

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.

Citation List

Patent Literature

[0004]

PTL 1: JP 2002-249418 A

PTL 2: JP 2013-43848 A

Summary of the Invention

[0005]

The present invention relates to a hair cosmetic containing or prepared by blending the following components (A), (B), and (C):

(A) an aminopolyether-modified silicone containing a polyoxyalkylene structure and satisfying the following formula (I):

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

[in the formula (I), Si represents a molar number of a silicon atom in the component (A), and AO represents an oxyalkylene average addition molar number in the component (A)];

(B) an aminopolyether-modified silicone containing a polyoxyalkylene structure and satisfying the following formula (II):

$$1.6 < \text{Si}/\text{AO} \leq 3.0 \quad (\text{II})$$

[in the formula (II), 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)]; and

(C) a cationic surfactant.

Detailed Description of the Invention

[0006]

[Hair Cosmetic]

The hair cosmetic of the present invention is one containing or one prepared by blending the following components (A), (B), and (C):

(A) an aminopolyether-modified silicone containing a polyoxyalkylene structure and satisfying the following formula (I):

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

[in the formula (I), Si represents a molar number of a silicon atom in the component (A), and AO represents an oxyalkylene average addition molar number in the component (A)];

(B) an aminopolyether-modified silicone containing a polyoxyalkylene structure and satisfying the following formula (II):

$$1.6 < \text{Si}/\text{AO} \leq 3.0 \quad (\text{II})$$

[in the formula (II), 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)]; and

(C) a cationic surfactant.

As for the hair cosmetic of the present invention, in view of the fact that the aforementioned components (A), (B), and (C) are contained or blended, when applied to the hair after drying, not only the entanglement of hair existent after hair washing can be dissociated without performing an operation, such as passing of fingers through hair, but also a moist feeling can be given to the hair after drying. The expression "one containing the components (A), (B), and (C)" as referred to herein also means "one prepared by blending the components (A), (B), and (C)".

[0007]

Although all of the hair cosmetics disclosed in PTLs 1 and 2 are improved in smoothness of hair or finger-combing properties during use and so on, they have not reached spontaneous dissociation of the entanglement of hair generated due to hair washing without performing an operation, such as passing of fingers through hair.

The present invention relates to a hair cosmetic which when applied to hair after washing, is not only able to dissociate the entanglement of hair existent after hair washing without performing an operation, such as passing of fingers through hair and but also able to give a moist feeling to the hair after drying.

[0008]

The present inventors have found that a hair cosmetic containing or prepared by blending two kinds of aminopolyether-modified silicones, each of which contains a polyoxyalkylene structure and satisfies a predetermined requirement, and a cationic surfactant is able to solve the aforementioned

problem.

In accordance with the hair cosmetic of the present invention, when applied to the hair after washing, not only the entanglement of hair existent after hair washing can be dissociated without performing an operation, such as passing of fingers through hair, but also a moist feeling can be given to the hair after drying.

[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 existent after hair washing is spontaneously dissociated, it may be considered to be important that a frictional force working between the hairs is lowered. In a hair cosmetic, a silicone is occasionally blended as an active ingredient; however, the present inventors have found that in order to lower the frictional force working between the hairs, it is effective to use the component (A) that is a water-soluble aminopolyether-modified silicone and in which a content proportion of the polyoxyalkylene structure is high. Furthermore, it has been found that by using the component (A) jointly with the component (B) that is a water-insoluble aminopolyether-modified silicone and in which a content proportion of the polyoxyalkylene structure is low, a moist feeling can be given to the hair after drying, and furthermore, the entanglement of hair generated due to hair washing can be more effectively dissociated.

The cationic surfactant that is the component (C) has an effect for dispersing the water-insoluble component (B) in the hair cosmetic. In addition, in order to reveal detergency in a hair detergent, such as a shampoo, an anionic surfactant is blended; however, in view of the fact that the hair cosmetic of the present invention contains the component (C), when applied to the hair after washing, a favorable conditioning effect can be given.

[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 dye, and a hair growth promoter. Of these, a hair rinse, a hair conditioning agent, a hair treatment

agent, or a hair styling agent is preferred, and a hair rinse, a hair conditioning agent, or a hair treatment agent 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 containing a polyoxyalkylene structure and satisfying the following formula (I):

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

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

In view of the fact that the hair cosmetic of the present invention contains or is prepared by blending the component (A), when applied to the hair after drying, the entanglement of hair existent after hair washing can be spontaneously dissociated owing to the aforementioned mechanism of action without performing an operation, such as passing of fingers through hair.

From the viewpoint of dissociating the entanglement of hair existent after hair washing, the Si/AO in the formula (I) 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.

