procedure	
1.Thoroughly disperse part A in part B at room temperature.	
2.Add part B to part C and heat to 80°C.	
3.Mix until uniform.	
4.Cool to 50°C and add part D.	
5.Cool to room temperature with stirring.	
6.Adjust pH to 5.8 with part E. Stir until homogeneous.	
*1 POLYMER JR400	AMERCHOL
*2 TEXAPON HS	COGNIS
*3 MIRATAINE BET C-30	RHODIA
*4 ARLYPON F-T	COGNIS
*5 CETIOL HE	COGNIS
pH.....5.9	
Viscosity.....3500mPa·s (B type, rotor No.3, 30rpm, 30sec., 25°C)	
Stability.....45°C, 25°C, 0°C for three month	
■ AMISOFT® ECS-22SB (30%) : Disodium Cocoyl Glutamate	

●RS24-H1L

HAIR CONDITIONER RS24-H1L

This is the hair treatment with AJIDEW® NL-50, which improves hair control.

	(wt.%)
A WATER	balance
B HYDROXYETHYLCELLULOSE *1	0.02
C LACTIC ACID	0.01
DISODIUM EDTA	0.05
PRESERVATIVE	q.s.
D STEARTRIMONIUM CHLORIDE *2	2.00
CETYL ALCOHOL *3	4.00
HEXYLDECYL ISOSTEARATE *4	2.00
E AJIDEW® NL-50 (50%) (AJINOMOTO)	4.00
WATER	4.00
DIMETHICONE *5	2.00
F FRAGRANCE	q.s.
	100.0

Procedure	
1.Thoroughly disperse B in A at room temperature to dissolve.	
2.Add C to (A+B) and heat to 80-85°C with agitation.	
3.In a separate vessel, heat D to 80-85°C until uniform.	
4.Add D carefully and emulsify at 70-80°C.	
5.Stir and cool to 50°C until it becomes viscous.	
6.Add E in order shown and mix until uniform.	
7.Add F at 45°C then cool to room temperature with mixing.	
*1 NATROSOL 250HHR	AQUALON
*2 QUATAMIN 86P conc.	KAO
*3 KALCOHL 6098	KAO
*4 ICIS	KOKYU ALCOHOL KOGYO
*5 TSF451-1M	TOSHIBA SILICONE
pH.....5.3	
Viscosity.....10000mPa·s (B type, rotor No.4, 30rpm, 30sec., 25°C)	
Stability.....50, 25°C for three months	

●HCP-UV4L

HAIR CREAM HCP-UV4L

This is the hair cream with AJIDEW® NL-50, which has the light feeling and is suitable to care the hair.

	(wt.%)
A ACRYLATES/C10-30 ALKYL ACRYLATE CROSPOLYMER*1	0.44
WATER	19.66
B L-ARGININE	0.37
WATER	18.13
C DIOCTYLDODECYL LAUROYL GLUTAMATE *2	0.20
OCTYLDODECYL ISOSTEARATE *3	1.00
POLYSORBATE85 *4	0.50
ELDEW® CL-202 (AJINOMOTO)	0.05
D CYCLOMETHICONE *5	2.00
E DIMETHICONE *6	0.50
AMODIMETHICONE *7	0.10
F PRESERVATIVE	q.s.
ALCOHOL	5.00
FRAGRANCE	0.01
G AJIDEW® NL-50 (50%) (AJINOMOTO)	0.01
TRISODIUM HEDTA *8	0.05
WATER	balance
	100.00

