Cosmetic Ingredients

Cationic Dextran for Cosmetics

CDC

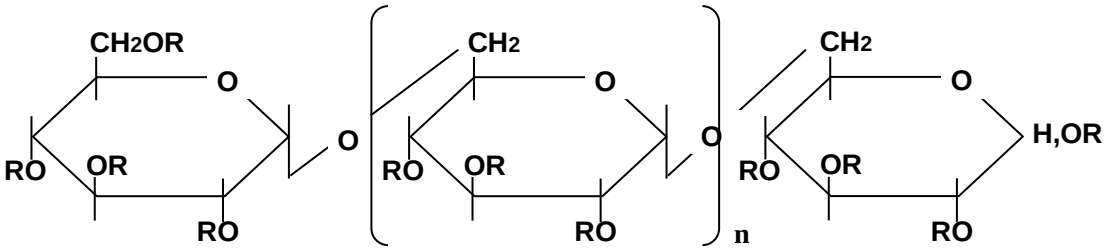
（Dextran Hydroxypropyltrimonium Chloride）

meito sangyo co., ltd.

Cationic Dextran has an excellent conditioning effect on hair and skin, and can be used as an additive for hair care and skin care cosmetics, quasi-drugs, and permanent wave agents. Cationic Dextran is a cosmetic ingredient with excellent safety and workability that can be expected to have the desired conditioning effect by selecting the molecular weight.

■ Name / structural formula

Ingredient name ：Dextran Hydroxypropyl Trimethylammonium Ether Chloride
The Japanese standards of quasi-drug ingredients 2021
Ingredient code…520780
JCIA ：Ingredient number…563106
INCI ：Dextran Hydroxypropyltrimonium Chloride
CAS ：83855-79-2



R=－$CH_2CH(OH)CH_2N^+(CH_3)_3Cl^-$ or－H

■ Product code

Code	Average molecular weight (Dextran used as raw material)	Nitrogen (%)
CDC-L	ca. 10,000	2.2 to 2.8
CDC	ca. 40,000	
CDC-H	ca. 500,000	

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■ Features

◎ Cationic Dextran adheres well to skin and hair

Cationic Dextran adheres to the skin and damaged hair, making it moist and smooth.
In addition, it is compatible with amphoteric and anionic surfactants and forms a complex salt to form a conditioning film.

⇒【refer to page-4】 Conditioning action

◎ Cationic Dextran suppresses the decrease in hair strength

With the addition of Cationic Dextran, hair damage during permanent wave treatment can be suppressed.

⇒【refer to page-6】 Suppression of hair damage

◎ Cationic Dextran has a moderate moisturizing effect

The water absorption of Cationic Dextran is not significantly affected by changes in the ambient humidity. It does not absorb excessive water in high humidity and maintains appropriate moisturizing properties even in low humidity.

⇒【refer to page-7】 Moisturizing

◎ Cationic Dextran can be used safely

Since dextran, which has good biocompatibility, is used as a raw material, Cationic Dextran is extremely low in toxicity and irritation and is safe.

⇒【refer to page-8】 Safety

Conditioning action

① **Adhesive action**

Cationic Dextran adheres to the skin and damaged hair, making it moist and smooth. In addition, Cationic Dextran, which has a low molecular weight, easily adheres to damaged hair and makes it soft.

【Test】

Hair treated with **Permanent Wave-1*** is vacuum dried in a silica gel desiccator for 20 days, then immersed in 2% sample solution for 30 minutes, washed with water and dried for 20 days in the same manner. The amount of adhesion to the hair was determined from the weight of the hair before and after treatment with the sample, and a sensory test was also performed.