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

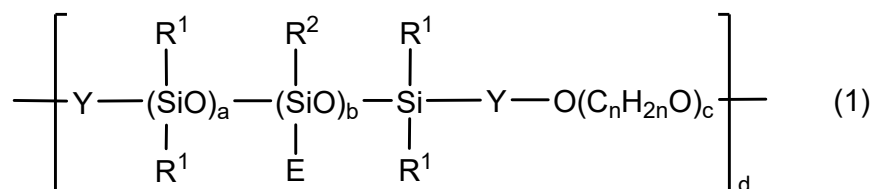
described in the section of Examples.

[0012]

From the viewpoint of dissociating the entanglement of hair existent after hair washing, the nitrogen content of the component (A) 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 (A) 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 (A) is a value measured in conformity with the potentiometric titration method as prescribed in JIS K0113:2005.

[0013]

More specifically, the component (A) is preferably an aminopolyether-modified silicone having a repeating unit represented by the following general formula (1), and more preferably an aminopolyether-modified silicone constituted of a repeating unit represented by the following general formula (1).



In the formula (1), R¹ represents a hydrogen atom or a monovalent hydrocarbon group having 1 or more and 6 or less carbon atoms. R² represents either R¹ or E. E represents a monovalent group represented by -R³-Z (wherein R³ represents a single bond or a divalent hydrocarbon group having 1 or more and 20 or less carbon atoms; and Z represents a primary to tertiary amino group-containing group). Y represents an alkylene group having 1 or more and 6 or less carbon atoms. a represents a number of 2 or more; b represents a number of 1 or more; c represents a number of 4 or more and 100 or less; and d represents a number of 1 or more. 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

(C_nH_{2n}O)'s in the number of c may be the same as or different from each other. In addition, plural R¹'s, R²'s, and E's may be the same as or different from each other, respectively.

In the case where the component (A) is constituted of the repeating unit represented by the general formula (1), the Si/AO in the foregoing formula (I) is represented by (a + b + 1)/c.

[0014]

In the general formula (1), R¹ represents a hydrogen atom or a monovalent hydrocarbon group having 1 or more and 6 or less carbon atoms. R¹'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.

[0015]

In the general formula (1), R² represents either R¹ or E. E represents a monovalent group represented by -R³-Z (wherein R³ represents a single bond or a divalent hydrocarbon group having 1 or more and 20 or less carbon atoms).

R³ 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.

[0016]

Z is a primary to tertiary amino group-containing group, and preferably an amino group-containing group represented by -N(R⁴)₂, -NR⁴(CH₂)_mN(R⁴)₂, or -NR⁴(CH₂)_mN(R⁵)CO-R⁶. Here, R⁴ and R⁵ 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. R⁶ represents an alkyl group having 1 or more and 3 or less carbon atoms. m represents a number of 1 or more and 6 or less, and preferably a number of 2 or more and 4 or less.

[0017]

In the general formula (1), the E group is preferably -(CH₂)₃-NH₂, -(CH₂)₃-N(CH₃)₂, -(CH₂)₃-NH-(CH₂)₂-NH₂, or -(CH₂)₂-NH-(CH₂)₂-N(CH₃)₂, and more preferably -(CH₂)₃-NH-(CH₂)₂-NH₂.

[0018]

In the general formula (1), 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 i-butylene group, and more preferably a n-butylene group or an i-butylene group. The i-butylene group as referred to herein includes $-\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2-$, $-\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2-$, and $-\text{CH}_2\text{CH}_2\text{CH}(\text{CH}_3)-$.

[0019]

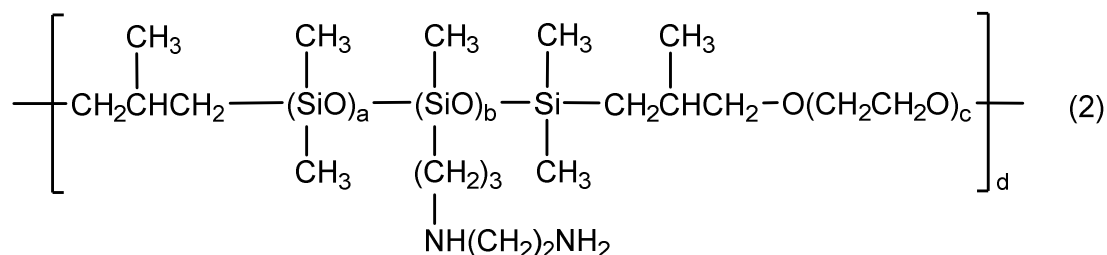
In the general formula (1), a represents a number of 2 or more; b represents a number of 1 or more; c represents a number of 4 or more and 100 or less; and d represents a number of 1 or more. a is preferably a number of 2 or more and 1,000 or less, and more preferably a number of 2 or more and 100 or less. b is preferably a number of 1 or more and 50 or less; c 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 d is preferably a number of 1 or more and 100 or less.

