

HAIR COSMETIC

Field of the Invention

[0001]

The present invention relates to a hair cosmetic.

Background of the Invention

[0002]

The hair is damaged by the living environment (ultraviolet rays or heat of sunlight), the daily hair-care activities (friction by hair washing or brushing), and the chemical treatment (coloring, perm, etc.). When the damaged hairs rub against each other, a large frictional force is generated on the surface, and entanglement is caused. The "entanglement of hair" is a cause of all of stresses in the hair-care activities. The "entanglement of hair" is sensed by poor finger-combing properties in an operation of lathering a hair detergent, such as a shampoo, during hair washing, poor finger-combing properties during hair rinsing after hair washing, or the like.

In the case of using a hair cosmetic, such as a hair conditioner and a hair treatment, as a method of dissociating the entanglement of hair after hair washing, such a hair cosmetic is coated on the hair and applied smoothly over the entangled site while passing the fingers therethrough, thereby dissociating the entanglement of hair while spreading lubricating components on the hair surface. In the conventional technology, for the purpose of enhancing finger-combing properties or combing properties of hair, the hair cosmetic, such as a hair conditioner and a hair treatment, is blended with a cationic surfactant, a higher alcohol, a silicone, and so on.

[0003]

PTL 1 discloses that a hair cosmetic using a polyether amino-modified silicone and a cationic surfactant can prevent damage due to the entanglement of hair during rinsing by suppressing the squeaky feeling of hair in a water flow during rinsing and improving flexibility and smoothness.

PTL 2 discloses that a hair cosmetic in which an amino-modified silicone in a specific kinematic viscosity range, an aminopolyether-modified silicone, a dimethylpolysiloxane in a specified kinematic viscosity range, a specified alkyl-type cation, and a specified higher alcohol are combined is able

to improve finger combining during use, to give feeling of soft and moist finish, and to prevent roughness and dryness and give a moist feeling under low humidity, while enhancing moist retention of hair.

In addition, PTL 3 discloses a hair cosmetic to be used after being applied to hair and then washed off, in which by combining an aminopolyether-co-modified silicone having a specified structure with a volatile silicone, the amount of adsorption of an adhesive component on the hair decreases, and it becomes difficult for the bulky adhesive component to adhere to the hair, and as a result, the wet hair after treatment is extremely easily dispersed, and the drying speed is improved.

Citation List

Patent Literature

[0004]

PTL 1: JP 2002-249418 A

PTL 2: JP 2013-43848 A

PTL 3: JP 2017-105760 A

Summary of the Invention

[0005]

The present invention relates to a hair cosmetic containing or prepared by blending: (A) an aminopolyether-modified silicone having a polyoxyalkylene structure in a side chain portion; and (B) an aminopolyether-modified silicone having a polyoxyalkylene structure in a main chain portion.

Detailed Description of the Invention

[0006]

[Hair Cosmetic]

The hair cosmetic of the present invention is one containing or one prepared by blending: (A) an aminopolyether-modified silicone having a polyoxyalkylene structure in a side chain portion (hereinafter also referred to as "component (A)"); and (B) an aminopolyether-modified silicone having a polyoxyalkylene structure in a main chain portion (hereinafter also referred to as "component (B)"). The amino group in each of the component (A) and the component (B) may be any of primary to tertiary amino groups. In addition,

though the foregoing amino group may be present in any of the main chain portion and the side chain portion of the component (A) and the component (B), it is preferred that the amino group is present in the side chain portion.

As for the hair cosmetic of the present invention, in view of the fact that both the component (A) and the component (B) are contained or blended, when applied to the hair, the entanglement can be dissociated without performing an operation, such as passing of fingers through hair. Furthermore, it is possible to improve the drying speed of hair after treatment and to give smoothness to the hair during rinsing. The expression "one containing the component (A) and the component (B) " as referred to herein also means "one prepared by blending the component (A) and the component (B)".

[0007]

Although the hair cosmetics disclosed in PTLs 1 to 3 are improved in smoothness of hair or finger-combing properties during use, drying speed, and so on, they have not reached spontaneous dissociation of the entanglement of hair without performing an operation, such as passing of fingers through hair.

The present invention relates to a hair cosmetic which when applied to hair, is able to dissociate the entanglement without performing an operation, such as passing of fingers through hair, and further, is able to improve the drying speed of hair after treatment, thereby giving smoothness to the hair during rinsing.

[0008]

The present inventors have found that a hair cosmetic containing or prepared by blending: two kinds of aminopolyether-modified silicones each having a predetermined structure can solve the aforementioned problem.

When the hair cosmetic of the present invention is applied to hair, the entanglement can be dissociated without performing an operation, such as passing of fingers through hair. In addition, the hair having the foregoing hair cosmetic applied thereto is fast in drying and favorable in smoothness of hair during rinsing.

[0009]

Although the reason why in view of the fact that the hair cosmetic of the present invention has the aforementioned constitution, the effects of the present invention are brought is not elucidated yet, the following may be conjectured.

In order to reveal such a state that the entanglement of hair generated during hair washing or present after hair washing is spontaneously dissociated, it may be considered to be important to lower a frictional force working between the hairs. In a hair cosmetic, a silicone is occasionally blended as an active ingredient; however, it may be considered that when the component (B) that is an aminopolyether-modified silicone having high water solubility is used, the frictional force working between the hairs can be lowered, and therefore, the effect for dissociating the entanglement of hair is revealed. In addition, by using the component (A), it is possible to improve the drying speed of hair after treatment with the hair cosmetic and to give smoothness to the hair during rinsing.

Furthermore, the present inventors have found that by using the component (A) and the component (B) in combination, the entanglement of hair can be more effectively dissociated as compared with the case of using the component (B) alone.

[0010]

Examples of the hair cosmetic of the present invention include a hair rinse, a hair conditioning agent, a hair treatment agent (inclusive of a non-washed away type), a hair styling agent, a hair detergent, a hair dye, and a hair growth promoter. Of these, a hair rinse, a hair conditioning agent, a hair treatment agent, a hair styling agent, or a hair detergent is preferred, and a hair rinse, a hair conditioning agent, or a hair treatment is more preferred.

A dosage form of the hair cosmetic is not particularly limited, and it is possible to adopt an arbitrary dosage form, for example, a liquid form, a lathering form, a paste form, a cream form, a solid form, or a powder form. From the viewpoint of easiness of spreading on the hair, a liquid form, a paste form, or a cream form is preferred, and a liquid form or a cream form is more preferred. In addition, the hair cosmetic of the present invention may be used in a state of an aqueous solution upon being diluted with water according to the use mode.

[0011]

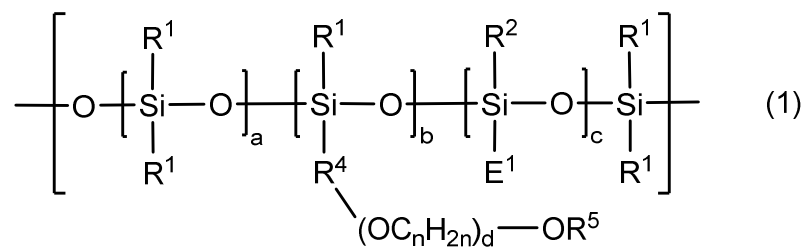
<Component (A)>

The hair cosmetic of the present invention is one containing or prepared by blending therein, as the component (A), an aminopolyether-modified silicone having a polyoxyalkylene structure in a side chain portion. In view of the fact

that the hair cosmetic of the present invention contains or is prepared by blending therein the component (A), it is possible to improve the drying speed of hair after treatment and to give smoothness to the hair during rinsing. In addition, when the component (A) and the component (B) are used in combination, while maintaining the aforementioned effect, an effect for spontaneously dissociating the entanglement of hair after treatment can be more improved.

[0012]

More specifically, examples of the component (A) include ones having a structure represented by the following general formula (1).



In the formula (1), R¹ represents a monovalent hydrocarbon group having 1 or more and 6 or less carbon atoms. R² represents either R¹ or E¹. E¹ represents a monovalent group represented by -R³-Z¹ (wherein R³ represents a divalent hydrocarbon group having 1 or more and 6 or less carbon atoms; and Z¹ represents a primary to tertiary amino group-containing group). R⁴ represents a divalent hydrocarbon group having 1 or more and 6 or less carbon atoms, and R⁵ represents a hydrogen atom or a monovalent hydrocarbon group having 1 or more and 4 or less carbon atoms.

a represents a number of 1 or more and 50 or less; b represents a number of 1 or more and 50 or less; c represents a number of 1 or more and 50 or less; and d represents a number of 2 or more and 100 or less. n represents a number of 2 or more and 10 or less. The bonding order among the structural units within the bracket does not matter, and the bonding form may be a block form or a random form. The (OC_nH_{2n})'s in the number of d may be the same as or different from each other. In addition, plural R¹'s, R²'s, R⁴'s, R⁵'s, and E¹'s may be the same as or different from each other, respectively.

