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(71) Applicant: HENKEL AG & CO. KGAA [DE/DE];
Henkelstr. 67, 40589 Duesseldorf (DE).

(71) Applicant (for SC only): HENKEL (CHINA) INVEST-
MENT CO., LTD. [CN/CN]; Floor 5, 6, 7, Building 6,
No. 99 Jiang Wan Cheng Road, Yang Pu District, Shanghai
200438 (CN).

(72) Inventors: CHANG, Xiaowei; 7F, Building 6, The Springs
Center, No. 99 Jiang Wan Cheng Road, Yangpu District,
Shanghai 200438 (CN). HOU, Xiaoting; 5F, Building 7,
The Springs Center, No. 99 Jiang Wan Cheng Road, Yangpu
District, Shanghai 200438 (CN).

(74) Agent: NTD PATENT AND TRADEMARK AGENCY
LTD.; 10th Floor, Tower C, Beijing Global Trade Center,
36 NorthThird Ring Road East, Dongcheng District, 100013
(CN).

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(54) Title: USE OF AMIDO-TERTIARY AMINE IN SELF-WARMING HAIR CONDITIONER FOR IMPROVING
CONDITIONING EFFECTS, AND SELF-WARMING HAIR CONDITIONERS

(57) Abstract: Provided is the use of an amido-tertiary amine in a self-warming hair conditioner for improving conditioning effects,
especially improving smoothness/combability, and to self-warming hair conditioners. And a water-free self-warming hair conditioner
consisting of said amido-tertiary amine, polyethylene glycols, polyhydric alcohol monomers, fatty alcohols and optionally, one or
more additives is also provided. Further, said self-warming hair conditioners do not contain quaternary ammonium compounds that are
commonly used in the conventional hair conditioners.

**Use of amido-tertiary amine in self-warming hair conditioner for improving conditioning effects,
and self-warming hair conditioners**

5 Technical field

The present invention relates to use of an amido-tertiary amine in a self-warming hair conditioner for improving conditioning effects, especially improving smoothness/combability, and to self-warming hair conditioners.

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Background of the invention

In our daily life, shampoos are used to clean the hair. In general, shampoo compositions contain anionic surfactants, nonionic surfactants, amphoteric surfactants, typically anionic surfactants, and leave hair with undesirable harsh, dull and dry touch, after the hair is shampooed and then rinsed with water. Further, thoroughly cleansed hair is also extremely difficult to comb, in either wet or dry state.

Hair conditioners are conventionally used after shampooing, so as to impart conditioning properties such as smooth, soft, good feeling on touch, to the hair and overcome the undesirable feelings brought by the shampooing. It is known that anionic surfactants are typically suitable for hair shampooing, and that cationic compounds, like cationic surfactants and cationic polymers are suitable as hair conditioner. Therefore, cationic compounds especially quaternary ammonium compounds are often used in hair conditioners to bring conditioning effects to the hair, see for example, TAN Xiaoyan, Application of Quaternary Ammonium Salt Cationic Conditioner in Hair Care Products, Guangdong Chemical Industry, 2019, vol. 46, p. 43-45 and 39.

Conventional conditioners are applied and effected under normal temperature, and then rinsed out from the hair. In practice, there is need for improving the consumer usage experience of the hair conditioners, and it is found that if the conditioner is used under a warm temperature, the consumer would feel comfort and relaxation. Meanwhile, the warming treatment can enhance the penetration of product so to improve the product performance. Therefore, it would be desirable for the conditioners being used to have the ability to increase the temperature during use. Such ability is called "self-warming".

Self-warming conditioners typically are water-free and contains glycols which generate heat through dissolution of the glycol in water. When using self-warming conditioners, it is desirable to increase the temperature faster and higher enough so as to impart good feelings, and meanwhile, it is also desirable to achieve better conditioning properties by selecting each component.

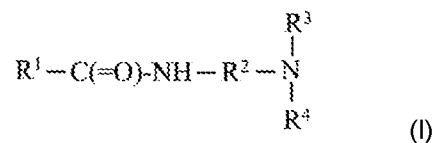
In conventional hair conditioners, quaternary ammonium compounds are widely used and well known for their excellent conditioning properties, such as combability. And generally, amido-tertiary amines

per se are not hair conditioning agents, and they only exhibit conditioning effect in conventional conditioners at acid pH, especially lower than 4.5, under which condition the amido-tertiary amine can be transformed to its cationic form. Meanwhile, even under acid pH, amido-tertiary amines do not show much better conditioning effect than quaternary ammonium compounds. Moreover, amido-tertiary amines are known for their good biodegradability, and thus, in practice, amido-tertiary amines usually are used in combination with quaternary amines in the formulation of conventional hair conditioners to boost the natureness of the formula, but are not used alone to impart or improve the conditioning effect.

