

SPECIFICATION

TITLE OF THE INVENTION

KERATIN FIBER TREATMENT COMPOSITION

TECHNICAL FIELD

- [0001] The present invention relates to a keratin fiber treatment composition. More specifically, the present invention relates to a keratin fiber treatment composition that forms styles for keratin fibers, particularly hair and eyelashes, that can retain the styles for a long period of time, and that has an excellent feel when used.

BACKGROUND ART

- [0002] Keratin fibers, particularly hair, are styled as desired, on a daily basis, by using high-temperature hairdressing tools such as hair straightening irons and curling irons to straighten or curl the keratin fibers. However, such styling is temporary, and the styles break down with the passage of time. Additionally, there was a problem in that the hair could be damaged by being treated at a high temperature.
- [0003] In order to solve the aforementioned problem, various hair cosmetics (hairstyling agents) having the purpose of retaining shaped hairstyles for a long time or repairing hair damage have been proposed.
- [0004] Patent Document 1 describes a hair treatment composition that contains glucose, a carboxylic acid with a specific pKa and number of carbon atoms, and benzyl alcohol, and that has a pH of 2.5 to 4. This hair treatment composition is described as being able to suppress hair damage due to high-temperature hairdressing tools, but there is no mention regarding the improvement of hairdressing (styling) effects. Furthermore, with such a composition in the strongly acidic region (pH = 2.5 to 4), there is a problem in that, if urea, which has a moisture retention function, is added, an unpleasant smell is generated.
- [0005] Patent Document 2 discloses a hair cosmetic containing (A) an amine oxide group-containing resin having a specific structure, and (B) one or more compounds selected from among basic amino acids, acidic amino acids, pyrrolidone carboxylic acid, urea and pantothenyl alcohol, which is described as having excellent setting properties, set retention strength and heat-caused hair damage prevention effects, particularly for cases in which curlers or hot curlers are used to make waves. However, with cosmetics that retain a style by means of a resin, there was sometimes a sense of stiffness (poor finger passage) due to the resin.
- [0006] On the other hand, Patent Document 3 discloses a styling cosmetic in which (a) a

hydrolyzed keratin having an average molecular weight of 25,000 to 35,000, and (b) a fractionated protein from sheep wool or human hair are added at a specific ratio, which is described as being able to retain good styling without imparting a resin-like feel.

[0007] Regarding eyelashes, the improvement of eyelash adhesion properties and curling effects due to the addition of hydrolyzed silk, which is a hydrolysate of a protein, as in Patent Document 3, has been described (Patent Document 4). However, with the cosmetic of Patent Document 4, it is described as being necessary to provide a sense of volume by adding a wax or a resin.

[0008] In other words, these conventional cosmetics often depend on an added resin for forming and retaining the shape (style), and a stiff texture due to the resin was unavoidable. Additionally, though the cosmetic in Patent Document 3 does not essentially contain a resin, the style retention and the texture when used, achieved thereby, were not adequate.

RELATED ART

PATENT DOCUMENTS

[0009] Patent Document 1: JP 5779399 B
Patent Document 2: JP 4136965 B
Patent Document 3: JP 4881567 B
Patent Document 4: JP 2016-41673 A

DISCLOSURE OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0010] Thus, a problem addressed by the present invention is to provide a keratin fiber treatment composition that can retain the shape (style) of keratin fibers, including hair and eyelashes, for a long period of time, and that also has an excellent texture when used.

MEANS FOR SOLVING THE PROBLEM

[0011] The present inventors carried out diligent investigations towards solving the above-mentioned problem, and discovered, for the first time, that sugar alcohols have a keratin fiber styling function. As a result thereof, they arrived at the present invention on the basis of the discovery that, by using a composition containing a sugar alcohol, the effect of retaining the style of keratin fibers for a long period of time is achieved, and the texture when used is also improved.

[0012] In other words, the present invention provides a keratin fiber treatment composition characterized by containing a sugar alcohol.

The keratin fiber treatment composition of the present invention preferably further

contains one or both of a hair fixative resin and urea and/or a urea derivative. Additionally, the keratin fiber treatment composition of the present invention preferably has a pH within a range from 4.0 to 7.5.