[0013]

In the general formula (1), R¹ represents a monovalent hydrocarbon group having 1 or more and 6 or less carbon atoms, preferably an alkyl group having 1 or more and 6 or less carbon atoms or a phenyl group, more preferably

a methyl group or an ethyl group, and still more preferably a methyl group. R^2 represents either R^1 or E^1 and preferably R^1 .

[0014]

In the general formula (1), E^1 represents a monovalent group represented by $-R^3-Z^1$ (wherein R^3 represents a divalent hydrocarbon group having 1 or more and 6 or less carbon atoms; and Z^1 represents a primary to tertiary amino group-containing group). R^3 is preferably a divalent hydrocarbon group having 2 or more and 4 or less carbon atoms, and more preferably an ethylene group, a trimethylene group, a propylene group, or a tetramethylene group.

Z^1 is a primary to tertiary amino group-containing group, and preferably a group represented by $-N(R^6)_2$, $-NR^6(CH_2)_pN(R^6)_2$, or $-NR^6(CH_2)_pN(R^7)CO-R^8$. Here, R^6 represents a hydrogen atom or a monovalent hydrocarbon group having 1 or more and 4 or less carbon atoms, and preferably a hydrogen atom, a methyl group, or an ethyl group. R^7 represents a monovalent hydrocarbon group having 1 or more and 4 or less carbon atoms, and preferably a methyl group or an ethyl group. R^8 represents a monovalent hydrocarbon group having 1 or more and 4 or less carbon atoms. p represents a number of 2 or more and 6 or less, and preferably a number of 2 or more and 4 or less.

[0015]

In the general formula (1), the E^1 group is preferably $-(CH_2)_3-NH_2$, $-(CH_2)_3-N(CH_3)_2$, $-(CH_2)_3-NH-(CH_2)_2-NH_2$, or $-(CH_2)_2-NH-(CH_2)_2-N(CH_3)_2$, and more preferably $-(CH_2)_3-NH_2$.

[0016]

In the general formula (1), R^4 represents a divalent hydrocarbon group having 1 or more and 6 or less carbon atoms, preferably a divalent hydrocarbon group having 2 or more and 4 or less carbon atoms, and more preferably an ethylene group, a trimethylene group, a propylene group, or a tetramethylene group.

R^5 represents a hydrogen atom or a monovalent hydrocarbon group having 1 or more and 4 or less carbon atoms, and preferably a methyl group or an ethyl group.

[0017]

The component (A) is more preferably one represented by the following

The kinematic viscosity at 25°C of the component (A) is determined in such a manner that using a capillary viscometer, a time for which a liquid in a fixed volume flows in the capillary of the viscometer at 25°C under 1013.25 hPa is measured, and the kinematic viscosity is calculated from this outflow time

and a viscometer constant according to the following equation. As the capillary viscometer, a model, such as an Ubbelohde or Cannon-Fenske, is generally used.

Kinematic viscosity (mm^2/s) = (Outflow time (sec)) $\times$ (Viscometer constant)
[0020]

The component (A) may be used alone or in combination of two or more thereof.

As the component (A), a commercially available aminopolyether-modified silicone may be used, too. Examples thereof include "ABIL SOFT AF100", manufactured by Evonik Industries AG (aminopolyether-modified silicone represented by the general formula (1-1) (methoxy PEG/PPG-7/3 aminopropyl dimethicone), viscosity: $400 \text{ mm}^2/\text{s}$); "X-22-3939A", manufactured by Shin-Etsu Chemical Co., Ltd. (viscosity: $2,800 \text{ mm}^2/\text{s}$); and "SILSENSE A21", manufactured by The Lubrizol Corporation (PEG7-amodimethicone, viscosity: $250 \text{ mm}^2/\text{s}$).

[0021]

From the viewpoint of dissociating the entanglement of hair and the viewpoint of improving the drying speed of hair after treatment and giving smoothness to the hair during rinsing, the content or blending amount of the component (A) in the hair cosmetic is preferably 0.01% by mass or more, more preferably 0.05% by mass or more, and still more preferably 0.1% by mass or more, and from the viewpoint of improving the drying speed of hair after treatment and giving smoothness to the hair during rinsing, it is preferably 5.0% by mass or less, more preferably 3.0% by mass or less, still more preferably 1.0% by mass or less, yet still more preferably 0.8% by mass or less, and even yet still more preferably 0.6% by mass or less. A specific range of the content or blending amount of the component (A) in the hair cosmetic is preferably 0.01 to 5.0% by mass, more preferably 0.01 to 3.0% by mass, still more preferably 0.01 to 1.0% by mass, yet still more preferably 0.05 to 0.8% by mass, and even yet still more preferably 0.1 to 0.6% by mass.

[0022]

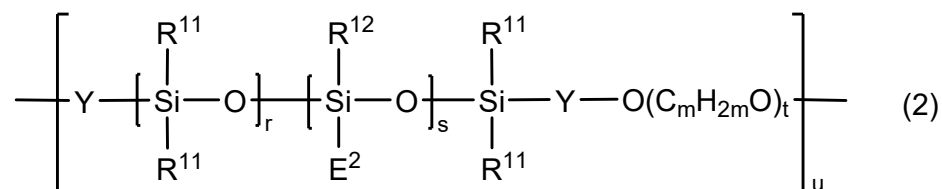
<Component (B)>

The hair cosmetic of the present invention is one containing or prepared by blending therein, as the component (B), an aminopolyether-modified silicone having a polyoxyalkylene structure in a main chain portion. In view of the fact

that the hair cosmetic of the present invention contains or is prepared by blending therein the component (B), when applied to the hair, the entanglement can be spontaneously dissociated without performing an operation, such as passing of fingers through hair, owing to the aforementioned mechanism of action.

[0023]

More specifically, examples of the component (B) include ones having a structure represented by the following general formula (2).



In the formula (2), R^{11} represents a hydrogen atom or a monovalent hydrocarbon group having 1 or more and 6 or less carbon atoms. R^{12} represents either R^{11} or E^2 . E^2 represents a monovalent group represented by $-\text{R}^{13}-\text{Z}^2$ (wherein R^{13} represents a single bond or a divalent hydrocarbon group having 1 or more and 20 or less carbon atoms; and Z^2 represents a primary to tertiary amino group-containing group). Y represents an alkylene group having 1 or more and 6 or less carbon atoms.

r represents a number of 2 or more; s represents a number of 1 or more; t represents a number of 4 or more and 100 or less; and u represents a number of 1 or more. m represents a number of 2 or more and 10 or less. The bonding order among the structural units within the bracket does not matter, and the bonding form may be a block form or a random form. The $(\text{C}_m\text{H}_{2m}\text{O})$'s in the number of t may be the same as or different from each other. In addition, plural R^{11} 's, R^{12} 's, and E^2 's may be the same as or different from each other, respectively.

[0024]

In the general formula (2), R^{11} represents a hydrogen atom or a monovalent hydrocarbon group having 1 or more and 6 or less carbon atoms. R^{11} 's are each independently preferably a hydrogen atom, an alkyl group having 1 or more and 6 or less carbon atoms, or a phenyl group, more preferably a methyl group or an ethyl group, and still more preferably a methyl group.

[0025]

In the general formula (2), R^{12} represents either R^{11} or E^2 . E^2

represents a monovalent group represented by $-R^{13}-Z^2$ (wherein R^{13} represents a single bond or a divalent hydrocarbon group having 1 or more and 20 or less carbon atoms).

R^{13} is preferably a divalent hydrocarbon group having 1 or more and 20 or less carbon atoms; more preferably an alkylene group having 1 or more and 20 or less carbon atoms; still more preferably a linear or branched alkylene group having 1 or more and 6 or less carbon atoms; yet still more preferably a methylene group, an ethylene group, a trimethylene group, a propylene group, a tetramethylene group, or a hexamethylene group; and even yet still more preferably a trimethylene group or a propylene group.

[0026]

Z^2 is a primary to tertiary amino group-containing group, and preferably an amino group-containing group represented by $-N(R^{14})_2$, $-NR^{14}(CH_2)_qN(R^{14})_2$, or $-NR^{14}(CH_2)_qN(R^{15})CO-R^{16}$. Here, R^{14} and R^{15} each independently represent a hydrogen atom or an alkyl group having 1 or more and 3 or less carbon atoms, and preferably a hydrogen group or a methyl group. R^{16} represents an alkyl group having 1 or more and 3 or less carbon atoms. q represents a number of 1 or more and 6 or less, and preferably a number of 2 or more and 4 or less.