***：Permanent Wave-1**

First solution: Thioglycolic acid, 6.5%, pH 9.4, 25 °C-15 minutes
Second solution: Sodium bromate, 6%

【Result】

Sample		Adhesion amount（mg/g・hair）	Sensory evaluation
Cationic Dextran	CDC-L	16.3	◎
	CDC	14.5	◎
	CDC-H	9.9	◎
Cationic Cellulose	Product A	10.4	△
	Product B	6.2	△
Blank	Water	(1.1)	(〇)

Sensory evaluation: ◎= soft, 〇= normal, △= slightly hard

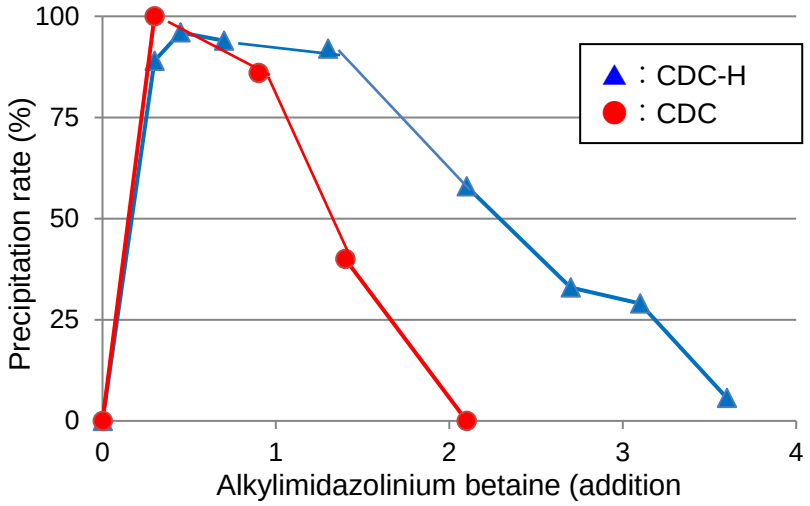
From the above results, it was found that CDC and CDC-L adhere to hair in a larger amount than cationic cellulose having a similar substituent structure, and high results were obtained in the sensory evaluation.
In addition, CDC-H, whose adhesion amount was not so different from that of cationic cellulose (Product A), had a much higher sensory evaluation than cationic cellulose.

② Complex salt formation

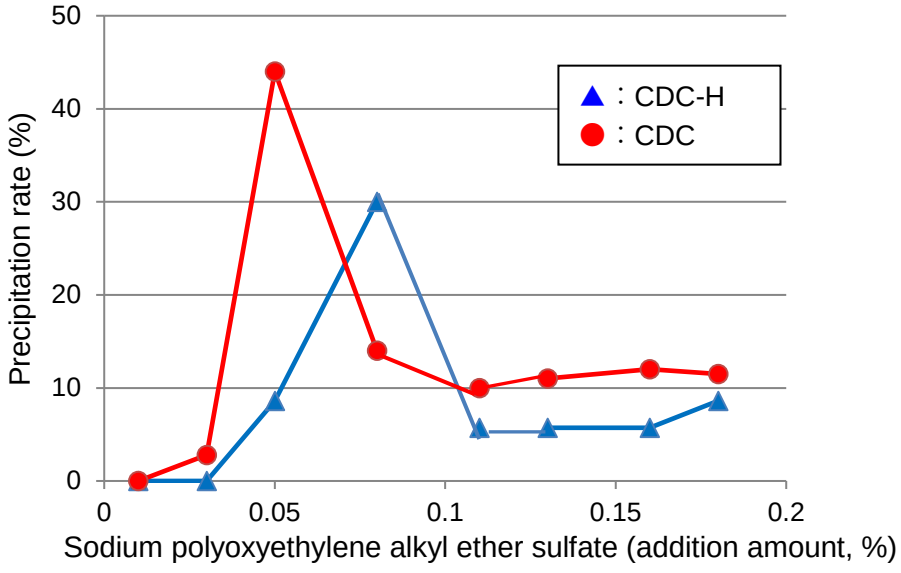
Cationic Dextran is compatible with amphoteric and anionic surfactants, forms complex salts, and adheres moderately to hair and skin to form a conditioning film.