Procedure	
1.Add part G to part A at room temperature	
2.Add B to part (A+G) and heat to 60°C	
3.Dissolve part C at 60°C and add to part (A+G+B)	
4.Add part D to part (A+G+B+C) with stirring	
5.Cool to 50°C and add part E	
6.Cool to 45°C and add part F	
*1 PEMULEN TR-1	NIKKO CHEMICALS
*2 AMITER LG-2000	NIHON EMULSION
*3 ODIS	KOKYU ALCOHOL KOGYO
*4 NIKKOL TO-30	NIKKO CHEMICALS
*5 DC246	TORAY DOW CORNING SILICONE
*6 BY22-055	TORAY DOW CORNING SILICONE
*7 SM8702C	TORAY DOW CORNING SILICONE
*8 CLEWAT OH-300	NAGASE CHEMTEX
pH.....5.8	
Viscosity.....35000mPa·s (B type, rotor No.3, 30rpm, 30sec., 25°C)	
Stability.....50, 25, cycle (-5-40°C) for one month	
■ ELDEW® CL-202:Cholesteryl/Octyldodecyl Lauroyl Glutamate	

●SGT-327

SHOWER GEL <Transparent> SGT-327

This is the shower gel with AJIDEW® NL-50, which has the excellent moisture feel.

	(wt.%)
A POLYQUATERNIUM-10 *1	0.2
B WATER	10.0
C SODIUM LAURETH SULFATE	35.0
COCAMIDOPROPYL BETAINE *2	15.0
PEG-7 POLYGLYCERYL COCOATE	2.0
AJIDEW® NL-50 (50%) (AJINOMOTO)	2.0
AMISOFT® ECS-22SB (30%) (AJINOMOTO)	10.0
BUTYLENE GLYCOL LAURATE *3	0.6
PRESERVATIVE	q.s.
D WATER	balance
E MAGNESIUM CHLORIDE *4	0.3
F FRAGRANCE	q.s.
CITRIC ACID	q.s.
	100.0

Procedure	
1.Thoroughly disperse part A in part B at room temperature.	
2.Add part B to part C and heat to 80°C.	
3.Mix until uniform and add part D.	
4.Cool to 50°C and add part E.	
5.Cool to room temperature with stirring.	
6.Adjust pH to 5.2 with part F. Stir until homogeneous.	
*1 POLYMER JR400	AMERCHOL
*2 SOFTAZOLIN CPB	KAWAKEN FINE CHEMICAL
*3 COMPOAL BL	NOF
*4 MgCl2 6H2O	
pH.....5.2	
Viscosity.....3500 - 4000 mPa·s (B type, rotor No.3, 30rpm, 30sec., 25°C)	
Stability.....Under testing	
■ AMISOFT® ECS-22SB (30%) : Disodium Cocoyl Glutamate	

●BGJ-01K

SHOWER GEL BGJ-01K

This is the weakly acidic shower gel with AJIDEW® NL-50, which has the light feel after towel dry.

	(wt.%)	Procedure
AMILITE® GCK-12K (30%) (AJINOMOTO)	75.0	1.Dissolve all ingredients at 70-80°C.
COCAMIDOPROPYL BETAINE *1	10.0	2.Cool down to room temperature.
COCAMIDE DEA *2	4.0	
AJIDEW® NL-50 (50%) (AJINOMOTO)	6.0	
AMISOFT® CA (AJINOMOTO)	1.7	
GLYCOL DISTEARATE *3	2.0	
WATER	balance	
PRESERVATIVE	q.s.	
	100.0	

*1 SOFTAZOLINE CPBKAWAKEN FINE CHEMICALS

*2 AMISOL CDEKAWAKEN FINE CHEMICALS

*3 EMALEx EG-di-SENIHON EMULSION

pH.....6.8

Viscosity.....5900mPa·s (B Type, rotor No.3, 30rpm, 30sec., 25°C)

Stability.....40, 25, cycle (40,-5°C) for 3 month

■ AMILITE® GCK-12K (30%) : Potassium Cocoyl Glycinate

■ AMISOFT® CA : Cocoyl Glutamic Acid

●H-046

FACIAL CLEANSER <CREAM> H-046

This is the amino acid based facial cleanser with Sodium PCA, which has the moisture feel after towel dry.