[0027]

In the general formula (2), the E^2 group is preferably $-(CH_2)_3-NH_2$, $-(CH_2)_3-N(CH_3)_2$, $-(CH_2)_3-NH-(CH_2)_2-NH_2$, or $-(CH_2)_2-NH-(CH_2)_2-N(CH_3)_2$, and more preferably $-(CH_2)_3-NH-(CH_2)_2-NH_2$.

[0028]

In the general formula (2), Y is an alkylene group having 1 or more and 6 or less carbon atoms, preferably an ethylene group, a propylene group, a trimethylene group, a *n*-butylene group (tetramethylene group), or an isobutylene group, and more preferably a *n*-butylene group or an isobutylene group. The isobutylene group as referred to herein includes $-CH(CH_3)CH_2CH_2-$, $-CH_2CH(CH_3)CH_2-$, and $-CH_2CH_2CH(CH_3)-$.

[0029]

In the general formula (2), r represents a number of 2 or more; s represents a number of 1 or more; t represents a number of 4 or more and 100 or less; and u represents a number of 1 or more. r is preferably a number of 2 or more and 1,000 or less, and more preferably a number of 2 or more and 100 or

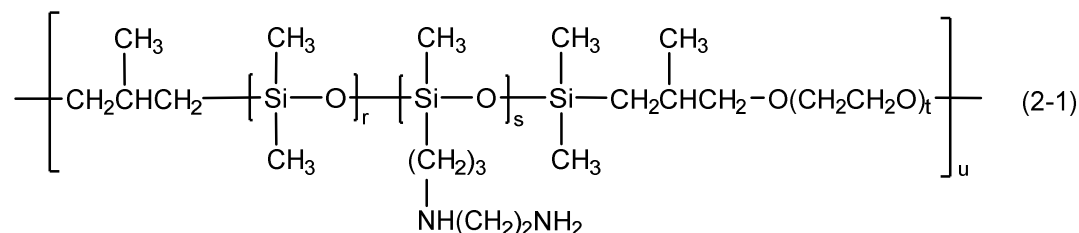
less. s is preferably a number of 1 or more and 50 or less; t is preferably a number of 4 or more and 50 or less, and more preferably a number of 10 or more and 18 or less; and u is preferably a number of 1 or more and 100 or less.

[0030]

In the general formula (2), m represents a number of 2 or more and 10 or less, preferably a number of 2 or more and 6 or less, and more preferably a number of 2 or more and 4 or less.

[0031]

The component (B) is more preferably an aminopolyether-modified silicone having a structure represented by the following general formula (2-1), and still more preferably an aminopolyether-modified silicone composed of a structure represented by the following general formula (2-1).



In the formula (2-1), r, s, t, and u are the same as those mentioned above.

[0032]

The component (B) is preferably one satisfying the following formula (I). When the component (B) satisfies the following formula (I), the effect for dissociating the entanglement of hair is more excellent because of high water solubility.

$$0.01 \leq \text{Si}/\text{AO} \leq 1.6 \quad (\text{I})$$

In the formula (I), Si represents a molar number of a silicon atom in the component (B), and AO represents an oxyalkylene average addition molar number in the component (B).

In the formula (I), from the viewpoint of dissociating the entanglement of hair, the Si/AO is 0.01 or more, preferably 0.05 or more, still more preferably 0.1 or more, yet still more preferably 0.3 or more, even yet still more preferably 0.5 or more, and even still more preferably 0.7 or more, and from the same viewpoint, it is 1.6 or less, preferably 1.4 or less, more preferably 1.2 or less, still more preferably 1.0 or less, and yet still more preferably 0.9 or less.

In the case where the component (B) is one composed of the structure

represented by the general formula (2) or the general formula (2-1), the Si/AO in the formula (I) is represented by $(r + s + 1)/t$.

The Si/AO in the formula (I) can be calculated from an integrated value of hydrogen atoms bonded to silicon and H of the hydrocarbon group and an integrated value of H of the oxyalkylene group, as measured by the ^1H -NMR measurement. Specifically, the measurement may be performed by the method described in the section of Examples.

[0033]

From the viewpoint of dissociating the entanglement of hair, the nitrogen content of the component (B) is preferably 0.1% by mass or more, more preferably 0.2% by mass or more, still more preferably 0.5% by mass or more, and yet still more preferably 1.0% by mass or more, and it is preferably 2.5% by mass or less, more preferably 2.0% by mass or less, still more preferably 1.8% by mass or less, and yet still more preferably 1.5% by mass or less. A specific range of the nitrogen content of the component (B) is preferably 0.1 to 2.5% by mass, more preferably 0.2 to 2.0% by mass, still more preferably 0.5 to 1.8% by mass, and yet still more preferably 1.0 to 1.5% by mass. The nitrogen content of the component (B) is a value measured in conformity with the potentiometric titration method as prescribed in JIS K0113:2005.

[0034]

Although the component (B) may be any form of an oil, an emulsion, and so on, it is preferably an oil.

In the case where the component (B) is an oil, from the viewpoint of allowing it to efficiently remain in the hair or the like to exhibit the effects of the present invention, its kinematic viscosity at 25°C is preferably 50 mm²/s or more, more preferably 100 mm²/s or more, still more preferably 300 mm²/s or more, yet still more preferably 500 mm²/s or more, and even yet still more preferably 700 mm²/s or more, and from the viewpoint of water solubility, it is preferably 50,000 mm²/s or less, more preferably 20,000 mm²/s or less, still more preferably 10,000 mm²/s or less, yet still more preferably 5,000 mm²/s or less, even yet still more preferably 3,000 mm²/s or less, even still more preferably 1,500 mm²/s or less, and even still more further preferably 1,400 mm²/s or less. A specific range of the kinematic viscosity at 25°C of the component (B) is preferably 50 to 50,000 mm²/s, more preferably 100 to 20,000 mm²/s, still more preferably 300 to 10,000 mm²/s, yet still more preferably 500

to 5,000 mm²/s, even yet still more preferably 500 to 3,000 mm²/s, even still more preferably 500 to 1,500 mm²/s, and even still more further preferably 700 to 1,400 mm²/s. The kinematic viscosity of the component (B) may be measured by the same method as that mentioned above.

[0035]

The component (B) may be used alone or in combination of two or more thereof.

As the component (B), a commercially available aminopolyether-modified silicone may be used, too. Examples of the aminopolyether-modified silicone having a structure represented by the general formula (2-1) include "SILSTYLE 201", manufactured by Dow Corning Toray Co., Ltd. ((bisisobutyl PEG-14/amodimethicone) copolymer, nitrogen content: 1.2% by mass, viscosity: 1,000 mm²/s, Si/AO = 0.80).

[0036]

From the viewpoint of dissociating the entanglement of hair and the viewpoint of improving the drying speed of hair after treatment, the content or blending amount of the component (B) in the hair cosmetic is preferably 0.0001% by mass or more, more preferably 0.0005% by mass or more, and still more preferably 0.001% by mass or more, and from the viewpoint of improving the drying speed of hair after treatment and giving smoothness to the hair during rinsing, it is preferably 5.0% by mass or less, more preferably 3.0% by mass or less, still more preferably 1.0% by mass or less, yet still more preferably 0.7% by mass or less, even yet still more preferably 0.5% by mass or less, and even still more preferably 0.3% by mass or less. A specific range of the content or blending amount of the component (B) in the hair cosmetic is preferably 0.0001 to 5.0% by mass, more preferably 0.0001 to 3.0% by mass, still more preferably 0.0001 to 1.0% by mass, yet still more preferably 0.0001 to 0.7% by mass, even yet still more preferably 0.0005 to 0.5% by mass, and even still more preferably 0.001 to 0.3% by mass.

[0037]

In the hair cosmetic of the present invention, from the viewpoint of improving the drying speed of hair after treatment and giving smoothness to the hair during rinsing, a mass ratio [(A)/(B)] of the component (A) to the component (B) is preferably 1,000 or less, more preferably 500 or less, still more preferably 300 or less, yet still more preferably 100 or less, even yet still

more preferably 50 or less, and even still more preferably 20 or less. In addition, from the viewpoint of dissociating the entanglement of hair and the viewpoint of improving the drying speed of hair after treatment and giving smoothness to the hair during rinsing, the mass ratio [(A)/(B)] is preferably 0.01 or more, more preferably 0.1 or more, still more preferably 0.3 or more, and yet still more preferably 0.5 or more. A specific range of the mass ratio [(A)/(B)] of the component (A) to the component (B) in the hair cosmetic is preferably 0.01 to 1,000, more preferably 0.1 to 500, still more preferably 0.3 to 300, yet still more preferably 0.5 to 100, even yet still more preferably 0.5 to 50, and even still more preferably 0.5 to 20.