When a surfactant is added to a 0.1% aqueous solution of Cationic Dextran, a complex salt is precipitated in an appropriate concentration range.
This state shows how the complex salt precipitates when the hair is washed with a shampoo containing Cationic Dextran and diluted with water during rinsing.
This complex salt adheres to the hair and forms a smooth, conditioning film.

Composite salt formation of amphoteric surfactant (imidazoline-type)



Complex salt formation with anionic surfactant



Suppression of hair damage

By adding Cationic Dextran to the second solution of permanent wave treatment, it is possible to suppress hair damage and bring it closer to the original strength of hair (suppression of hair damage and maintenance of tensile strength).

【Test】

The treated hair A (hereinafter referred to as A) obtained by performing **Permanent Wave-2*** was subjected to **Abuse Test**** to obtain treated hair B (hereinafter referred to as B).

***：Permanent Wave-2**

First solution: Thioglycolic acid, 6.5%, pH 9.4, 25 ° C-15 minutes
Second solution: Sodium bromate, 6% plus sample, 2% or blank

****：Abuse Test**

Immerse A in water at 40 °C for 24 hours

As a result of measuring the tensile strength using B (hair diameter 65 to 90 μm) prepared in the above test, the addition of Cationic Dextran tended to suppress the decrease in tensile strength as compared with the case without addition. In addition, it was found that the degree of suppression of the decrease was equal to or considerably higher than that of Cationic Cellulose (97-125%).

Sample	Tensile strength (g)
CDC-L	96
CDC	75
CDC-H	87
Cationic Cellulose product (comparative control product)	77
Additive free (blank)	75
No permanent wave treatment	111

Moisturizing

The absorption and moisturizing properties of Cationic Dextran (CDC) were compared with the existing moisturizers glycerin and propylene glycol in terms of residual moisture rate (%).

- Test

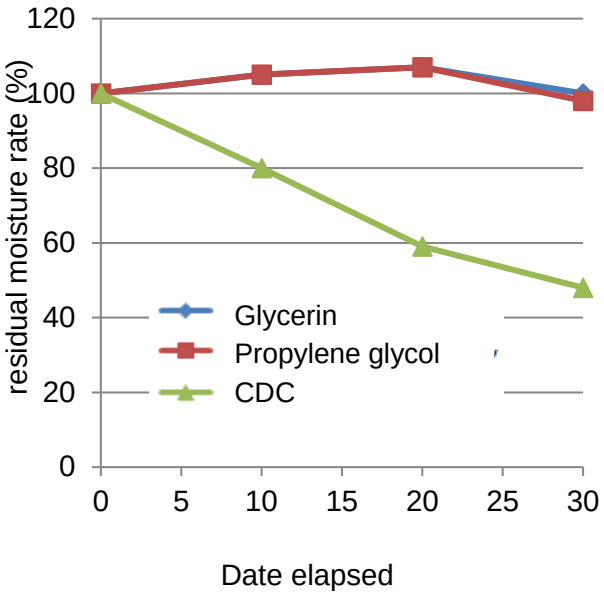
  Sample: 10 % aqueous solution
  Temperature: 30 ℃
  Condition-1: relative humidity (RH)= 80 %
  Condition-2: relative humidity (RH)= 56 %

- Results

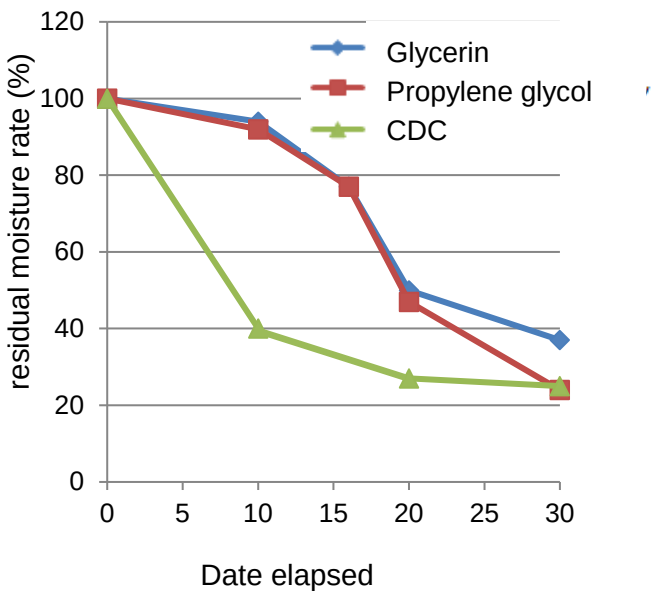
  Existing moisturizers such as glycerin and propylene glycol retain more water than necessary when the relative humidity is high (condition ①). In addition, these moisturizers are greatly affected by the ambient humidity, such as when the relative humidity is low (condition ②), the water retention rate is significantly reduced.