Summary of the invention

In formulating the self-warming hair conditioners, the inventors surprisingly found that amido-tertiary amines, even without under acid pH, can achieve better conditioning properties than quaternary ammonium compounds, which is contrary to the knowledge in the art.

On the basis of the above findings, it is provided the use of an amido-tertiary amine in self-warming hair conditioners for improving conditioning effects, especially improving smoothness/combability, wherein the amido-tertiary amine has the Formula (I):



wherein R^1 is a fatty acid residue having about 9 to about 21 carbon atoms; R^2 is an alkylene group having 2 to 5 carbon atoms, preferably, ethylene, propylene and butylene; R^3 is hydrogen, methyl, ethyl, propyl, butyl or hydroxyalkylene group having 1 to 4 carbon atoms; and R^4 is hydrogen, methyl, ethyl, propyl, butyl or hydroxyalkylene group having 1 to 4 carbon atoms.

In an embodiment of the present invention, the self-warming hair conditioner, apart from the amido-tertiary amine, may further comprise: (i) one or more polyethylene glycols having a number average molecular weight of 100 to 10000, preferably having a number average molecular weight of 100-6000; (ii) one or more polyhydric alcohol monomers; and (iii) one or more fatty alcohols.

In an embodiment of the present invention, the amido-tertiary amine is selected from the group consisting of almondamidopropyl dimethylamine, avocamidopropyl dimethylamine, babassuamidopropyl dimethylamine, behenamidopropyl dimethylamine, brassicamidopropyl dimethylamine, cocamidopropyl dimethylamine, isostearamidopropyl dimethylamine, lauramidopropyl dimethylamine, linoleamidopropyl dimethylamine, myristamidopropyl dimethylamine, oatamidopropyl dimethylamine, oleamidopropyl dimethylamine, olivamidopropyl dimethylamine, palmitamidopropyl dimethylamine, ricinoleamidopropyl dimethylamine, sesamidopropyl dimethylamine, soyamidopropyl dimethylamine, stearamidopropyl dimethylamine, wheat germamidopropyl dimethylamine,

palmitamidopropyl diethylamine, stearamidoethyl diethylamine, stearamidopropyl diethylamine, dilinoleamidopropyl dimethylamine, and mixtures thereof.

In an embodiment of the present invention, the polyethylene glycol (PEG) is selected from the group consisting of PEG-4, PEG-6, PEG-7, PEG-8, PEG-9, PEG-10, PEG-12, PEG-14, PEG-16, PEG-18, PEG-20, PEG-32, PEG-33, PEG-40, PEG-45, PEG-55, PEG-60, PEG-75, PEG-80, PEG-90, PEG-100, PEG-135, PEG-150, PEG-180, PEG-200, PEG-220, PEG-240, PEG-350, PEG-400, PEG-450, PEG-500, PEG-800, and mixtures thereof.

In an embodiment of the present invention, the polyhydric alcohol monomer is selected from C_2 - C_{10} polyol monomers, preferably from the group consisting of ethylene glycol, 1,3-propylene glycol, 1,2-propylene glycol, 1,4-butylene glycol, 1,3-butylene glycol, 1,2-butylene glycol, 2,3-butylene glycol, pentanediols, hexanediols, heptanediols, octanediols, nonanediols, decanediol, glycerol, sorbitol, and mixtures thereof.

In an embodiment of the present invention, the fatty alcohol is selected from fatty alcohols having 8 to 36 carbon atoms, preferably having 12 to 22 carbon atoms, preferably selected from the group consisting of cetearyl alcohol, stearyl alcohol, cetyl alcohol, behenyl alcohol, lauryl alcohol, myristyl alcohol, coco alcohol, and mixtures thereof.

In an embodiment of the present invention, the conditioner further comprises one or more additives selected from the group consisting of perfume, plant extracts, proteins, emulsifiers, dyes, colorants, preservatives, silicone oils, emollients, pH adjust agents, and viscosity modifiers.