[0038]

<Component (C): Surfactant>

The hair cosmetic of the present invention may further contain or be prepared by further blending, as a component (C), a surfactant. When the hair cosmetic of the present invention contains or is prepared by blending the component (C), not only the components (A) and (B) are dispersed in the hair cosmetic, but also the function as the hair cosmetic is effectively revealed.

In the case where the hair cosmetic is a hair rinse, a hair conditioning agent, or a hair treatment agent, it is preferred that the component (C) contains a cationic surfactant, and in the case where the hair cosmetic is a hair detergent, it is preferred that the component (C) contains an anionic surfactant. Furthermore, a nonionic surfactant or an ampholytic surfactant may also be used in combination.

[0039]

(Cationic Surfactant)

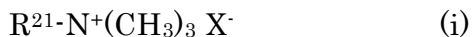
The cationic surfactant is able to not only disperse the components (A) and (B) in the hair cosmetic but also give a conditioning effect to the hair after washing.

Examples of the cationic surfactant include an alkyltrimethylammonium salt, an alkoxyalkyltrimethylammonium salt, a dialkyldimethylammonium salt, an alkyltrimethylamine and its salt, an alkoxyalkyldimethylamine and its salt, and an alkylamidoalkyldimethylamine and its salt.

[0040]

(i) Alkyltrimethylammonium Salt

Examples of the alkyltrimethylammonium salt include a compound represented by the following general formula (i).



In the formula, R^{21} represents an alkyl group having 12 or more and 22 or less carbon atoms, and X^- represents a halide ion, such as a chloride ion and a bromide ion.

R^{21} is preferably an alkyl group having 16 or more and 20 or less carbon atoms. Specifically, examples of the alkyltrimethylammonium salt include cetyltrimethylammonium chloride, stearyltrimethylammonium chloride (stearyltrimonium chloride), and behenyltrimethylammonium chloride.

[0041]

(ii) Alkoxyalkyltrimethylammonium Salt

Examples of the alkoxyalkyltrimethylammonium salt include a compound represented by the following general formula (ii).



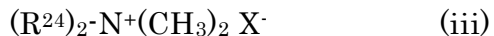
In the formula, R^{22} represents an alkyl group having 12 or more and 22 or less carbon atoms; R^{23} represents an ethylene group or a propylene group, each of which may be substituted with a hydroxy group; and X^- is the same as that mentioned above.

R^{22} is preferably an alkyl group having 16 or more and 20 or less carbon atoms. Specifically, examples of the alkoxyalkyltrimethylammonium salt include stearoxypropyltrimethylammonium chloride, stearoxyethyltrimethylammonium chloride, and a stearoxyhydroxypropyltrimethylammonium chloride.

[0042]

(iii) Dialkyldimethylammonium Salt

Examples of the dialkyldimethylammonium salt include a compound represented by the following general formula (iii).



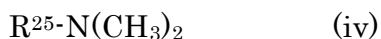
In the formula, R^{24} 's each independently represent an alkyl group having 12 or more and 22 or less carbon atoms, and X^- is the same as that mentioned above.

R^{24} is preferably an alkyl group having 16 or more and 20 or less carbon atoms. Specifically, examples of the dialkyldimethylammonium salt include distearyldimethylammonium chloride.

[0043]

(iv) Alkyldimethylamine and Its Salt

The alkyldimethylamine reacts with an acid to become a quaternary ammonium salt and works as a surfactant. In consequence, the alkyldimethylamine and its salt are defined as a cationic surfactant. In addition, its content is expressed in terms of a mass of the alkyldimethylamine. Examples of the alkyldimethylamine and its salt include a compound represented by the following general formula (iv) and its salt.



In the formula, R^{25} represents an alkyl group having 12 or more and 22 or less carbon atoms.

R^{25} is preferably an alkyl group having 16 or more and 20 carbon atoms.

Examples of the salt include a salt by an organic acid or an inorganic acid. Examples of the organic acid include monocarboxylic acids, such as acetic acid and propionic acid; dicarboxylic acids, such as malonic acid, succinic acid, glutaric acid, adipic acid, maleic acid, fumaric acid, and phthalic acid; polycarboxylic acids, such as polyglutamic acid; hydroxycarboxylic acids, such as glycolic acid, lactic acid, hydroxyacrylic acid, glyceric acid, malic acid, tartaric acid, and citric acid; and acidic amino acids, such as glutamic acid and aspartic acid. Examples of the inorganic acid include hydrochloric acid, sulfuric acid, and phosphoric acid. Of these, organic acids are preferred, and at least one selected from the group consisting of dicarboxylic acids, hydroxycarboxylic acids, and acidic amino acids is more preferred. As the dicarboxylic acid, at least one selected from the group consisting of maleic acid and succinic acid is more preferred. As the hydroxycarboxylic acid, at least one selected from the group consisting of glycolic acid, lactic acid, and malic acid is more preferred. As the acidic amino acid, glutamic acid is more preferred.

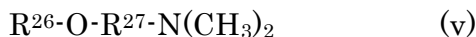
Specific examples of the alkyldimethylamine and its salt include N,N-dimethylbehenylamine, N,N-dimethylstearylamine, and organic acid salts thereof, and a lactic acid salt of N,N-dimethylbehenylamine, a glycolic acid salt of N,N-dimethylstearylamine, and so on are preferred.

[0044]

(v) Alkoxyalkyldimethylamine and Its Salt

The alkoxyalkyldimethylamine reacts with an acid to become a quaternary ammonium salt and works as a surfactant. In consequence, the

alkoxyalkyldimethylamine and its salt are defined as a cationic surfactant. In addition, its content is expressed in terms of a mass of the alkoxyalkyldimethylamine. Examples of the alkoxyalkyldimethylamine and its salt include a compound represented by the following general formula (v) and its salt.



In the formula, R^{26} represents an alkyl group having 12 or more and 22 or less carbon atoms, and R^{27} represents an ethylene group or a propylene group.

R^{26} is preferably an alkyl group having 16 or more and 20 or less carbon atoms.

Examples of the salt include a salt by an organic acid or an inorganic acid. Specific examples of the organic acid and the inorganic acid include those exemplified above for the (iv) alkyldimethylamine and its salt. Of these, organic acids are preferred, and at least one selected from the group consisting of dicarboxylic acids, hydroxycarboxylic acids, and acidic amino acids is more preferred. As the dicarboxylic acid, at least one selected from the group consisting of maleic acid and succinic acid is more preferred. As the hydroxycarboxylic acid, at least one selected from the group consisting of glycolic acid, lactic acid, and malic acid is more preferred. As the acidic amino acid, glutamic acid is more preferred.

Specific examples of the alkoxyalkyldimethylamine and its salt include N,N-dimethyl-3-hexadecyloxypropylamine, N,N-dimethyl-3-octadecyloxypropylamine, and organic acid salts thereof, and a lactic acid salt of N,N-dimethyl-3-hexadecyloxypropylamine, a lactic acid salt of N,N-dimethyl-3-octadecyloxypropylamine (stearoxypropyldimethylamine), and a glycolic acid salt of N,N-dimethyl-3-octadecyloxypropylamine are preferred.

[0045]

(vi) Alkylamidoalkyldimethylamine and Its Salt

The alkylamidoalkyldimethylamine reacts with an acid to become a quaternary ammonium salt and works as a surfactant. In consequence, the alkylamidoalkyldimethylamine and its salt are defined as a cationic surfactant. In addition, its content is expressed in terms of a mass of the alkylamidoalkyldimethylamine. Examples of the

alkylamidoalkyldimethylamine and its salt include a compound represented by the following general formula (vi) and its salt.



In the formula, R^{28} represents an alkyl group having 11 or more and 21 or less carbon atoms, and R^{29} represents an ethylene group or a propylene group.

R^{28} is preferably an alkyl group having 15 or more and 19 or less carbon atoms.

Examples of the salt include a salt by an organic acid or an inorganic acid. Specific examples of the organic acid and the inorganic acid include those exemplified above for the (iv) alkyldimethylamine and its salt. Of these, organic acids are preferred, and at least one selected from the group consisting of dicarboxylic acids, hydroxycarboxylic acids, and acidic amino acids is more preferred. As the dicarboxylic acid, at least one selected from the group consisting of maleic acid and succinic acid is more preferred. As the hydroxycarboxylic acid, at least one selected from the group consisting of glycolic acid, lactic acid, and malic acid is more preferred. As the acidic amino acid, glutamic acid is more preferred.

Specific examples of the alkylamidoalkyldimethylamine and its salt include N-[3-(dimethylamino)propyl]docosanamide, N-[3-(dimethylamino)propyl]stearamide, and organic acid salts thereof, and a lactic acid salt of N-[3-(dimethylamino)propyl]docosanamide and a glycolic acid salt of N-[3-(dimethylamino)propyl]stearamide are preferred.