  On the other hand, it can be seen that cationic dextran is not easily affected by changes in humidity, such as stably retaining water after releasing excess water under both conditions ① and ②.

Condition-①



Condition-②



Safety

Since dextran, which has good biocompatibility, is used as a raw material, Cationic Dextran is extremely low in toxicity and irritation and is safe.

Ocular mucosal irritation	:	Negative (regenerated human corneal epithelial model, HCE method)
Skin sensitization	:	Negative (human, 5% aqueous solution)
Mutagenicity	:	Negative (AMES method)
Patch test	:	Negative (human, 5% aqueous solution)

(sample: CDC)

■ **Specification** (Japanese Standards of Quasi-drug Ingredients 2021)

Characteristics		:	White to light yellowish white powder, odorless
identification	Anthrone	:	Positive
	Toluidine blue	:	Negative
	Bromophenol blue	:	Positive
	Chloride	:	positive
pH		:	5. 0 to 7. 5
Loss on drying		:	5.0 % or under
Ash		:	4.0 % or under
Nitrogen		:	2.2 to 2.8 %
Purity	Heavy metals	:	20 ppm or under
	Arsenic	:	2 ppm or under

■ **Packaging form (example)**

Polyethylene double bag (5 kg packed)

Carton box

■ Handling precautions

- Avoid direct sunlight and humidity, and store in a cool place as much as possible.
- Be careful not to scatter or inhale the powder.
- If you accidentally get the powder in your eyes, wash it thoroughly with water.
- After finishing the work, please gargle, wash your hands, and wash your face.

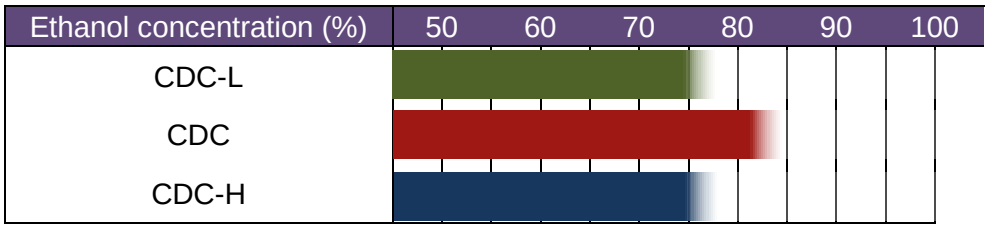
■ Reference information (solubility, viscosity, cosmetic prescription)

Solubility

- **Solubility in various solvents (○: soluble, ×: insoluble)**
  Cationic Dextran: 10 %

Solvent	CDC-L	CDC	CDC-H
Water	○	○	○
50 % Ethanol	○	○	○
50 % Isopropanol	○	○	○
50 % Acetone	○	○	○
100 % Acetone	×	×	×