EFFECTS OF THE INVENTION

[0013] By applying the keratin fiber treatment composition of the present invention to keratin fibers such as hair or eyelashes, and preferably styling the keratin fibers while applying heat, the formed style is retained over a long period of time. Furthermore, the keratin fiber treatment composition of the present invention, during application, has a very excellent texture when used.

MODES FOR CARRYING OUT THE INVENTION

[0014] The keratin fiber treatment composition (hereinafter also referred to simply as “treatment composition”) according to the present invention contains a sugar alcohol as an essential ingredient.

The “keratin fibers” in the present invention refer to fibrous keratin substances that are styled, particularly to hair and eyelashes.

[0015] The sugar alcohol which is an essential ingredient in the present invention only needs to be able to be added to a cosmetic for keratin fibers or the like, and may, for example, be one or more sugar alcohols selected from among erythritol, sorbitol, maltitol, mannitol and xylitol. Among the above, erythritol is particularly effective.

[0016] Although sugar alcohols were added to conventional hair cosmetics and the like as “moisturizers”, “humectants” or the like, it was discovered, for the first time, in the present invention, that sugar alcohols have a keratin fiber styling function, i.e., are effective as keratin fiber styling agents.

[0017] The sugar alcohol content in the treatment composition of the present invention is at least 0.1 mass% and at most 5.0 mass%, preferably 0.2 to 3.0 mass%, and more preferably 0.5 to 2.0 mass%. If the content is less than 0.1 mass%, sufficient styling retention effects cannot be obtained, and if the content is 5.0 mass% or more, there is a tendency for stickiness to occur.

[0018] The treatment composition of the present invention has an aqueous base in which the sugar alcohol is dissolved in an aqueous medium, and is preferably in the form of a solubilized aqueous composition or an oil-in-water emulsified composition.

[0019] The treatment composition of the present invention preferably further contains urea and/or a urea derivative, the addition of which further improves the style setting strength.

[0020] Urea derivatives are compounds having a structure wherein at least one of the

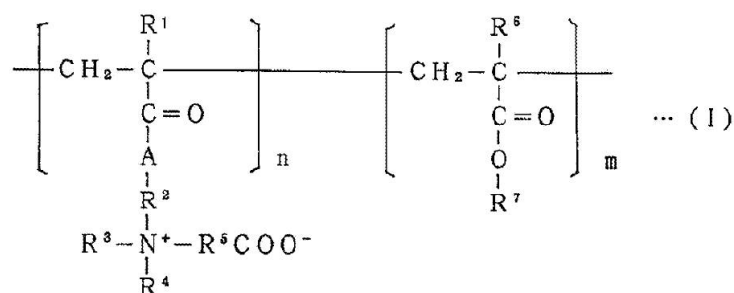
hydrogen atoms in urea is substituted with a functional group such as an alkyl group. Preferably, it is a compound in which at least one of the hydrogen atoms is substituted with a hydroxyalkyl group having 1 to 10 carbon atoms, examples of which include hydroxyethyl urea, hydroxymethyl urea, hydroxypropyl urea and the like.

[0021] The urea and/or urea derivative content in the treatment composition of the present invention is at least 0.1 mass% and at most 5.0 mass%, preferably 0.2 to 3.0 mass%, and more preferably 0.5 to 2.0 mass%. If the content is less than 0.1 mass%, the setting strength improvement effect due to the addition thereof cannot be obtained.

[0022] When a hair fixative resin is further added to the treatment composition of the present invention, the curl retention in high-temperature, high-humidity environments is particularly improved. The hair fixative resin used in the present invention includes amphoteric high-molecular-weight resin compounds, cationic high-molecular-weight resin compounds, anionic high-molecular-weight resin compounds and non-ionic high-molecular-weight resin compounds, among which any one or more types can be selected as appropriate. Among the above, it is preferable to add an anionic resin.