[0046]

Examples of other cationic surfactant than those mentioned above in (i) to (vi) include a lanolin fatty acid aminopropylethyldimethylammonium ethyl sulfate (ethyl sulfate salt of alkanoylaminopropyl dimethylethylammonium, the alkanoyl group being derived from lanolin), a lanolin fatty acid aminoethyltriethylammonium ethyl sulfate, a lanolin fatty acid aminopropyltriethylammonium ethyl sulfate, a lanolin fatty acid aminoethyltrimethylammonium methyl sulfate, a lanolin fatty acid aminopropylethyldimethylammonium methyl sulfate, an isoalkanoic acid ($\text{C}_{14}\text{-C}_{20}$) aminopropylethyldimethylammonium ethyl sulfate, an isoalkanoic acid ($\text{C}_{18}\text{-C}_{22}$) aminopropylethyldimethylammonium ethyl sulfate, isostearic acid aminopropylethyldimethylammonium ethyl sulfate, isononanoic acid

aminopropylethyldimethylammonium ethyl sulfate, and an alkyltrimethylammonium saccharin.

[0047]

Of those mentioned above, the cationic surfactant is preferably at least one selected from the group consisting of an alkyltrimethylammonium salt, an alkoxyalkyltrimethylammonium salt, a dialkyldimethylammonium salt, an alkyldimethylamine and its salt, an alkoxyalkyldimethylamine and its salt, and an alkylamidoalkyldimethylamine and its salt, and specifically, at least one selected from the group consisting of compounds represented by the foregoing general formulae (i) to (iii) and compounds represented by the foregoing formulae (iv) to (vi) and salts thereof. The cationic surfactant is more preferably at least one selected from the group consisting of an alkyltrimethylammonium salt and an alkoxyalkyldimethylamine and its salt, and specifically, at least one selected from the group consisting of compounds represented by the foregoing general formula (i) and compounds represented by the foregoing general formula (v) and salts thereof. The cationic surfactant is still more preferably an alkoxyalkyldimethylamine or its salt; yet still more preferably a compound represented by the foregoing general formula (v) or its salt; and even yet still more preferably at least one selected from the group consisting of N,N-dimethyl-3-hexadecyloxypropylamine, N,N-dimethyl-3-octadecyloxypropylamine (stearoxypropyldimethylamine), and organic acid salts thereof.

[0048]

(Anionic Surfactant)

The anionic surfactant is used for the purpose of not only dispersing the components (A) and (B) in the hair cosmetic but also giving detergency in the case where the hair cosmetic is a hair detergent.

Examples of the anionic surfactant include alkylbenzenesulfonic acid salts, alkyl or alkenyl ether sulfuric acid salts, alkyl or alkenyl sulfuric acid salts, alkylsulfonic acid salts, saturated or unsaturated fatty acid salts, alkyl or alkenyl ether carboxylic acid salts, α -sulfo fatty acid salts, N-acylamino acids, phosphoric acid mono- or diesters, and sulfosuccinic acid esters. Of these, one or more thereof may be used.

Examples of a counter ion of the anionic group of the anionic surfactant include alkali metal ions, such as a sodium ion and a potassium ion; alkaline

earth metal ions, such as a calcium ion and a magnesium ion; an ammonium ion; and alkanol ammoniums having 1 to 3 alkanol groups having 2 or 3 carbon atoms (for example, monoethanolammonium, diethanolammonium, triethanolammonium, and triisopropanolammonium).

Above all, from the viewpoint of lathering during washing, the anionic surfactant is preferably at least one selected from the group consisting of alkyl sulfuric acid salts, alkyl ether sulfuric acid salts, and alkyl ether carboxylic acid salts. Examples of the alkyl ether sulfuric acid salt include polyoxyethylene alkyl ether sulfuric acid salts, such as ammonium laureth sulfate; and examples of the alkyl ether carboxylic acid salts include polyoxyethylene alkyl ether acetic acid salts, such as sodium laureth acetate.

From the viewpoint of lathering during washing, the anionic surfactant is more preferably at least one selected from the group consisting of alkyl ether sulfuric acid salts and alkyl ether carboxylic acid salts; still more preferably at least one selected from the group consisting of polyoxyethylene alkyl ether sulfuric acid salts and polyoxyethylene alkyl ether acetic acid salts; and yet still more preferably at least one selected from the group consisting of ammonium laureth sulfate and sodium laureth acetate.

[0049]

(Nonionic Surfactant)

Examples of the nonionic surfactant include a polyoxyalkylene alkyl ether, a polyoxyalkylene alkenyl ether, a polyoxyalkylene sorbitan fatty acid ester, a polyoxyalkylene fatty acid ester, an alkyl glucoside, an alkyl glyceryl ether, a higher fatty acid sugar ester, a polyglycerin fatty acid ester, a polyoxyethylene hydrogenated castor oil, an alkyl saccharide, an alkylamine oxide, and an alkylamidoamine oxide.

Of these, at least one selected from the group consisting of a polyoxyalkylene alkyl ether, a polyoxyalkylene alkenyl ether, a polyoxyalkylene sorbitan fatty acid ester, a polyoxyalkylene fatty acid ester, an alkyl glucoside, and an alkyl glyceryl ether is preferred; and at least one selected from the group consisting of a polyoxyalkylene alkyl ether and an alkyl glyceryl ether is more preferred.

The carbon number of each of the alkyl group in the polyoxyalkylene alkyl ether, the alkyl glucoside, the alkyl glyceryl ether, the alkyl saccharide, the alkylamine oxide, and the alkylamidoamine oxide; the alkenyl group in the

polyoxyalkylene alkenyl ether; and the fatty acid in the polyoxyalkylene sorbitan fatty acid ester, the polyoxyalkylene fatty acid ester, the higher fatty acid sugar ester, and the polyglycerin fatty acid ester is preferably 8 or more and 22 or less, and more preferably 10 or more and 18 or less.

[0050]

(Ampholytic Surfactant)

Examples of the ampholytic surfactant include betaine-based surfactants, such as an imidazoline-based betaine, an alkyldimethylamino acetic acid betaine, and a fatty acid amidopropyl betaine; and sultaine-based surfactants, such as an alkyl sultaine, an alkyl hydroxysultaine, an alkylamidossultaine, and an alkylamidohydroxy sultaine. These may be used alone or in combination of two or more thereof.

As the betaine-type surfactant, a fatty acid amidopropyl betaine is preferred. The fatty acid amidopropyl betaine is preferably one having an acyl group having 8 or more and 22 or less carbon atoms, and furthermore, 10 or more and 18 or less carbon atoms; more preferably at least one selected from the group consisting of lauric acid amidopropyl betaine (lauramidopropyl betaine), palm kernelamidopropyl betaine, and cocamidopropyl betaine; and still more preferably lauric acid amidopropyl betaine.

The sultaine-based surfactant is preferably an alkyl hydroxysultaine; more preferably an alkyl hydroxysultaine having an alkyl group having 8 or more and 22 or less carbon atoms, and furthermore, 10 or more and 18 or less carbon atoms; and still more preferably lauryl hydroxysultaine.

[0051]

From the viewpoint of dispersing the components (A) and (B), the content or blending amount of the component (C) in the hair cosmetic is preferably 0.3% by mass or more, more preferably 0.5% by mass or more, and still more preferably 0.8% by mass or more, and from the viewpoint of dissociating the entanglement of hair, it is preferably 30% by mass or less, more preferably 20% by mass or less, and still more preferably 15% by mass or less. A specific range of the content or blending amount of the component (C) in the hair cosmetic is preferably 0.3 to 30% by mass, more preferably 0.5 to 20% by mass, and still more preferably 0.8 to 15% by mass.

[0052]

<Component (D): Higher Alcohol>

From the viewpoint of giving smoothness to the hair after treatment during rinsing and the viewpoint of stability and viscosity adjustment in the case where the dosage form of the hair cosmetic is a liquid form, a paste form, or a cream form, it is preferred that the hair cosmetic of the present invention is one further containing or prepared by further blending, as a component (D), a higher alcohol. The higher alcohol is preferably an aliphatic primary alcohol having 12 or more and 22 or less carbon atoms, and examples thereof include cetyl alcohol, oleyl alcohol, stearyl alcohol, isostearyl alcohol, 2-octyl dodecanol, myristyl alcohol, behenyl alcohol, and cetostearyl alcohol. These may be used alone or in combination of two or more thereof.