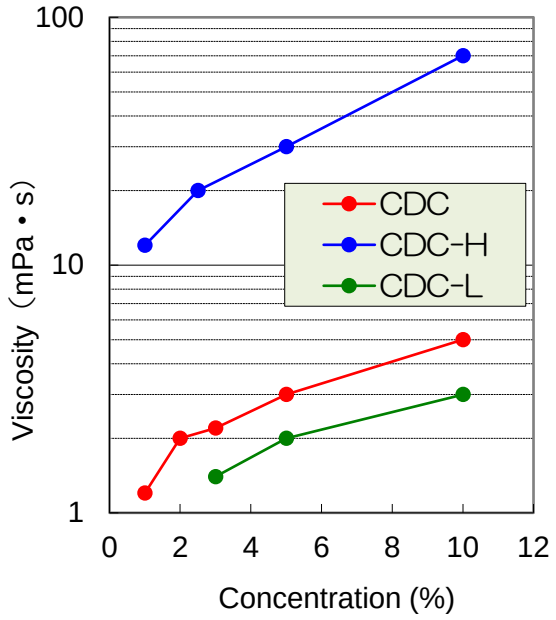
- **Solubility in ethanol**
  Sample concentration: 10 %



Viscosity

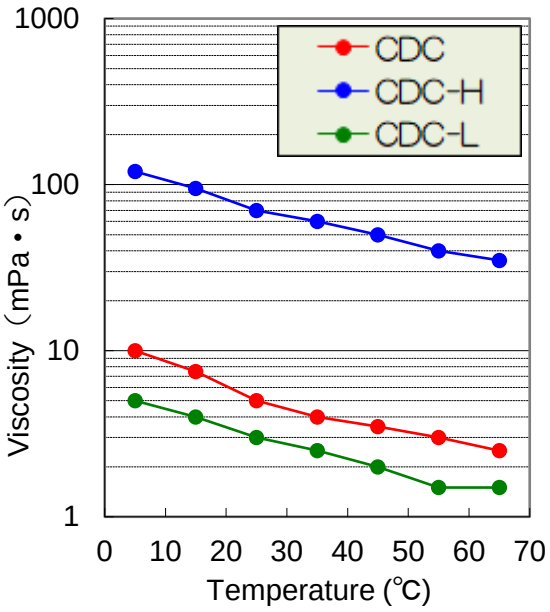
① Sample concentration (25℃)

Viscosity increases at higher concentrations.



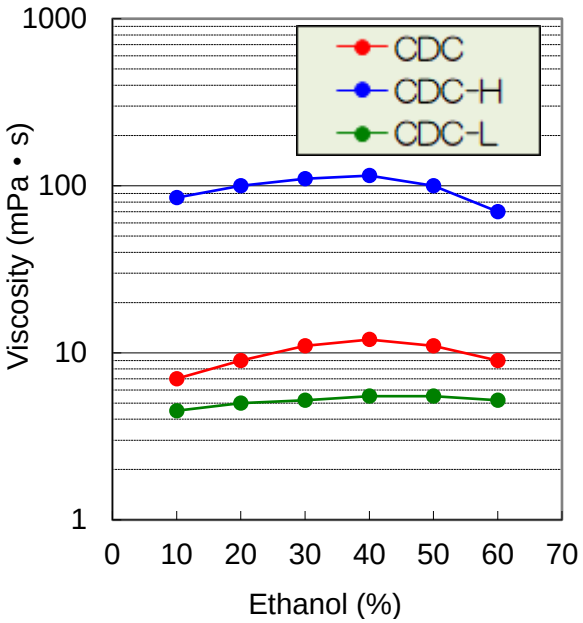
② Temperature (Sample: 10 %)

Viscosity decreases at higher temperature.



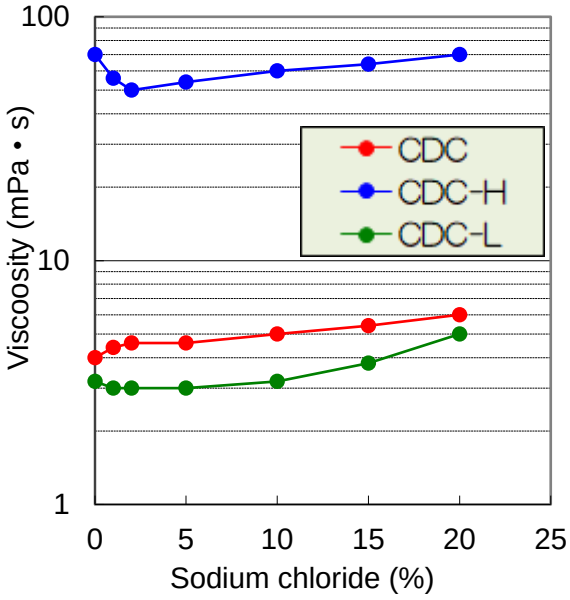
③ Ethanol concentration (25℃) (Sample conc.: 10 %)