	(wt.%)	Procedure
A AMISOFT® LS-11 (AJINOMOTO)	36.0	1.Dissolve part A, part B at 70-80°C with stirring.
SODIUM COCOYL SARCOSINATE *1	2.0	2.Add part B to part A, and cool down to 50°C with stirring.
SODIUM C14-16 OLEFIN SULFONATE *2	3.0	3.Hold temperature at around crystallizing point (40-50°C) with stirring.
COCAMIDE DEA *3	5.0	4.Cool down to 30°C.
AJIDEW® N-50 (50%) (AJINOMOTO)	5.0	
BUTYLENE GLYCOL	19.0	
WATER	balance	
B DIOCTYLDODECETH-5 LAUROYL GLUTAMATE *4	2.0	
PEG-30 HYDROGENATED CASTOR OIL PCA ISOSTEARATE *5	4.0	
PEG-150 STEARATE *6	3.0	
PEG-150 DISTEARATE *7	1.0	
PRESERVATIVE	q.s.	
	100.0	

*1 SOIPON SC (30%)Kawaken Fine Chemicals

*2 LIPORAN PJ-400Lion

*3 AMISOL CDEKawaken Fine Chemicals

*4 AMITER LGOD-5 (H)NIHON EMULSION

*5 PYROTER CPI-30NIHON EMULSION

*6 EMALEx 6300M-STNIHON EMULSION

*7 EMALEx 6300DI-STNIHON EMULSION

pH.....5.3 (1%aq.)

Stability.....45, 25, -5°C, cycle (40,-5°C) for one month

■ AMISOFT® LS-11 :Sodium Lauroyl Glutamate

■ AMISOFT® N-50 (50%) : Sodium PCA

AGC-203

LOTION <O/W> AGC-203

This is the skin lotion with AJIDEW® NL-50, which has the moisture feel.

	(wt.%)	Procedure
A PEG-10 HYDROGENATED CASTOR OIL *1	0.25	1.Dissolve part B and C respectively.
PEG-20 HYDROGENATED CASTOR OIL *2	2.25	2.Heat and mix Part A at 80°C
ELDEW® PS-203 (AJINOMOTO)	1.00	3.Heat Part B and C at 70°C
MINERAL OIL *3	9.00	4.Add part B and C to A with agitation.
GLYCERIN	10.00	5.Cool down to room temperature with agitation.
B ACRYLATES/C10-30 ALKYL ACRYLATE CROSSPOLYMER *4	0.50	6.Add part D to (A+B+C) with agitation.
WATER	49.50	7.Add part E to (A+B+C+D) with agitation.
C HYDROXYETHYLCELLULOSE *5	0.07	
WATER	6.93	
D L-ARGININE (AJINOMOTO)	0.40	
WATER	3.60	
E AJIDEW® NL-50 (AJINOMOTO)	1.00	
PRODEW® 400 (AJINOMOTO)	1.00	
BUTYLENE GLYCOL	12.00	
WATER	balance	
PRESERVATIVE	q.s.	
	100.0	

*1 NIKKOL HCO-10NIKKO CHEMICALS

*2 NIKKOL HCO-20NIKKO CHEMICALS

*3 MORESCO WHITE P-55MATSUMURA OIL RESEARCH

*4 PEMULEN TR-1NOVEON

*5 NATROSOL 250HHR AQUALON

pH.....5.4

Viscosity.....3100mPa·s (B type, rotor No.3, 12rpm, 30sec., 25°C)

Stability.....5, 25, 40°C for one month

■ ELDEW® PS-203 : Phytosterl/Octyldodecyl Lauroyl Glutamate

■ PRODEW® 400 : AMINO ACID BASED HUMECTANT

●2L-122

CREAM <O/W> 2L-122

This is the skin cream with AJIDEW® NL-50.