[0023] The amphoteric high-molecular-weight resin compound may, for example, be a compound such as that represented by the general formula (I):

[Chemical Formula 1]



(In the formula, $n : m = 2 : 8$ to $8 : 2$, and the molecular weight is within the range 50,000 to 500,000. R^1 and R^6 are hydrogen atoms or methyl groups, R^3 and R^4 are alkyl groups having 1 to 4 carbon atoms, R^2 and R^5 are alkylene groups having 1 to 4 carbon atoms, R^7 is a saturated or unsaturated alkyl group having 1 to 24 carbon atoms, and A is an oxygen atom or an NH group, or does not exist.), the compound being obtained by copolymerizing a dialkyl aminoethyl acrylate, a dialkyl aminoethyl methacrylate, a diacetone acrylamide or the like with acrylic acid, methacrylic acid, an acrylic acid alkyl ester, a methacrylic acid alkyl ester or the like, then amphoterizing the resulting copolymer with a halogenated acetic acid [commercial product: Yukaformer AM75 (manufactured by Mitsubishi Chemical)]; or a copolymer of hydroxypropyl acrylate, butylaminoethyl methacrylate and octylacrylamide, as represented by Amphomer (AkzoNobel), or the like.

[0024] The cationic high-molecular-weight resin compound may, for example, be a

poly[dimethyl diallyl ammonium halide]-type cationic polymer represented by Merquat 100 (manufactured by Lubrizol), a cationic polymer that is a copolymer of a dimethyl diallyl ammonium halide and an acrylamide represented by Merquat 550 (manufactured by Lubrizol), a quaternary nitrogen-containing cellulose ether represented by Polymer JR-400, Polymer JR-125 and Polymer JR-30M (all manufactured by Union Carbide), a copolymer of polyethylene glycol, epichlorohydrin, propylene amine and tallowyl amine represented by Polycoat H (manufactured by Henkel), a copolymer of polyethylene glycol, epichlorohydrin, coconut oil alkyl amine and dipropylene triamine represented by Polycoat NH (manufactured by Henkel), and a copolymer of vinylpyrrolidone and dimethyl aminoethyl methacrylate represented by H.C. Polymers 1, 1N, 2 and HCP-3A (all manufactured by Osaka Organic Chemical Industry), and Gafquat 755 and 734 (manufactured by ISP), or the like.

[0025] The non-ionic high-molecular-weight resin compound may, for example, be a copolymer of vinylpyrrolidone and vinyl acetate represented by PVP/VA (manufactured by ISP), Luviskol VA (manufactured by BASF) and PVA 6450 (manufactured by Osaka Organic Chemical Industry), a polyvinylpyrrolidone represented by PVPK (manufactured by ISP) and Luviskol K (manufactured by BASF), Luviflex D4101 (manufactured by BASF), a polyvinyl alcohol, a vinylpyrrolidone-vinyl acetate-alkyl aminoethyl acrylate copolymer, hydroxyethyl cellulose, hydroxypropyl cellulose, hydroxypropyl methylcellulose, methyl cellulose, ethyl cellulose, dextrin, galactan, pullulan or the like.

[0026] The anionic high-molecular-weight resin compound may specifically be an anionic block copolymer such as, for example, an anionic acrylic polymer represented by Diahold A-403 (manufactured by Mitsubishi Chemical), Aniset, KB-1000, KB-100H, B-1015 and HS-3000 (all manufactured by Osaka Organic Chemical Industry), Plascize L-33, L-53, L-9909B and L-6330 (all manufactured by Goo Chemical) [label names: (acrylate/(C12, 13) alkyl methacrylate/methoxyethyl acrylate) cross-polymer, alkyl acrylate copolymer AMP, (acrylate/(C1-18) alkyl acrylate/(C1-8) alkyl acrylamide) copolymer AMP, (acrylate/diacetone acrylamide) copolymer, etc.]; a copolymer of a methyl vinyl ether and a maleic acid monoalkyl ester represented by BEM-42S and WEM-22S (both manufactured by Osaka Organic Chemical Industry), and Gantrez ES-425, ES-225 and ES-33 (all manufactured by ISP); Resin 28-1310 and Resin 28-2930 (both manufactured by AkzoNobel), Luviset CE5055 (manufactured by BASF), a copolymer of vinyl acetate and crotonic acid; a copolymer of acrylic acid, an acrylic acid alkyl ester and N-alkyl acrylamide represented by Ultrahold 8 (manufactured by BASF); carboxymethyl cellulose, a carboxy vinyl polymer, xanthan gum, carrageenan, sodium alginate, gum arabic, pectin and the like.