In an embodiment of the present invention, the polyethylene glycol is contained in the conditioner in an amount of from 10 to 90 wt%, preferably from 20 to 80 wt%, based on the total weight of the conditioner.

In an embodiment of the present invention, the polyhydric alcohol monomer is contained in the conditioner in an amount of from 0.1 to 50 wt%, preferably from 1 to 20 wt%, based on the total weight of the conditioner.

In an embodiment of the present invention, the amido-tertiary amine is contained in the conditioner in an amount of from 0.1 to 10 wt%, preferably from 0.5 to 7 wt%, based on the total weight of the conditioner.

In an embodiment of the present invention, the fatty alcohol is contained in the conditioner in an amount of from 0.1 to 40 wt%, preferably from 2 to 10 wt%, based on the total weight of the conditioner.

In another aspect of the present invention, it is also provided a self-warming hair conditioner.

When using amido-tertiary amines in a self-warming hair conditioner, better conditioning effects especially smoothness/combability than quaternary ammonium compounds can be achieved.

Brief introduction to the figures

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Figure 1 is a bar chart comparing combabilities of self-warming hair conditioners using amido-tertiary amine and quaternary ammonium compound, respectively.

Detailed description of the invention

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It is to be understood by one of ordinary skill in the art that the present discussion is a description of exemplary embodiments only and is not intended as limiting the broader aspects of the present invention. Each aspect so described may be combined with any other aspect(s) unless clearly indicated to the contrary. In particular, any feature indicated as being preferred or advantageous may be combined with any other feature or features indicated as being preferred or advantageous.

15

Unless otherwise defined, all terms used in the present invention, including technical and scientific terms, have the meaning as commonly understood by one of the ordinary skilled in the art to which this invention belongs. Unless specified otherwise, in the context of the present invention, the terms used are to be construed in accordance with the following definitions.

20

Unless specified otherwise, all wt.% or % by weight values quoted herein are percentages by weight.

Unless specified otherwise, as used herein, the terms “a”, “an” and “the” include both singular and plural referents.

25

The terms “comprising” and “comprises” as used herein are synonymous with “including”, “includes” or “containing”, “contains”, and are inclusive or open-ended and do not exclude additional, non-recited members, elements or process steps.

30

The term “consisting essentially of” as used herein means that the listed components constitute main body of the composition, for example, at least 70% by weight of the composition, at least 80% by weight of the composition, at least 85% by weight of the composition, or at least 90% by weight of the composition.

35

The term “consisting of” as used herein is close-ended and excludes additional, non-recited, intentionally added members, elements or process steps.

The term “at least one” or “one or more” used herein to define a component refers to the type of the component, and not to the absolute number of molecules. For example, “one or more fatty alcohols” means one type of fatty alcohols or a mixture of a plurality of different fatty alcohols.

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The terms “about”, “around” and the like used herein in connection with a numerical value refer to the numerical value $\pm 10\%$, preferably $\pm 5\%$. All numerical values herein should be interpreted as being modified by the term “about”.

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The term “fatty acid residue” used herein means a moiety (or a group) derived from fatty acid wherein the carboxyl group is excluded.

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The term “polyhydric alcohol” used herein means a compound having two or more hydroxyl groups in the molecule.

The term “polyhydric alcohol monomer” used herein means a compound having two or more hydroxyl groups and having a backbone consisting of carbon and hydrogen atoms.

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The term “fatty alcohol” used herein means aliphatic monohydric alcohols having 8 to 36 carbon atoms, normally having even numbers of carbon atoms.

The number average molecular weight (M_n) mentioned herein is determined through the end group analysis.

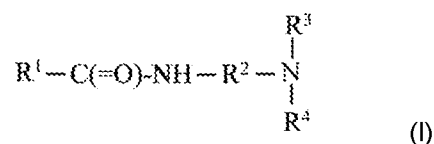
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Unless specified otherwise, the recitation of numerical end points includes all numbers and fractions subsumed within the respective ranges, as well as the recited end points.

All references cited in the present specification are hereby incorporated by reference in their entirety.