[0053]

In the case of using the component (D), from the viewpoint of adjustment to the viscosity that is easy to use, the content or blending amount of the component (D) in the hair cosmetic is preferably 0.1% by mass or more, more preferably 0.2% by mass or more, and still more preferably 1.0% by mass or more, and from the viewpoint of an improvement in drying speed of the hair after treatment and smoothness of the hair during rinsing, it is preferably 10% by mass or less, more preferably 9.0% by mass or less, still more preferably 8.0% by mass or less, and yet still more preferably 5.0% by mass or less. A specific range of the content or blending amount of the component (D) in the hair cosmetic is preferably 0.1 to 10% by mass, more preferably 0.2 to 9.0% by mass, still more preferably 0.2 to 8.0% by mass, yet still more preferably 0.2 to 5.0% by mass, and even yet still more preferably 1.0 to 5.0% by mass.

[0054]

(Organic Acid or Inorganic Acid)

From the viewpoint of dissolving the components (A) and (B) and the viewpoint of when using, as the component (C), an amine, such as an alkyldimethylamine, an alkoxyalkyldimethylamine, and an alkylamidoalkyldimethylamine among the cationic surfactants, neutralizing such an amine to form a salt, it is preferred that the hair cosmetic of the present invention is one further containing or prepared by further blending an organic acid or an inorganic acid.

Examples of the organic acid or inorganic acid include the organic acids or inorganic acids as exemplified above as the cationic surfactant in the (iv) alkyldimethylamine and its salt. Of these, organic acids are preferred,

Examples of the organic acid include monocarboxylic acids, such as acetic acid and propionic acid; dicarboxylic acids, such as malonic acid, succinic acid, glutaric acid, adipic acid, maleic acid, fumaric acid, and phthalic acid; polycarboxylic acids, such as polyglutamic acid; hydroxycarboxylic acids, such as glycolic acid, lactic acid, hydroxyacrylic acid, glyceric acid, malic acid, tartaric acid, and citric acid; and acidic amino acids, such as glutamic acid and aspartic acid. Of these, at least one selected from the group consisting of dicarboxylic acids, hydroxycarboxylic acids, and acidic amino acids is preferred. As the dicarboxylic acid, at least one selected from the group consisting of maleic acid and succinic acid is more preferred. As the hydroxycarboxylic acid, at least one selected from the group consisting of glycolic acid, lactic acid, and malic acid is more preferred. As the acidic amino acid, glutamic acid is more preferred.

[0055]

In the case of using the organic acid or inorganic acid, from the viewpoint of dissolving the components (A) and (B), the content or blending amount thereof in the hair cosmetic is preferably 0.005% by mass or more, more preferably 0.01% by mass or more, and still more preferably 0.02% by mass or more, and from the viewpoint of stability of a product, it is preferably 10% by mass or less, more preferably 8.0% by mass or less, still more preferably 5.0% by mass or less, yet still more preferably 1.0% by mass or less, and even yet still more preferably 0.5% by mass or less.

A specific range of the content or blending amount of the organic acid or inorganic acid in the hair cosmetic is preferably 0.005 to 10% by mass, more preferably 0.01 to 8.0% by mass, still more preferably 0.02 to 5.0% by mass, yet still more preferably 0.02 to 1.0% by mass, and even yet still more preferably 0.02 to 0.5% by mass.

In the case of using, as the component (C), an amine, such as an alkyl dimethylamine, an alkoxyalkyl dimethylamine, and an alkylamidoalkyl dimethylamine, the organic acid or inorganic acid in a suitable amount in order to neutralize such an amine to form a salt may be appropriately contained or blended.

[0056]

(Aqueous Medium)

The hair cosmetic of the present invention is one typically containing or

prepared by blending an aqueous medium. The aqueous medium is preferably one composed mainly of water, and an aqueous medium other than water may be further contained or blended, too. Examples of the aqueous medium other than water include lower alcohols, such as ethanol and isopropanol; and low-molecular diols and triols having 6 or less carbon atoms, such as 1,3-butylene glycol, glycerin, ethylene glycol, propylene glycol, diethylene glycol, and dipropylene glycol.

The content of water in the aqueous medium is preferably 50% by mass or more, more preferably 70% by mass or more, and still more preferably 80% by mass or more, and an upper limit thereof is 100% by mass.

Although the content or blending amount of the aqueous medium in the hair cosmetic may be appropriately selected according to the dosage form of the hair cosmetic, it is typically in a range of 5 to 99% by mass, and preferably in a range of 30 to 98% by mass.

[0057]

<Other Component>

The hair cosmetic of the present invention may appropriately contain or be prepared by blending other component that is typically blended in a hair cosmetic within a range where the object of the present invention is not impaired. Examples of the foregoing component include polymer compounds, such as cationized cellulose, a hydroxyalkyl cellulose, and a highly polymerized polyethylene oxide; oil agents; silicones other than the component (A) and the component (B); antioxidants; anti-dandruff agents, such as zinc pyrithione and benzalkonium chloride; vitamin agents; disinfectants; anti-inflammatory agents; antiseptics; chelating agents; moisturizers, such as panthenol; pearlescent agents; ceramides; fragrances; UV absorbers; colorants, such as a dye and a pigment; extracts, such as an extract of eucalyptus in a polar solvent, a protein available from a shell having a pearl layer or a pearl, or a hydrolyzate thereof, a protein available from silk or a hydrolyzate thereof, a protein-containing extract available from a seed of legume, an Asian ginseng extract, a rice bran extract, a fucus vesiculosus extract, a camellia extract, an aloe extract, an Alpinia Leaf extract, and a chlorella extract; and refrigerants, such as menthol.

Examples of the oil agent include hydrocarbons, such as squalene, squalane, liquid paraffin, liquid isoparaffin, and cycloparaffin; glycerides, such

as castor oil, cacao oil, mink oil, avocado oil, and olive oil; waxes, such as beeswax, whale wax, lanolin, and carnauba wax; esters, such as isopropyl palmitate, isopropyl myristate, octyldodecyl myristate, hexyl laurate, cetyl lactate, propylene glycol monostearate, oleyl oleate, hexadecyl 2-ethylhexanoate, isononyl isononanoate, and tridecyl isononanoate; and higher fatty acids, such as capric acid, lauric acid, myristic acid, palmitic acid, stearic acid, behenic acid, oleic acid, a coconut oil fatty acid, a lanolin fatty acid, isostearic acid, and isopalmitic acid.

[0058]

<Production Method of Hair Cosmetic>

A production method of the hair cosmetic of the present invention is not particularly limited. For examples, the hair cosmetic of the present invention may be produced by blending the components (A) and (B) and other components to be used, if desired by the method described in the section of Examples and mixing the contents by using a known agitation apparatus or the like.

[0059]

<Use Method>

A use method of the hair cosmetic of the present invention is not particularly limited, too and may be appropriately selected according to the kind, the dosage form, and so on.

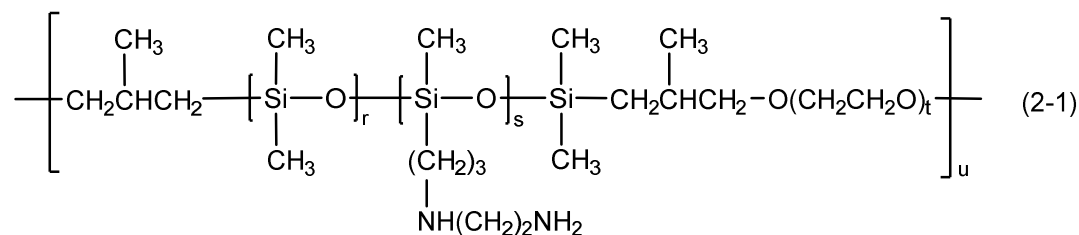
For example, in the case where the hair cosmetic is a hair rinse, a hair conditioning agent, or a hair treatment agent, there are exemplified a method in which the hair cosmetic is coated and applied smoothly over the hair after washing, followed by washing away, if desired; a method in which the hair after washing is immersed in the hair cosmetic or its aqueous solution; and so on. In the case where the hair cosmetic is a hair detergent, there is exemplified a method of washing the hair with the foregoing hair detergent.

When the hair cosmetic of the present invention is, for example, used by the aforementioned method, the entanglement of hair can be dissociated without performing an operation, such as passing of fingers through hair, and it is possible to improve the drying speed of hair after treatment and to give smoothness to the hair during rinsing.

[0060]

Regarding the aforementioned embodiments, the present invention discloses a hair cosmetic and a method of preventing entanglement of hair.

a represents a number of 1 or more and 50 or less; b represents a number of 1 or more and 50 or less; c represents a number of 1 or more and 50 or less; e represents a number of 1 or more and 50 or less; and f represents a number of 0 or more and 50 or less. The bonding order among the structural units within the bracket does not matter, and the bonding form may be a block form or a random form. In addition, plural R⁴'s, R⁵'s, and E¹'s may be the same as or different from each other, respectively.