[0027] The foregoing description is merely illustrative, and the hair fixative resin in the

present invention is not limited to those named above. In the present invention, it is particularly preferable to use an anionic acrylic acid-based high-molecular-weight resin such as, for example, the block polymer described in JP 2012-162519 A.

[0028] The hair fixative resin content in the treatment composition of the present invention is at least 0.01 mass% and at most 2.0 mass%, preferably 0.01 to 1.0 mass%, and more preferably 0.01 to 0.5 mass%. If the content is less than 0.01 mass%, then the improvement effect due to the addition cannot be obtained, and if the content is more than 2.0 mas%, then there is stiffness due to the resin and a light and soft texture cannot be obtained.

[0029] The treatment composition of the present invention preferably has a pH that is adjusted to be within the range 4.0 to 7.5, more preferably 4.3 to 7.2, and even more preferably 4.6 to 7.0. By setting the pH within the aforementioned range, there is no stickiness at the time of application, and the light and soft texture when used is further improved.

[0030] The pH of the treatment composition of the present invention can be adjusted by adding a pH adjuster (including an acidifying agent, a basifying agent or a buffer) that can be normally added to a cosmetic or the like. The buffer may be lactic acid/sodium lactate or the like, but is not limited thereto.

[0031] Additionally, an amino acid, particularly an aliphatic amino acid, especially L-alanine, may be added to the treatment composition of the present invention, and by adding an amino acid, it is possible to further improve the styling retention effect.

[0032] The treatment composition of the present invention may contain other ingredients that can be added to compositions for treating, particularly styling, keratin fibers such as hair and eyelashes, within a range not inhibiting the effects of the present invention. Other ingredients include, for example, polyhydric alcohols, lower alcohols, surfactants, higher alcohols, sugars (monosaccharides, disaccharides such as trehalose, and oligosaccharides), ceramides, phospholipids, vegetable extracts, silicone and silicone derivatives, various types of dyes, metal ion sequestering agents, preservatives, UV absorbing agents, antioxidants, fragrances and the like.

[0033] The treatment composition of the present invention may be used as a hairdressing or styling cosmetic that is not washed away, for styling curls or straightening keratin fibers such as hair and eyelashes. The format thereof is not particularly limited, and it may be provided in various forms, such as a liquid, a mist, a cream, a gel, a foam, an aerosol or the like.

[0034] The treatment composition of the present invention can form styles for keratin fibers, preferably while they are being heated.

As the specific method of use, for example, the treatment composition of the present invention may be applied to keratin fibers such as hair and eyelashes, then the keratin fibers

may be styled with a hair iron, a hot curler, a rod, an eyelash curler or the like. The heating temperature is preferably 40 to 200 °C, and in the case of hair, should preferably be in the range 160 to 200 °C. Next, the keratin fibers may optionally be set by blowing with a dryer.

EXAMPLES

[0035] Herebelow, the present invention will be explained in further detail by giving examples, but the present invention is not limited, in any way, by these examples. Where not otherwise indicated, content is indicated in mass% relative to the overall amount of the composition containing the relevant ingredient.

[0036] Keratin fiber treatment compositions were prepared with the formulations indicated in Tables 1 to 3 below. The composition (sample) of each example was used by a panel of experts, and evaluated in the following categories (1) to (6) in accordance with the below-indicated methods and criteria.