25

In one aspect of the present invention, it is provided the use of an amido-tertiary amine in self-warming hair conditioners for improving conditioning effects, especially improving smoothness/combability, wherein the amido-tertiary amine has the Formula (I):



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wherein R^1 is a fatty acid residue having about 9 to about 21 carbon atoms; R^2 is an alkylene group having 2 to 5 carbon atoms, preferably, ethylene, propylene and butylene; R^3 is hydrogen, methyl, ethyl, propyl, butyl or hydroxyalkylene group having 1 to 4 carbon atoms such as hydroxymethyl, hydroxyethyl and hydroxypropyl; and R^4 is hydrogen, methyl, ethyl, propyl, butyl or hydroxyalkylene group having 1 to 4 carbon atoms such as hydroxymethyl, hydroxyethyl and hydroxypropyl.

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When formulating the self-warming hair conditioner, the amido-tertiary amine can be contained in the conditioner in an amount of from 0.1 to 10 wt%, preferably from 0.5 to 7 wt%, such as 1 wt%, 2 wt%, 3 wt%, 4wt%, 5wt%, 6wt%, based on the total weight of the conditioner.

In a preferred embodiment, the amido-tertiary amine is selected from the group consisting of almondamidopropyl dimethylamine, avocadamidopropyl dimethylamine, babassuamidopropyl dimethylamine, behenamidopropyl dimethylamine, brassicamidopropyl dimethylamine, cocamidopropyl dimethylamine, isostearamidopropyl dimethylamine, lauramidopropyl dimethylamine, linoleamidopropyl dimethylamine, myristamidopropyl dimethylamine, oatamidopropyl dimethylamine, oleamidopropyl dimethylamine, olivamidopropyl dimethylamine, palmitamidopropyl dimethylamine, ricinoleamidopropyl dimethylamine, sesamidopropyl dimethylamine, soyamidopropyl dimethylamine, stearamidopropyl dimethylamine, wheat germamidopropyl dimethylamine, palmitamidopropyl diethylamine, stearamidoethyl diethylamine, stearamidopropyl diethylamine, dilinoleamidopropyl dimethylamine, and mixtures thereof.

In a more preferred embodiment, the amido-tertiary amine is selected from the group consisting of brassicamidopropyl dimethylamine, cocamidopropyl dimethylamine, stearamidopropyl dimethylamine, isostearamidopropyl dimethylamine, dilinoleamidopropyl dimethylamine, palmitamidopropyl dimethylamine, and mixtures thereof.

Apart from the amido-tertiary amine, the self-warming hair conditioner can also comprise one or more polyethylene glycols having a number average molecular weight of 100 to 10000, preferably, having a number average molecular weight of 100-6000.

In the self-warming hair conditioners, the polyethylene glycol (PEG) is used as the self-warming component. When mixing with water, the dissolution of polyethylene glycol in water generates heat and makes the conditioner warm. The molecular weight (M_n) of the PEG is within the range of 100 to 10000, preferably in the range of 100 to 6000, more preferably in the range of 100 to 2000. If the molecular weight of the PEG is too low, the system has a low viscosity and tends to be instable, and if the molecular weight of the PEG is too high, the PEG tends to separate out from the system due to crystallization, resulting in a ununiform and instable system.

For example, the polyethylene glycol useful in the present invention can be selected from the group consisting of PEG-4, PEG-6, PEG-7, PEG-8, PEG-9, PEG-10, PEG-12, PEG-14, PEG-16, PEG-18, PEG-20, PEG-32, PEG-33, PEG-40, PEG-45, PEG-55, PEG-60, PEG-75, PEG-80, PEG-90, PEG-100, PEG-135, PEG-150, PEG-180, PEG-200, PEG-220, PEG-240, PEG-350, PEG-400, PEG-450, PEG-500, PEG-800, and mixtures thereof. In a preferred embodiment, the PEGs showing liquid state at ambient temperature are preferably selected, such as, PEG-8, PEG-9, PEG-10, PEG-12, and PEG-14.

When formulating the self-warming hair conditioner, the PEG can be contained in the conditioner in an amount of from 10 to 90 wt%, preferably from 20 to 80 wt%, such as 30 wt%, 40wt%, 50wt%, 60wt%, 70wt%, based on the total weight of the conditioner.

Apart from the amido-tertiary amine and the polyethylene glycol, the self-warming hair conditioner can also comprise one or more polyhydric alcohol monomers. The polyhydric alcohol monomer can serve as solvent and stabilizer for the amidoamine or other conditioning agents, such as emollient in the PEG base. Meanwhile, the polyhydric alcohol monomer can also act as a heat-generating source when dissolved in water, even though it does not generate heat as much as the PEG does.