[0020]

In the general formula (1), n 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.

[0021]

The component (A) is more preferably an aminopolyether-modified silicone having a repeating unit represented by the following general formula (2), and still more preferably an aminopolyether-modified silicone constituted of a repeating unit represented by the following general formula (2). Even in the case where the component (A) is constituted of a repeating unit represented by the general formula (2), the Si/AO in the aforementioned formula (I) is represented by $(a + b + 1)/c$.



In the formula (2), a to d are the same as those mentioned above.

[0022]

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

In the case where the component (A) 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 (A) 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 at 25°C of the component (A) is a value measured in conformity with the "Viscosity Measurement Methods for Liquids" as prescribed in JIS Z8803:2011 or ASTM D445-46T, and may be, for example, measured with an Ubbelohde viscometer.

[0023]

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 of the aminopolyether-modified silicone having a repeating unit represented by the general formula (2) 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).

[0024]

From the viewpoint of dissociating the entanglement of hair existent after hair washing, the content or blending amount of the component (A) in the hair cosmetic is preferably 0.0001% by mass or more, more preferably 0.0005%

by mass or more, still more preferably 0.001% by mass or more, and yet still more preferably 0.005% by mass or more, and from the viewpoint of jointly using the component (B) as mentioned later to give a moist feeling to the hair after drying, 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, even still more preferably 0.3% by mass or less, even still more further preferably 0.2% by mass or less, and even yet still more further preferably 0.15% by mass or less. A specific range of the content or blending amount of the component (A) 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, even still more preferably 0.001 to 0.3% by mass, even still more further preferably 0.005 to 0.2% by mass, and even yet still more further preferably 0.005 to 0.15% by mass.

[0025]

<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 containing a polyoxyalkylene structure and satisfying the following formula (II):

$$1.6 < \text{Si}/\text{AO} \leq 3.0 \quad (\text{II})$$

[in the formula (II), 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 view of the fact that the hair cosmetic of the present invention contains or is prepared by blending the component (B), a moist feeling can be given to the hair after drying. In addition, by jointly using the component (A), the entanglement of hair existent after hair washing can be more effectively dissociated.

From the viewpoint of bringing about the aforementioned effect, it is preferred that the component (B) is water-insoluble. In this specification, the expression "water-insoluble" means that the solubility in 100 g of water at 25°C is 0.1 g or less.

From the viewpoint of giving a moist feeling to the hair after drying, the

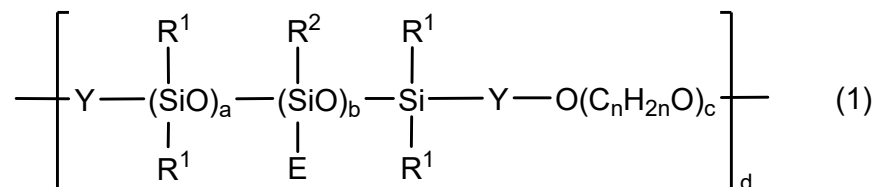
Si/AO in the formula (II) is preferably 1.8 or more, more preferably 2.0 or more, and still more preferably 2.2 or more, and from the viewpoint of blending stability, it is preferably 2.8 or less, and more preferably 2.6 or less. The Si/AO may be determined by the same method as that mentioned above.

[0026]

From the viewpoint of giving a moist feeling to the hair after drying and the viewpoint of more effectively dissociating the entanglement of hair owing to a combined use with the component (A), 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 0.8% 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 0.8 to 1.5% by mass. The nitrogen content of the component (B) may be determined by the same method as that mentioned above.

[0027]

It is more preferred that the component (B) has a repeating unit represented by the following general formula (1). More preferably, the component (B) is an aminopolyether-modified silicone constituted of a repeating unit represented by the following general formula (1). That is, in the present invention, it is preferred that each of the component (A) and the component (B) has a repeating unit represented by the following general formula (1), and it is more preferred that the component (A) and the component (B) are each an aminopolyether-modified silicone constituted of a repeating unit represented by following general formula (1).



In the formula (1), R¹, R², E, Y, a to d, and n are the same as those mentioned above.

In the case where the component (B) is constituted of the repeating unit represented by the general formula (1), the Si/AO in the foregoing formula (II)

is represented by $(a + b + 1)/c$.

In the component (B), R^1 , R^2 , E, Y, a to d, and n in the formula (1) and preferred ranges thereof are the same as those in the component (A) except for the range of Si/AO. That is, the component (B) is more preferably an aminopolyether-modified silicone having the repeating unit represented by the foregoing general formula (2), and still more preferably an aminopolyether-modified silicone constituted of the repeating unit represented by the foregoing general formula (2).