In the formula (2-1), r represents a number of 2 or more and 100 or less; s represents preferably a number of 1 or more and 50 or less; t represents a number of 10 or more and 18 or less; and u represents a number of 1 or more and 100 or less. The bonding order among the structural units within the bracket does not matter, and the bonding form may be a block form or a random form.

<2>

The hair cosmetic as set forth in <1>, wherein the component (C) contains a cationic surfactant.

<3>

The hair cosmetic as set forth in <1> or <2>, wherein the content or blending amount of the component (C) is 0.8 to 15% by mass.

<4>

The hair cosmetic as set forth in any one of <1> to <3>, wherein the content or blending amount of the component (B) is 0.001 to 0.3% by mass.

<5>

The hair cosmetic as set forth in any one of <1> to <4>, wherein the mass ratio [(A)/(B)] of the component (A) to the component (B) is 0.3 to 300.

<6>

The hair cosmetic as set forth in any one of <1> to <5>, which further contains or is prepared by further blending (D) a higher alcohol.

<7>

The hair cosmetic as set forth in any one of <1> to <6>, which is a hair rinse, a hair conditioning agent, or a hair treatment agent.

<8>

The hair cosmetic as set forth in any one of <1> to <6>, which is a hair detergent.

<9>

A method for preventing entanglement of hair, the method including a step of coating the hair cosmetic as set forth in any one of <1> to <7> onto hair.

<10>

A method for preventing entanglement of hair, the method including a step of washing hair with the hair cosmetic as set forth in <8>.

Examples

[0061]

The present invention is hereunder described by reference to Examples, but it should be construed that the present invention is not limited to the scope of the Examples. In the present Examples, various measurements and evaluations were performed by the following methods.

[0062]

(Measurement of Si/AO in Component (B))

10 mg of the component (B) (aminopolyether-modified silicone 3; having a polyoxyethylene structure in the main chain portion) used in each of the Examples was weighed in a No. 3 screw vial and dried overnight in a nitrogen atmosphere. The obtained dried material was added with and dissolved in 1 mL of deuterated chloroform (manufactured by Wako Pure Chemical Industries, Ltd., Chloroform-d, 99.8%). Using ^1H -NMR (manufactured by Bruker Japan K.K., JH074504 AV400), a unit ratio of Si/AO was calculated from an integrated value of the dimethylsilyl group bonded to silicon (6H: -0.3 to 0.3 ppm) and an integrated value of the oxyethylene (EO) chain (4H: 3.3 to 3.9 ppm) according to the following equation.

$$(\text{Si/AO}) = [(\text{Integrated value at } -0.3 \text{ to } 0.3 \text{ ppm})/6]/[(\text{Integrated value at } 3.3 \text{ to } 3.9 \text{ ppm})/4]$$

[0063]

(Measurement of Combing Load)

Using straight hairs of a Japanese person, a hair bundle for evaluation having a mass of 20 g, a length of 30 cm, and a width of 5.5 cm (one having been damaged through a bleach treatment with a hair bleach as mentioned below) was prepared. This hair bundle was washed with a plain shampoo as mentioned below, the entanglement of which was then dissociated by passing fingers therethrough on the occasion of rinsing, and the resulting hair bundle was thoroughly damped with warm water at 35 to 40°C.

The plain shampoo was again coated onto the hair bundle, the hair ends and the hair roots were put between palms of both hands and rubbed together so as to draw a circle, and the shampoo was lathered such that the hairs were entangled with each other. The resulting hair bundle was rinsed with warm water for 30 seconds without passing fingers therethrough, and after squeezing the water by hands, the hair bundle was immersed in one liter of the hair cosmetic of each of the Examples charged in a one-liter beaker. The hair bundle was shaken left and right 5 times in the beaker and then lifted up. When the water content of the hair bundle reached 20 g, a load applied when a comb was first passed through the hair bundle was measured in the following way.

The aforementioned hair bundle was set on a combing force measuring apparatus (manufactured by Utsunomiyaseiki Co., Ltd., "KOT-0303") and set such that the uppermost part of the hair bundle was put between two combs (skeleton brushes, in which pins having a diameter of 1 mm and a length of 2 cm were arranged on the surface of 2.5 cm in width and 9.0 cm in length in 5 rows deep at intervals of 5 mm), and a load (gf) applied when passing the combs through the hair ends was measured. The load was measured at intervals of 1.5 mm relative to the hair bundle having a length of 30 cm, and a maximum value of the measured values at 200 points was designated as the combing load. It is meant that the smaller of the value of the combing load, the higher the effect for spontaneously dissociating the entanglement of hair.

In the case of using purified water in place of the hair cosmetic, the combing load was 2,055 gf that is the measuring upper limit.

[0064]

(Composition of Plain Shampoo)

Component	(% by mass)
Polyoxyethylene (2.0) lauryl ether sulfuric acid Na	15.5
Lauric acid diethanolamide	2.2
Disodium edetate	0.15
Sodium benzoate	0.18
Oxybenzone	0.03
Phosphoric acid	0.07
Sodium chloride	0.8
Fragrance	0.4
Purified water	Balance
total	100.0

[0065]

(Bleach Treatment Method)

7 mL of Kao Foam Hair Bleach L (solution 1) and 14 mL of Kao Foam Hair Color (solution 2) were mixed, and the mixture was coated onto a hair bundle having a mass of 20 g. After allowing to stand for 20 minutes, the hair bundle was thoroughly rinsed with warm water at 35 to 40°C. This operation was repeated twice, to prepare a hair bundle for evaluation.

[0066]

(Drying Time)

Untreated hairs of a Chinese person having a length of 20 cm and a mass of about 15 g were planted in an area of 7 cm × 4.5 cm on a rubber of 9 cm × 7 cm, to prepare a hair trace.

This trace was thoroughly damped with warm water at 35 to 40°C and then washed with the aforementioned plain shampoo. After squeezing the water, 2 mL of the hair cosmetic prepared in each of the Examples was coated and well applied smoothly over the hairs. Then, the trace was rinsed with warm water at 35 to 40°C for 30 seconds, and the water was squeezed. The water was wiped off with a towel, to control the water content of the hair bundle to 4 g. After combing once with a rat-tail comb, a hair dryer (weak; warm air) was applied to the trace from a distance of 60 cm while shaking with a shaker at a speed of 200 times per minute, to measure a trace weight, and a

time until the water content of hair reached 1% (0.15 g in terms of a water content) was designated as "drying time".

[0067]

(Texture Evaluation of Hair during Rinsing)

The rubber trace prepared in the evaluation of drying time was thoroughly damped with warm water at 35 to 40°C and then washed with the aforementioned plain shampoo. After squeezing the water, 2 mL of the hair cosmetic prepared in each of the Examples was coated and well applied smoothly over the hairs. Then, the texture evaluation of hair during rinsing was performed by five panelists while rinsing with warm water at 35 to 40°C.

A 5-grade evaluation was performed while scoring "Very smooth" as 5, "Smooth without squeakiness during rinsing" as 3, and "Extremely squeaky" equal to that in rinsing after coating the plain shampoo as 1, respectively. An average grade (rounded off to the first decimal place) of the evaluation by the five panelists is shown in Table 1. When the average grade by the five panelists is score 3.0 or above, it can be judged that the texture is favorable without squeakiness during rinsing.

(Evaluation Criteria)

5: "Very smooth"

4: "Smooth"

3: "Smooth without squeakiness during rinsing"

2: "Squeaky"

1: "Extremely squeaky" equal to that in rinsing after coating the plain shampoo

[0068]

Examples 1 to 5 and Comparative Examples 1 to 2 (Preparation and Evaluation of Hair Cosmetic)

A hair cosmetic (hair conditioning agent) of each of the Examples was prepared in the following way according to the blending shown in Table 1 and evaluated.

In a one-liter beaker, the component (B) and purified water were charged and stirred. To the obtained suspension, lactic acid was dropped to prepare a transparent solution, to which was then added the component (C), and the beaker was dipped in a water bath and subjected to temperature rise to 75°C. Subsequently, the component (D) and dipropylene glycol which had been

previously mixed with each other were added, and the contents were stirred at 75°C for 10 minutes. The resulting beaker was then taken off from the water bath, and cooling was commenced. The component (A) was added, and the contents were cooled while stirring until the temperature reached to 40°C or lower, to obtain one liter of a hair cosmetic in a liquid form.

Using this hair cosmetic, the evaluations were carried out by the aforementioned methods. The results are shown in Table 1. The blending amounts shown in Table 1 are active component amounts (% by mass) of the respective components.