	(wt.%)	Procedure
A MINERAL OIL	8.0	1.Dissolve part A, B apart at 75-80°C with stirring.
SOPROPYL PALMITATE	2.0	2.Add B to A and homogenize with stirring.
STEARYL ALCOHOL *1	2.0	3.Add C with stirring.
CETYL ALCOHOL *2	0.5	4.Cool down to room temperature.
GLYCERYL STEARATE *3	0.5	
CETETH-20 *4	1.0	
B AJIDEW® NL-50 (50%) (AJINOMOTO)	4.4	
CARBOMER (1%aq.) *5	10.0	
PRESERVATIVE	q.s.	
WATER	balance	
C SODIUM HYDROXIDE (10%aq.)	10.5	
	100.0	

*1 KALCOHL86KAO

*2 NAA-44NOF

*3 EMALEx GMS-BNIHON EMULSION

*4 EMALEx120NIHON EMULSION

*5 CARBOPOL 940BF GOODRICH

Stability.....40, 25, -5°C for one month

●AF-1

WET TISSUE AF-1

This is the wet tissue liquid with AJIDEW® NL-50.

	(wt.%)
PEG-40 HYDROGENATED CASTOR OIL *1	1.20
COCONUT ACID *2	0.50
L-ARGININE (AJINOMOTO)	0.50
AJIDEW® NL-50 (50%) (AJINOMOTO)	0.50
GLYCERIN	3.00
PROPYLENE GLYCOL	2.00
PRESERVATIVE	q.s.
WATER	balance
	100.0

Procedure

- 1.Heat and dissolve Part A at 70-80°C.
- 2.Cool down to room temperature

*1 NIKKOL HCO-40	NIKKO CHEMICALS
*2 NAA-312	NOF

pH.....8.2

●SSCP-08L

SUNSCREEN CREAM<W/O> SSCP-08

This is the sunscreen cream with AJIDEW® NL-50.

	(wt.%)
A DIMETHICONE *1	10.0
ELDEW® PS-304 (AJINOMOTO)	1.0
TOCOPHERYL ACETATE	0.1
DIMETHICONE COPOLYOL *2	2.0
B CYCLOMETHICONE *3	15.0
C TITANIUM DIOXIDE *4	5.0
ZINC OXIDE *5	10.0
AMIHOPE® LL (AJINOMOTO)	3.0
D MAGNESIUM SULFATE	0.5
AJIDEW® NL-50 (50%) (AJINOMOTO)	0.5
GLYCERIN	5.0
HYDROXYETHYLCELLULOSE *6	0.1
BUTYLENE GLYCOL	5.0
PRESERVATIVE	q.s.
WATER	balance
	100.0

Procedure

- 1.Dissolve and mix part A at 70°C.
- 2.Cool down part A and add part B at R.T..
- 3.Add part C and disperse well by a mixer (3000rpm, 10min.) at R.T..
- 4.Dissolve and mix part D at R.T..
- 5.Adding part D to part (A+B+C) slowly with agitation to emulsify.

*1 L45 (10)	NIPPON UNICAR
*2 EMALEx SS-5050K	NIHON EMULSION
*3 SH245	TORAY DOW CORNING SILICONE
*4 MT-100Z	TAYCA
*5 MZ-3S	TAYCA
*6 NATROZOL 250HHR	AQUALON

Stability.....40, 25, 5°C for three months

- ELDEW® PS-304 : Phytosteryl/Behenyl/Octyldodecyl/Lauroyl Glutamate
- AMIHOPE® LL : Lauroyl Lysine

Product information

■Specification

Item	Specification
(1) Appearance	Colorless to pale yellow transparent liquid Characteristic odor
(2) Density	1.26~1.30
(3) pH	6.8~7.4
(4) Transmittance	NLT 95.0%
(5) Heavy metals (Pb)	NMT 20ppm
(6) Arsenic (As ₂ O ₃)	NMT 2ppm
(7) Concentration	48.0~52.0%
(8) Total microorganisms	NMT100cfu/g

■Material Information

Trade Name	Chemical Name	CAS No.	EINECS No.	Physical Form	Packaging	PCPC INCI Name	Composition (%)
AJIDEW® NL-50	Sodium L- Pyrrolidonecarboxylate, Water	28874-51-3	249-277-1	50% Aqueous Solution	25kg Drum 250kg Drum	Sodium PCA	50.0
						Water	50.0

■Registration

EINECS NO. : 249-277-1.

AICS (Australia) : registered

KOREA : KE-31565

CHINA : registered

PICCSA (Philippines) : registered

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