[0028]

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 water-insolubility, its kinematic viscosity at 25°C is preferably 2,000 mm²/s or more, more preferably 3,000 mm²/s or more, and still more preferably 5,000 mm²/s or more, and from the viewpoint of easiness of blending, it is preferably 200,000 mm²/s or less, more preferably 100,000 mm²/s or less, and still more preferably 50,000 mm²/s or less. In the case where the component (B) is an oil, a specific range of the kinematic viscosity at 25°C is preferably 2,000 to 200,000 mm²/s, more preferably 3,000 to 100,000 mm²/s, and still more preferably 5,000 to 50,000 mm²/s. The kinematic viscosity may be measured by the same method as that mentioned above.

[0029]

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 thereof include "SILSTYLE 104", manufactured by Dow Corning Toray Co., Ltd. ((bisisobutyl PEG-14/amodimethicone) copolymer having the repeating unit represented by the foregoing general formula (2), nitrogen content: 1.2% by mass, kinematic viscosity at 25°C: 12,000 mm²/s, Si/AO = 2.46); "SS-3588", manufactured by Dow Corning Toray Co., Ltd. ((bisisobutyl PEG-15/amodimethicone) copolymer having the repeating unit represented by the foregoing general formula (2), nitrogen content: 1.0% by mass, Si/AO = 2.39); and "SILSTYLE 401", manufactured by Dow Corning Toray Co., Ltd. ((bisisobutyl PEG/PPG-20/35/amodimethicone) copolymer, nitrogen content: 0.2% by mass).

[0030]

From the viewpoint of giving a moist feeling to the hair after drying, the content or blending amount of the component (B) 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 preventing stickiness of the hair after drying, 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 0.5% by mass or less, and even yet 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 0.01 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 0.01 to 0.5% by mass, even yet still more preferably 0.05 to 0.5% by mass, and even still more preferably 0.1 to 0.3% by mass.

[0031]

In the hair cosmetic of the present invention, from the viewpoint of dissociating the entanglement of hair generated due to hair washing, a mass ratio [(A)/(B)] of the component (A) to the component (B) is preferably 0.005 or more, more preferably 0.01 or more, still more preferably 0.03 or more, and yet still more preferably 0.05 or more, and from the viewpoint of giving a moist feeling to the hair after drying, it is preferably 70 or less, more preferably 50 or less, still more preferably 30 or less, yet still more preferably 20 or less, even yet still more preferably 10 or less, and even still more preferably 5 or less. A specific range of the mass ratio [(A)/(B)] of the component (A) to the component (B) in the hair cosmetic is preferably 0.005 to 70, more preferably 0.01 to 50, still more preferably 0.01 to 30, yet still more preferably 0.01 to 20, even yet still more preferably 0.01 to 10, even still more preferably 0.03 to 5, and even still more further preferably 0.05 to 5.

[0032]

From the viewpoint of more effectively dissociating the entanglement of hair and the viewpoint of giving a moist feeling to the hair after drying, an absolute value of a difference between the value of Si/AO of the component (A) and the value of Si/AO of the component (B) is preferably 0.2 or more, more preferably 0.5 or more, still more preferably 1.0 or more, and yet still more preferably 1.5 or more, and from the same viewpoints, it is preferably 2.5 or

less, more preferably 2.0 or less, and still more preferably 1.8 or less. A specific range of the absolute value of a difference between the value of Si/AO of the component (A) and the value of Si/AO of the component (B) is 0.2 or more, more preferably 0.2 to 2.5, still more preferably 0.5 to 2.0, yet still more preferably 1.0 to 2.0, even yet still more preferably 1.5 to 2.0, and even still more preferably 1.5 to 1.8.

[0033]

<Component (C): Cationic Surfactant>

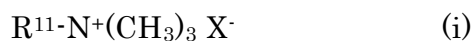
The hair cosmetic of the present invention is one containing or prepared by blending therein, as the component (C), a cationic surfactant. In view of the fact that the hair cosmetic of the present invention contains the component (C), it not only disperses the component (B) in the hair cosmetic but also exhibits a conditioning effect relative to the hair after hair washing.

Examples of the cationic surfactant include 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.

[0034]

(i) Alkyltrimethylammonium Salt

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



In the formula, R^{11} 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^{11} 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.

[0035]

(ii) Alkoxyalkyltrimethylammonium Salt

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



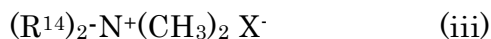
In the formula, R^{12} represents an alkyl group having 12 or more and 22 or less carbon atoms; R^{13} represents an ethylene group or a propylene group, each of which may be substituted with a hydroxy group; and X^- is the same as that mentioned above.