Viscosity gradually increases and reaches a max. at an ethanol concentration of 40 to 50 %, then decreases.



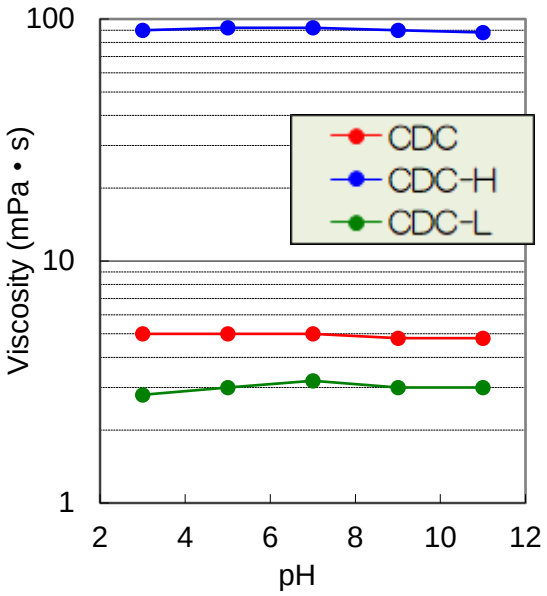
④ Sodium chloride (25℃) (Sample conc.: 10 %)

The addition of sodium chloride causes little change in viscosity



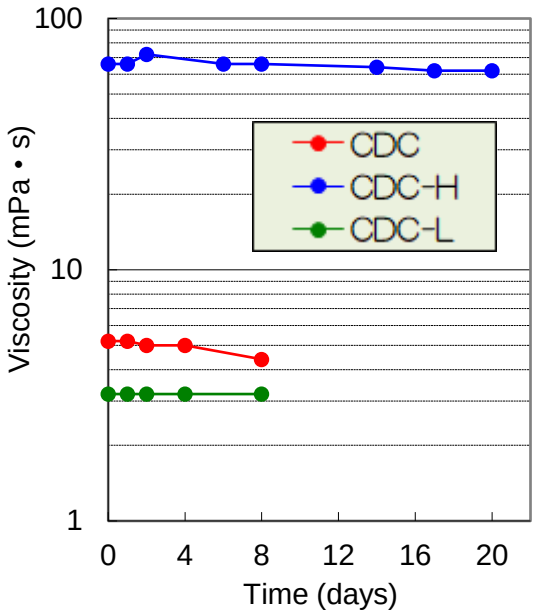
⑤ pH (25℃)
(Sample conc.: 10 %)

Viscosity hardly changes in a wide range of pH from the acidic side to the alkaline side.



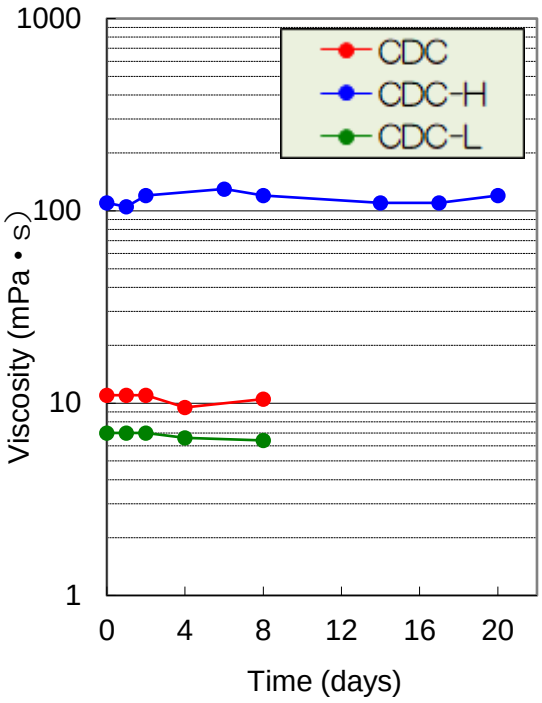
⑥ Time course-A: Aqueous solution (25℃), (Sample conc.: 10 %)