- (1) Setting strength (ability to style (curl) the hair as desired)
- (2) Curl retention (ability to retain (keep) the shape of formed curls)
- (3) Lack of stickiness when applied (lack of a sticky texture when the sample is applied to hair)
- (4) Lack of stiffness of curls (lack of a sense of stiffness when passing a finger through a lock of hair with the flow of the hair after curling, also could be referred to as “ease of finger passage”)
- (5) Softness of curls (soft texture of formed curls themselves)
- (6) Lightness of curls (light texture of formed curls)

[0037] <Evaluation Method and Evaluation Criteria>

- (1) Setting strength (curl formation ability)

0.3 g of a sample of each example was evenly applied to a lock of hair consisting of hair (1 g) with a length of 10 cm and naturally dried for 2 hours, after which the hair was wound about a hair iron set to 180 °C and the apparent length (L1) of the hair lock after being released from the hair iron was measured. Based on the measurement value (L1), the setting strength was defined by the following formula, with the ideal value (100%) being when the diameter of the curled hair lock was equal to the diameter (L0) of the hair iron.

$$\text{Setting strength (\%)} = 100 - (L1 - L0) \div (10 - L0) \times 100$$

(The closer this value is to 100%, the higher the setting strength.)

A++: Setting strength of 70% or higher

A+: Setting strength of 60% or higher

A: Setting strength of 50% or higher

B: Setting strength of less than 50%

[0038] (2) Curl retention (keep strength)

A hair lock that was set (curled) in the same manner as in (1) above was suspended by being fixed at one end in a constant-temperature constant-humidity chamber at 25 °C and 80% humidity, removed after 120 minutes, and the apparent length (L2) of the hair lock was measured again. Based on the measurement value (L2), the curl retention (keep strength) was defined by the following formula.

$$\text{Keep strength (\%)} = 100 - (L2 - L0) \div (10 - L0) \times 100$$

(The greater this value, the better the curl retention (keep strength).)

A++: Keep strength of at least 25% or higher

A+: Keep strength of at least 20%

A: Keep strength of at least 10%

B: Keep strength of less than 10%

[0039] (3) to (6): Other evaluation categories

Usage tests were performed by ten expert panelists, by taking a sample of each example in the hand, and evaluating the lack of stickiness when applied to hair, the lack of stiffness after curling, the softness and the lightness on the basis of the following evaluation points and criteria:

(Evaluation points criteria)

5 points: Observed

4 points: Somewhat observed

3 points: Slightly observed

2 points: Mostly not observed

0 points: Not observed at all

(Evaluation criteria)

A+: Total of at least 40 points

A: Total of at least 25 points and less than 40 points

B: Total of less than 25 points

[0040] [Table 1]]

	Ex. 1	Ex. 2	Ex. 3	Comp. Ex. 1	Comp. Ex. 2
Water	balance to total of 100				
Erythritol	1	-	-	-	-
Sorbitol	-	1	-	-	-
Maltitol	-	-	1	-	-
Glucose	-	-	-	1	-
Hydrolyzed keratin (sheep wool)	-	-	-	-	1
pH	7.98	6.39	7.23	7.01	7.46
Setting strength	A	A	A	A	A
Curl retention	A	A	A	B	B
Lack of stickiness after application	A+	A	A	A	A+
Lack of stiffness of curls	A+	A+	A+	A+	A+
Softness of curls	A+	A	A	A	A

[0041] As shown in Table 1, Examples 1-3, containing erythritol, sorbitol or maltitol, which are sugar alcohols, were evaluated as excellent in all categories. Among these, erythritol performed the best. In contrast therewith, the curl retention, in particular, was inferior in Comparative Examples 1 and 2, containing glucose, which is a monosaccharide, or hydrolyzed keratin, which is described in Patent Document 3.

[0042] [Table 2]

	Ex. 1	Ex. 4	Ex. 5	Ex. 6	Ex. 7	Ex. 8	Ex. 9	Comp. Ex. 3	Comp. Ex. 4
Water	balance to total of 100								
Erythritol	1	1	1	1	1			-	-
Sorbitol	-	-	-			1		-	-
Maltitol	-	-	-				1	-	-
Urea	-	1	-	1	1	1	1	-	1
Lactic acid	-	-	s.a.					-	-
Amine oxide group-containing resin (*)	-	-	-					2	2
pH	7.98	8.34	4.53	4.63	6.83	4.13	4.35	-	-
Setting strength	A	A+	A	A+	A+	A+	A+	A+	A
Curl retention	A	A	A+	A+	A+	A+	A+	A+	A+
Lack of stickiness after application	A+	A+	A+	A+	A+	A	A	B	B
Lack of stiffness of curls	A+	A+	A	A+	A+	A+	A+	B	B
Softness of curls	A+	A+	A	A+	A+	A	A	A	B
Lightness of curls	A+	A+	A+	A+	A+	A+	A+	B	B