R^{12} 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 stearoxyhydroxypropyltrimethylammonium chloride.

[0036]

(iii) Dialkyldimethylammonium Salt

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



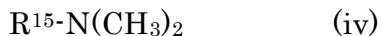
In the formula, R^{14} 's each independently represent an alkyl group having 12 or more and 22 or less carbon atoms, and X^- is the same as that mentioned above.

R^{14} is preferably an alkyl group having 16 or more and 20 or less carbon atoms. Specifically, examples of the dialkyldimethylammonium salt include distearyldimethylammonium chloride.

[0037]

(iv) Alkyldimethylamine and Its Salt

The alkyldimethylamine reacts with an acid to become a quaternary ammonium salt and works as a surfactant. In consequence, here, the alkyldimethylamine and its salt are defined as a cationic surfactant. In addition, its content or blending amount 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^{15} represents an alkyl group having 12 or more and 22 or less carbon atoms.

R^{15} 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. Examples of the organic acid include monocarboxylic acids, such as acetic

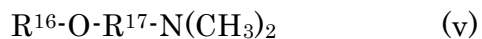
acid and propionic acid; dicarboxylic acids, such as malonic acid, succinic acid, glutaric acid, adipic acid, maleic acid, fumaric acid, and phthalic acid; polycarboxylic acids, such as polyglutamic acid; hydroxycarboxylic acids, such as glycolic acid, lactic acid, hydroxyacrylic acid, glyceric acid, 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.

[0038]

(v) Alkoxyalkyldimethylamine and Its Salt

The alkoxyalkyldimethylamine reacts with an acid to become a quaternary ammonium salt and works as a surfactant. In consequence, here, the alkoxyalkyldimethylamine and its salt are defined as a cationic surfactant. In addition, its content or blending amount 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^{16} represents an alkyl group having 12 or more and 22 or less carbon atoms, and R^{17} represents an ethylene group or a propylene group.

R^{16} 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.

[0039]

(vi) Alkylamidoalkyldimethylamine and Its Salt

The alkylamidoalkyldimethylamine reacts with an acid to become a quaternary ammonium salt and works as a surfactant. In consequence, here, the alkylamidoalkyldimethylamine and its salt are defined as a cationic surfactant. In addition, its content or blending amount 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^{18} represents an alkyl group having 11 or more and 21 or less carbon atoms, and R^{19} represents an ethylene group or a propylene group.

R^{18} 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.

[0040]

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 alkanoylaminopropyltrimethylammonium, 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 (C₁₄-C₂₀) aminopropylethyldimethylammonium ethyl sulfate, an isoalkanoic acid (C₁₈-C₂₂) aminopropylethyldimethylammonium ethyl sulfate, isostearic acid aminopropylethyldimethylammonium ethyl sulfate, isononanoic acid aminopropylethyldimethylammonium ethyl sulfate, and an alkyltrimethylammonium saccharin.

[0041]

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

Of those mentioned above, the component (C) 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 general 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.

[0042]

From the viewpoint of dispersing the component (B) in the hair cosmetic and the viewpoint of revealing a conditioning effect, 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 generated due to hair washing, it is preferably 20% by mass or less, more preferably 10% by mass or less, still more preferably 5.0% by mass or less, and yet still more preferably 2.0% 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 20% by mass, more preferably 0.5 to 10% by mass, still more preferably 0.8 to 5.0% by mass, and yet still more preferably 0.8 to 2.0% by mass.

[0043]

In the hair cosmetic of the present invention, from the viewpoint of dissociating the entanglement of hair existent after hair washing, a mass ratio $[(B)/(C)]$ of the component (B) to the component (C) is preferably 0.005 or more, more preferably 0.01 or more, still more preferably 0.03 or more, and yet still more preferably 0.05 or more, and from the viewpoint of dispersibility of the component (B), it is preferably 3 or less, more preferably 1 or less, still more preferably 0.8 or less, and yet still more preferably 0.5 or less. A specific range of the mass ratio $[(B)/(C)]$ of the component (B) to the component (C) in the hair cosmetic is preferably 0.005 to 3, more preferably 0.01 to 1, still more preferably 0.03 to 0.8, and yet still more preferably 0.05 to 0.5.

[0044]

[Higher Alcohol]

From the viewpoint of giving smoothness and a moist feeling to the hair after drying 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 a higher alcohol having 12

or more and 22 or less carbon atoms. Examples of the higher alcohol 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.