Viscosity hardly fluctuates over time



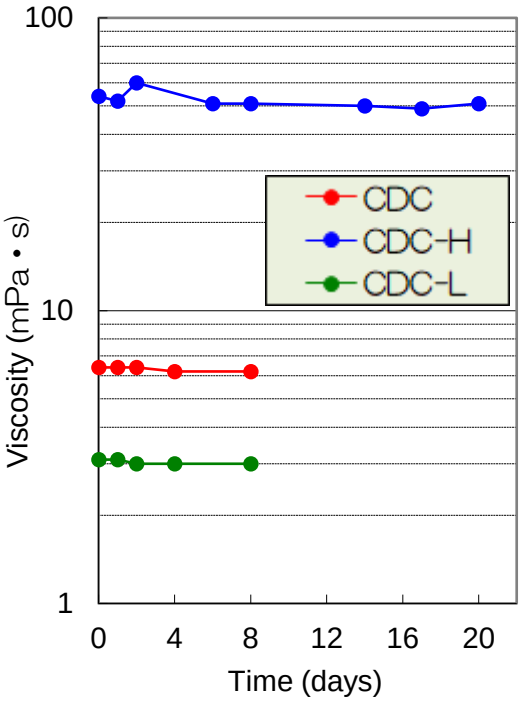
⑦ Time course-B: 40%-Ethanol solution (25℃), (Sample conc.: 10 %)

Viscosity hardly fluctuates over time



⑧ Time course-C: 10%-NaCl solution (25℃), (Sample conc.: 10 %)

Viscosity hardly fluctuates over time



Cosmetic prescription (example)

① Conditioning shampoo [Components]	[Ratio (%)]
Triethanolamine Lauryl Sulfate (40%)	10.0
Sodium N-Lauroyl-N'-Carboxymethyl-N'-Hydroxyethylethylenediamine (Sodium Lauroamphoacetate)	20.0
Lauric Acid Diethanolamide	4.0
Sodium Methyl Cocoyl Taurate	10.0
1,3-Butylene Glycol	3.0
Disodium Edetate	0.1
Citric Acid	0.1
CDC-H	0.5
Preservatives	Appropriate amount
Fragrance	Appropriate amount
Add Purified Water	(Total) 100.0

② Cream rinse [Components]	[Ratio (%)]
Stearyltrimethylammonium Chloride (STEARTRIMONIUM. CHLORIDE)	3.0
Distearyldimethylammonium Chloride (DISTEARYLDIMONIUM CHLORIDE)	2.0
Behenyl Alcohol (Docosanol)	2.5
2-Octyldodecanol	1.0
Polyoxyethylene (2) Oleyl ether	2.0
Methylpolysiloxane (**DIMETHICONE**)	0.2
CDC	0.4
1,3-Butylene Glycol	3.0
Preservatives / Fungicides	Appropriate amount
Fragrance / Pigment	Appropriate amount
Add Purified Water	(Total) 100.0

■ Contact

For inquiries regarding this product, please contact the following.

Meito Sangyo Co., Ltd.

Fine Chemicals Sales Department

ISSEI BUILDING Annex 2F, 1-18-2, Akebono-cho, Tachikawa, Tokyo, 190-0012, Japan
TEL：+81-42-548-5535, FAX：+81-42-548-5537
http://www.meito-sangyo.co.jp

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名糖産業株式会社
MEITO SANGYO CO.,LTD.