(*) Diaformer Z732 (manufactured by Mitsubishi Chemical)

[0043] As shown in Table 2, by adding urea in addition to a sugar alcohol, the setting strength was further improved (Example 4). Additionally, Examples 5 to 9, in which the pH of a composition containing a sugar alcohol alone or a combination of a sugar alcohol

and urea was adjusted to 4.0 to 7.5, performed extremely well, particularly in curl retention, and Examples 6 and 7, in which the pH was adjusted to be within the range 4.6 to 7.0, obtained excellent (A+) results in all of the categories that were evaluated.

[0044] In contrast with these examples, Comparative Examples 3 and 4, which achieved good curl retention by containing 2 mass% of the amine oxide group-containing resin (cationic resin) described in Patent Document 2, were sticky when applied, felt stiff due to the resin, and were not able to result in a soft and light feel when used, regardless of whether or not a sugar alcohol and a urea were present.

[0045] [Table 3]

	Ex. 10	Ex. 11	Ex. 12	Ex. 13	Ex. 14	Comp. Ex. 5	Comp. Ex. 6
Water	balance to total of 100						
Alcohol	10	10	10	10	10	10	10
Erythritol	1	1	1	1	1	-	-
Urea	1	1	1	1	1	-	-
L-alanine	-	1	1	1	1	-	-
Anionic resin (*)	-	-	0.5	1	2	0.5	2
Caustic soda	-	-	s.a.				
Lactic acid	s.a.						
pH	4.22	4.51	4.70	4.81	4.93	4.76	4.99
Setting strength	A+	A+	A++	A++	A++	A+	A+
Curl retention	A+	A++	A++	A++	A++	A+	A+
Lack of stickiness after application	A+	A+	A+	A+	A	A	A
Lack of stiffness of curls	A+	A+	A+	A+	A	A	B
Softness of curls	A+	A+	A+	A	A	B	B
Lightness of curls	A+	A+	A+	A	A	A	A

(*) Diahold A-403 (manufactured by Mitsubishi Chemical) [label name: (acrylate/(C12, 13) alkyl methacrylate/methoxyethyl acrylate) cross-polymer]

[0046] From the results shown in Table 3, very excellent results were obtained in all evaluation categories when urea and L-alanine were added in addition to a sugar alcohol (erythritol). Even when up to 2 mass% of an anionic hair fixative resin was added to these compositions, there was no stickiness and the texture was not stiff when applied, and soft and light curls were formed. In contrast therewith, in Comparative Examples 5 and 6, containing only an anionic hair fixative resin without containing a sugar alcohol, there was a stiff texture and soft curls were not obtained.

CLAIMS

- [Claim 1] A keratin fiber treatment composition comprising a sugar alcohol.
- [Claim 2] The keratin fiber treatment composition according to claim 1, further comprising urea and/or a urea derivative.
- [Claim 3] The keratin fiber treatment composition according to claim 1, further comprising a hair fixative resin.
- [Claim 4] The keratin fiber treatment composition according to claim 1, further comprising urea and/or a urea derivative, and a hair fixative resin.
- [Claim 5] The keratin fiber treatment composition according to any one of claims 1 to 4, wherein the pH of the composition is within a range from 4.0 to 7.5.
- [Claim 6] The keratin fiber treatment composition according to any one of claims 1 to 5, wherein the sugar alcohol is erythritol.
- [Claim 7] The keratin fiber treatment composition according to any one of claims 3 to 6, wherein the hair fixative resin is an anionic resin.
- [Claim 8] The keratin fiber treatment composition according to claim 7, wherein the anionic resin is a block copolymer.
- [Claim 9] The keratin fiber treatment composition according to any one of claims 3 to 8, wherein the hair fixative resin content is 2.0 mass% or lower.
- [Claim 10] The keratin fiber treatment composition according to any one of claims 1 to 9, for hot styling of hair.