[0045]

In the case of using the higher alcohol, from the viewpoint of giving smoothness and a moist feeling to the hair after drying, the content or blending amount of the higher alcohol in the hair cosmetic is preferably 0.1% by mass or more, more preferably 0.5% by mass or more, and still more preferably 1.0% by mass or more, and from the viewpoint of preventing stickiness of the hair after drying and the viewpoint of 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 preferably 20% by mass or less, more preferably 15% by mass or less, still more preferably 10% 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 higher alcohol in the hair cosmetic is preferably 0.1 to 20% by mass, more preferably 0.5 to 15% by mass, still more preferably 1.0 to 10% by mass, and yet still more preferably 1.0 to 5.0% by mass.

[0046]

(Organic Acid or Inorganic Acid)

From the viewpoint of dissolving the component (A) and the viewpoint of when using, as the component (C), an amine, such as an alkyldimethylamine in order to neutralize the amine to form a salt, an alkoxyalkyldimethylamine, and an alkylamidoalkyldimethylamine, 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 component (C) 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 glycolic acid, lactic acid, and malic acid is more preferred. As the acidic amino acid, glutamic acid is more preferred.

[0047]

In the case of using the organic acid or inorganic acid, from the viewpoint of dissolving the component (A), 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% by mass or less, still more preferably 5% by mass or less, yet still more preferably 1% 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% by mass, still more preferably 0.02 to 5% by mass, yet still more preferably 0.02 to 1% 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 alkyltrimethylamine, an alkoxyalkyltrimethylamine, and an alkylamidoalkyltrimethylamine, in order to neutralize such an amine to form a salt, the organic acid or inorganic acid in a suitable amount may be appropriately contained.

[0048]

(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, too. Examples of the aqueous medium other than water include lower alcohols, such as ethanol and isopropyl alcohol; 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.

[0049]

(Other Component)

The hair cosmetic of the present invention may appropriately contain or be prepared by blending the 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); nonionic surfactants, such as a polyoxyethylene alkyl ether, a polyoxypropylene alkyl ether, a polyoxyethylene sorbitan fatty acid ester, a glycerin monofatty acid ester, a polyglycerin fatty acid ester, a polyoxyethylene hydrogenated castor oil, a sucrose fatty acid ester, a polyglycerin alkyl ether, a fatty acid alkanolamide, and an alkyl glycoside; ampholytic surfactants, such as a betaine; 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.

[0050]

(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) to (C) 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.

[0051]

(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. However, from the viewpoint of effectively exhibiting the effects of the present invention, it is preferred to apply the hair cosmetic of the present invention to the hair after washing.

For example, 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. When the hair cosmetic of the present invention is, for example, used by the aforementioned method, not only the entanglement of hair generated due to hair washing can be dissociated without performing an operation, such as passing of fingers through hair, but also a moist feeling can be given to the hair after drying.

[0052]

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

<1>

A hair cosmetic containing or prepared by blending the following components (A), (B), and (C):

(A) an aminopolyether-modified silicone containing a polyoxyalkylene structure having a repeating unit represented by the following general formula (2) and satisfying the following formula (I):

$$0.5 \leq \text{Si}/\text{AO} \leq 1.2 \quad (\text{I})$$

[in the formula (I), Si represents a molar number of a silicon atom in the component (A), and AO represents an oxyalkylene average addition molar number in the component (A)];

(B) an aminopolyether-modified silicone containing a polyoxyalkylene structure having a repeating unit represented by the following general formula (2) and satisfying the following formula (II):

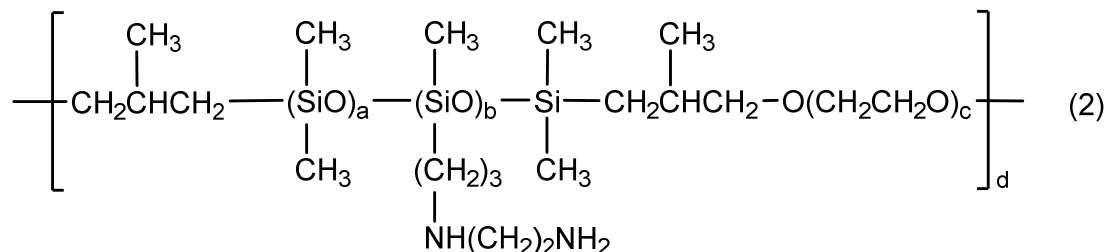
$$2.0 \leq \text{Si}/\text{AO} \leq 2.8 \quad (\text{II})$$

[in the formula (II), 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)]; and

(C) a cationic surfactant, wherein

a kinematic viscosity at 25°C of the component (A) is 500 to 1,500 mm²/s, and

a kinematic viscosity at 25°C of the component (B) is 3,000 to 100,000 mm²/s.