[0069]

Table 1

			Example					Comparative Example	
			1	2	3	4	5	1	2
Blending (% by mass)	(A)	Aminopolyether-modified silicone 1	*1	0.3		0.6	0.1		0.4
		Aminopolyether-modified silicone 2	*2		0.3				
	(B)	Aminopolyether-modified silicone 3 (Si/AO = 0.80)	*3	0.1	0.1	0.002	0.3	0.4	
		Stearyltrimonium chloride	*4	1	1	1	1	1	1
	(D)	Stearoxypropyldimethylamine	*5	1					
		Stearyl alcohol	*6	1.5	1.5	1.5	1.5	1.5	1.5
	Others	Dipropylene glycol	*7	2	2	2	2	2	2
		Lactic acid	*8	0.05	0.5	0.05	0.05	0.05	0.05
		Purified water		Balance	Balance	Balance	Balance	Balance	Balance
	Mass ratio (A)/(B)			3	3	3	300	0.33	-
Evaluation	Combing load [(maximum value)/gf]			824	777	794	810	1325	1784
	Drying time (sec)			242	229	254	217	315	253
	Texture of hair during rinsing			3.6	4.8	3.8	4.2	1.6	4.0

*1: Manufactured by Evonik Industries AG, ABIL SOFT AF100
 *2: Manufactured by The Lubrizol Corporation, SILSENSE A21
 *3: Manufactured by Dow Corning Toray Co., Ltd., SILSTYLE 201
 *4: Manufactured by Kao Corporation, QUARTAMIN 86W (active ingredient: 28%)
 *5: Manufactured by Kao Corporation, FARMIN DM-E80
 *6: Manufactured by Kao Corporation, KALCOL 8098
 *7: Manufactured by Adeka Corporation, DPG-RF
 *8: Manufactured by PURAC Thailand Ltd., PURAC ULTRAPURE 90 (active ingredient: 90%)

[0070]

As shown in Table 1, in comparison with the hair cosmetics of Comparative Example 1 containing, as the component (B), only the aminopolyether-modified silicone and Comparative Example 2 containing, as the component (A), only the aminopolyether-modified silicone, it is noted that in the case of applying the hair cosmetic of each of Examples 1 to 5 to the hair, the effect for improving the entanglement of hair is high. In addition, in the hair having the hair cosmetic of each of Examples 1 to 5 applied thereto was fast in drying, and the favorable texture without squeakiness during rinsing was obtained.

[0071]

A prescription example of a hair detergent (shampoo) that is the hair cosmetic of the present invention is shown in Table 2. The blending amounts shown in Table 2 are active component amounts (% by mass) of the respective components.

[0072]

Table 2

				Prescription Example 1
Blending (% by mass)	(A)	Aminopolyether-modified silicone 1	*1	0.2
	(B)	Aminopolyether-modified silicone 3 (Si/AO = 0.80)	*2	0.05
	(C)	Ammonium laureth sulfate	*3	10
		Sodium laureth acetate	*4	1
		Lauramidopropyl betaine	*5	1
	(D)	Myristyl alcohol	*6	0.2
	Others	Malic acid	*7	0.15
		Dimethicone emulsion	*8	1
		Guar hydroxypropyltrimonium chloride	*9	0.2
		Polyquaternium-10	*10	0.1
		Glycol distearate	*11	1.5
		Polypropylene glycol (PPG-7)	*12	0.5
		Fragrance		0.5
Purified water		Balance		
Mass ratio (A)/(B)				4

- *1: Manufactured by Evonik Industries AG, ABIL SOFT AF100
- *2: Manufactured by Dow Corning Toray Co., Ltd., SILSTYLE 201
- *3: Manufactured by Kao Corporation, EMAL 125A (active ingredient: 25%)
- *4: Manufactured by Kao Corporation, AKYPO LM-26SD (active ingredient: 21.9%)
- *5: Manufactured by Kao Corporation, AMPHITOL 20AB (active ingredient: 30%)
- *6: Manufactured by Kao Corporation, KALCOL 4098
- *7: Manufactured by Fuso Chemical Co., Ltd., Liquid Malic Acid (active ingredient: 50%)
- *8: Manufactured by Dow Corning Toray Co., Ltd., SILICONE BY22-050 (active ingredient: 50%)
- *9: Manufactured by Solvay-Rhodia, JAGUAR C-14SK
- *10: Manufactured by Kao Corporation, CATICELO L-150
- *11: Manufactured by Kao Corporation, EMANON 3201MV
- *12: Manufactured by Adeka Corporation, ADEKA CARPOL DL-30

Industrial Applicability

[0073]

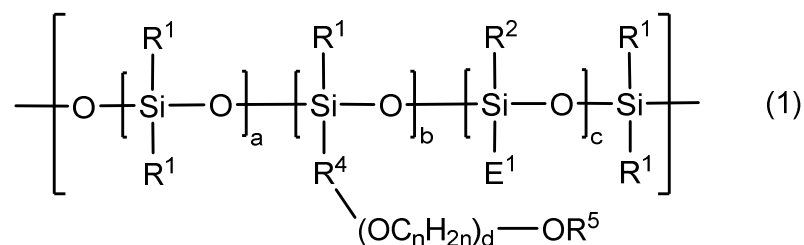
When the hair cosmetic of the present invention is applied to hair, the entanglement can be dissociated without performing an operation, such as passing of fingers through hair. In addition, the hair having the foregoing hair cosmetic applied thereto is fast in drying and favorable in smoothness of hair during rinsing.

CLAIMS

1. A hair cosmetic comprising (A) an aminopolyether-modified silicone having a polyoxyalkylene structure in a side chain portion; and (B) an aminopolyether-modified silicone having a polyoxyalkylene structure in a main chain portion.

2. A hair cosmetic, which is prepared by blending (A) an aminopolyether-modified silicone having a polyoxyalkylene structure in a side chain portion; and (B) an aminopolyether-modified silicone having a polyoxyalkylene structure in a main chain portion.

3. The hair cosmetic according to claim 1 or 2, wherein the component (A) is one having a structure represented by the following general formula (1):



wherein,

R^1 represents a monovalent hydrocarbon group having 1 or more and 6 or less carbon atoms; R^2 represents either R^1 or E^1 ; E^1 represents a monovalent group represented by $-\text{R}^3-\text{Z}^1$ (wherein R^3 represents a divalent hydrocarbon group having 1 or more and 6 or less carbon atoms, and Z^1 represents a primary to tertiary amino group-containing group); R^4 represents a divalent hydrocarbon group having 1 or more and 6 or less carbon atoms; and R^5 represents a hydrogen atom or a monovalent hydrocarbon group having 1 or more and 4 or less carbon atoms; and

a represents a number of 1 or more and 50 or less; b represents a number of 1 or more and 50 or less; c represents a number of 1 or more and 50 or less; d represents a number of 2 or more and 100 or less; n represents a number of 2 or more and 10 or less; the bonding order among the structural units within the bracket does not matter, and the bonding form may be a block form or a random form; the $(\text{OC}_n\text{H}_{2n})$'s in the number of d may be the same as or different from each other; and plural R^1 's, R^2 's, R^4 's, R^5 's, and E^1 's may be the

t represents a number of 4 or more and 100 or less; and u represents a number of 1 or more; m represents a number of 2 or more and 10 or less; the bonding order among the structural units within the bracket does not matter, and the bonding form may be a block form or a random form; the $(C_mH_{2m}O)$'s in the number of t may be the same as or different from each other; and plural R^{11} 's, R^{12} 's, and E^2 's may be the same as or different from each other, respectively.

7. The hair cosmetic according to any one of claims 1 to 6, wherein the component (B) satisfies the following formula (I):

$$0.01 \leq Si/AO \leq 1.6 \quad (I)$$

wherein,

Si represents a molar number of a silicon atom in the component (B), and AO represents an oxyalkylene average addition molar number in the component (B).

8. The hair cosmetic according to any one of claims 1 to 7, wherein a mass ratio $[(A)/(B)]$ of the component (A) to the component (B) is 0.01 or more and 1,000 or less.

9. The hair cosmetic according to any one of claims 1 to 8, which further comprises or is prepared by further blending (C) a surfactant.

10. The hair cosmetic according to claim 9, wherein the component (C) comprises a cationic surfactant.

11. The hair cosmetic according to any one of claims 1 to 10, which further comprises or is prepared by further blending (D) a higher alcohol.

12. The hair cosmetic according to any one of claims 1 to 11, wherein the content or blending amount of the component (A) is 0.01% by mass or more and 5.0% by mass or less.

13. The hair cosmetic according to any one of claims 1 to 12, wherein the content or blending amount of the component (B) is 0.0001% by mass or more and 5.0% by mass or less.

14. The hair cosmetic according to any one of claims 1 to 13, which is a hair rinse, a hair conditioning agent, or a hair treatment agent.