In the formula (2), a represents a number of 2 or more and 100 or less; b represents a number of 1 or more and 50 or less; c represents a number of 10 or more and 18 or less; and d 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 an absolute value of a difference between the value of Si/AO of the component (A) and the value of Si/AO of the component (B) is 1.0 to 2.0.

<3>

The hair cosmetic as set forth in <1> or <2>, wherein the Si/AO in the formula (I) is 0.7 or more and 0.9 or less.

<4>

The hair cosmetic as set forth in any one of <1> to <3>, wherein the Si/AO in the formula (II) is 2.2 or more and 2.6 or less.

<5>

The hair cosmetic as set forth in any one of <1> to <4>, wherein the kinematic viscosity at 25°C of the component (A) is 700 to 1,400 mm²/s.

<6>

The hair cosmetic as set forth in any one of <1> to <5>, wherein the kinematic viscosity at 25°C of the component (B) is 5,000 to 50,000 mm²/s.

<7>

The hair cosmetic as set forth in any one of <1> to <6>, wherein a mass ratio [(A)/(B)] of the component (A) to the component (B) is 0.05 to 5;

a mass ratio [(B)/(C)] of the component (B) to the component (C) is 0.05 to 0.5; and

the content or blending amount of the component (A) is 0.005 to 0.2% by mass.

<8>

The hair cosmetic as set forth in <7>, wherein the content or blending amount of the component (B) is 0.1 to 0.3% by mass.

<9>

The hair cosmetic as set forth in <7> or <8>, wherein the content or blending amount of the component (C) is 0.8 to 5.0% by mass.

<10>

The hair cosmetic as set forth in any one of <1> to <9>, which is a hair rinse, a hair conditioning agent, or a hair treatment agent.

<11>

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 <10> onto hair.

<12>

A method for preventing entanglement of hair, the method including a step of immersing the hair after washing in the hair cosmetic as set forth in any one of <1> to <11> or its aqueous solution.

Examples

[0053]

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.

[0054]

(Measurement of Si/AO in Each of Component (A) and Component (B))

10 mg of each of the component (A) and the component (B) (aminopolyether-modified silicones 1 to 3) 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.

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

[0055]

(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 absolutely 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.

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. It is meant that when the combing load is smaller than 2,055 gf, not only the effect for dissociating the entanglement of hair existent after hair washing is brought, but also the smaller the value of combing load, the higher the foregoing effect.

[0056]

(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

[0057]

(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.

[0058]

(Texture Evaluation of Hair after Drying)

The hair bundle for evaluation prepared in the evaluation of combing load was thoroughly damped with warm water at 35 to 40°C and then washed with the aforementioned plain shampoo. After squeezing the water, the hair bundle was immersed in one liter of the hair cosmetic prepared in each of the Examples for 1 minute, lifted up and then rinsed with warm water at 35 to 40°C for 30 seconds. The water was wiped off with a towel, and the resulting hair bundle was dried with a hair dryer.

The texture evaluation of the completely dried hair bundle was performed by five panelists. A 5-grade evaluation was performed while scoring "Misty" as 5 and "Not misty" as 1, respectively, and taking the evaluation of Comparative Example 1 as 4.0 (reference score). 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 3.5 or above, it can be judged that a moist feeling is present on the hair after drying.

(Evaluation Criteria)

- 5: Moisty
- 4: Slightly moisty
- 3: Neither
- 2: Not moisty too much
- 1: Not moisty

[0059]

Examples 1 to 4 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 (A) and 500 g of purified water were charged and stirred. To the obtained liquid, lactic acid was dropped, to which was then added the component (C), and thereafter, the beaker was dipped in a water bath and subjected to temperature rise to 75°C. Subsequently, a higher alcohol 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 beaker was then taken off from the water bath, and cooling was commenced. The component (B) and remaining purified water were 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.

[0060]

Table 1

					Example				Comparative Example		
					1	2	3	4	1	2	
Blending (% by mass)	(A)	Aminopolyether-modified (Si/AO = 0.80)	silicone 1	*1	0.1	0.01	0.1				
		Aminopolyether-modified (Si/AO = 2.46)	silicone 2	*2			0.1				
	(B)	Aminopolyether-modified (Si/AO = 2.39)	silicone 3	*3	0.1	0.3		0.1	0.2		
	(C)	Stearyltrimonium chloride		*4	1	1	1		1	1	
		Stearoxypropyldimethylamine		*5				1			
	Others	Stearyl alcohol		*6	1.5	1.5	1.5	1.5	1.5		1.5
		Dipropylene glycol		*7	2	2	2	2	2		2
		Lactic acid		*8	0.05	0.05	0.05	0.13	0.05		0.05
		Purified water				Balance	Balance	Balance	Balance	Balance	Balance
	Mass ratio (A)/(B)					1	0.033	1	1	0	-
mass ratio (B)/(C)					0.1	0.3	0.1	0.1	0.2	0	
Evaluation	Combing load [(maximum value)/gf]					703.1	993.3	896.7	927.3	2055	1542
	Texture of hair after drying					3.8	4.8	3.6	4.4	4.0	1.6

- *1: Manufactured by Dow Corning Toray Co., Ltd., SILSTYLE 201
 *2: Manufactured by Dow Corning Toray Co., Ltd., SILSTYLE 104
 *3: Manufactured by Dow Corning Toray Co., Ltd., SS-3588
 *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%)

[0061]

As shown in Table 1, in comparison with the hair cosmetics of Comparative Example 1 containing, as the component (A), 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 4 to the hair after washing, the entanglement existent after hair washing was relaxed, and the moist feeling of the hair after drying was held. On the occasion of applying the hair cosmetic to the hair, only by immersing the hair after washing in the hair cosmetic, the entanglement could be dissociated without absolutely passing fingers the hair.

Industrial Applicability

[0062]

In accordance with the hair cosmetic of the present invention, when applied to the hair after washing, not only the entanglement of hair existent after hair washing can be dissociated without performing an operation, such as passing of fingers through hair, but also a moist feeling can be given to the hair after drying.

CLAIMS

1. A hair cosmetic comprising the following components (A), (B), and (C):

(A) an aminopolyether-modified silicone containing a polyoxyalkylene structure and satisfying the following formula (I):

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

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

(B) an aminopolyether-modified silicone containing a polyoxyalkylene structure and satisfying the following formula (II):

$$1.6 < \text{Si}/\text{AO} \leq 3.0 \quad (\text{II})$$

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); and

(C) a cationic surfactant.

2. A hair cosmetic, which is prepared by blending the following components (A), (B), and (C):

(A) an aminopolyether-modified silicone containing a polyoxyalkylene structure and satisfying the following formula (I):

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

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

(B) an aminopolyether-modified silicone containing a polyoxyalkylene structure and satisfying the following formula (II):

$$1.6 < \text{Si}/\text{AO} \leq 3.0 \quad (\text{II})$$

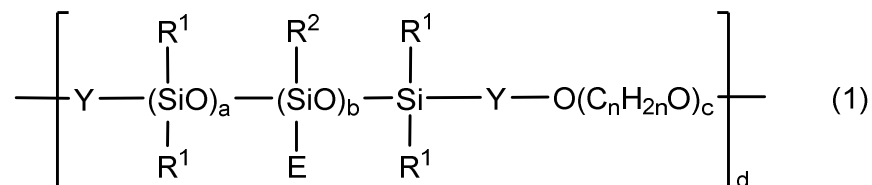
wherein Si represents a molar number of a silicon atom in the component (B), and AO represents an oxyalkylene average addition molar number in the component (B); and

(C) a cationic surfactant.

3. The hair cosmetic according to claim 1 or 2, wherein an absolute

value of a difference between the value of Si/AO of the component (A) and the value of Si/AO of the component (B) is 0.2 or more.

4. The hair cosmetic according to any one of claims 1 to 3, wherein each of the component (A) and the component (B) has a repeating unit represented by the following general formula (1):



wherein,

R^1 represents a hydrogen atom or a monovalent hydrocarbon group having 1 or more and 6 or less carbon atoms; R^2 represents either R^1 or E; E represents a monovalent group represented by $-\text{R}^3-\text{Z}$ (wherein R^3 represents a single bond or a divalent hydrocarbon group having 1 or more and 20 or less carbon atoms; and Z represents a primary to tertiary amino group-containing group); Y represents an alkylene group having 1 or more and 6 or less carbon atoms; a represents a number of 2 or more; b represents a number of 1 or more; c represents a number of 4 or more and 100 or less; d represents a number of 1 or more; 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 $(\text{C}_n\text{H}_{2n}\text{O})$'s in the number of c may be the same as or different from each other; and plural R^1 's, R^2 's, and E's may be the same as or different from each other, respectively.

5. The hair cosmetic according to any one of claims 1 to 4, wherein the component (C) is 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.

6. The hair cosmetic according to any one of claims 1 to 5, wherein the content or blending amount of the component (A) is 0.0001% by mass or more and 5.0% by mass or less.

7. The hair cosmetic according to any one of claims 1 to 6, wherein the content or blending amount of the component (B) is 0.01% by mass or more and 5.0% by mass or less.

8. The hair cosmetic according to any one of claims 1 to 7, wherein the content or blending amount of the component (C) is 0.3% by mass or more and 20% by mass or less.

9. The hair cosmetic according to any one of claims 1 to 8, which is a hair rinse, a hair conditioning agent, or a hair treatment agent.