For example, the polyhydric alcohol monomer useful in the present invention can be selected from C₂-C₁₀ polyol monomers, preferably from the group consisting of ethylene glycol, 1,3-propylene glycol, 1,2-propylene glycol, 1,4-butylene glycol, 1,3-butylene glycol, 1,2-butylene glycol, 2,3-butylene glycol, pentanediols, hexanediols, heptanediols, octanediols, nonanediols, decanediol, glycerol, sorbitol, and mixtures thereof. Among these, Glycerol, 1,3-butylene glycol, 1,3-propylene glycol, 1,2-propylene glycol and mixtures thereof are preferred.

When formulating the self-warming hair conditioner, the polyhydric alcohol monomer can be contained in the conditioner in an amount of from 0.1 to 50 wt%, preferably from 1 to 20 wt%, such as 2 wt%, 3 wt%, 5 wt%, 7wt%, 9wt%, 10wt%, 15wt%, based on the total weight of the conditioner.

Apart from the amido-tertiary amine and the polyethylene glycol and the polyhydric alcohol monomer, the self-warming hair conditioner can also comprise one or more fatty alcohols. Fatty alcohols are used as structurant / thickener in the present invention to increase the viscosity of the conditioner as well as stabilize the system.

For example, the fatty alcohol useful in the present invention can be selected from fatty alcohols having 8 to 36 carbon atoms, preferably having 12 to 22 carbon atoms, preferably selected from the group consisting of brassica alcohol, cetearyl alcohol, stearyl alcohol, cetyl alcohol, behenyl alcohol, lauryl alcohol, myristyl alcohol, coco alcohol, and mixtures thereof. Among these, solid fatty alcohols are preferred, and cetearyl alcohol, stearyl alcohol, cetyl alcohol, behenyl alcohol, brassica alcohol and mixtures thereof are more preferred.

When formulating the self-warming hair conditioner, the fatty alcohol can be contained in the conditioner in an amount of from 0.1 to 40 wt%, preferably from 2 to 10 wt%, such as 3 wt%, 4 wt%, 5 wt%, 7wt%, based on the total weight of the conditioner.

In addition to the above components, the self-warming hair conditioner can also comprise conventional additives, such as perfume, plant extracts, proteins, emulsifiers, dyes, colorants, preservatives, silicone oils, emollients, pH adjust agents, viscosity modifiers, and the like.

For example, emollients such as octyldodecanol, isopropyl palmitate, Caprylic/Capric Triglyceride, dicaprylyl Carbonate, C₁₂-C₂₂ saturated alkanes or plant oils may be used in the present invention, preferably in an amount of 0.1 to 50 wt%, more preferably in an amount of 1 to 20 wt%, based on the total weight of the self-warming hair conditioner.

In the context of the use of the amido-tertiary amine in self-warming hair conditioners according to the present invention, the self-warming hair conditioners may also contain quaternary ammonium compounds that are commonly used in the conventional hair conditioners.

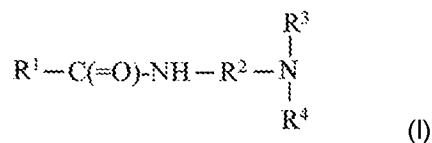
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In the context of the use of the amido-tertiary amine in self-warming hair conditioners according to the present invention, the conditioners can be in a form of one-package, or a in a form of two or more packages. When the amido-tertiary amine is used in one-package self-warming conditioners, the one-package conditioners are water-free, because the self-warming component should be isolated from water before application so as to avoid heat-generating prior to in contact with hair or scalp. When the amido-tertiary amine is used in self-warming conditioners in the form of two or more packages, water can be contained in the package(s) that does/do not contain the self-warming component, and immediately before application, the ingredients in all packages can be mixed together such that the self-warming component is in contact with water so as to generate heat.

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In another aspect, it is provided a water-free self-warming hair conditioner consisting of:

- (i) 0.1 to 10 wt%, preferably from 0.5 to 7 wt% of one or more amido-tertiary amines having the Formula (I):



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wherein R^1 is a fatty acid residue having about 9 to about 21 carbon atoms; R^2 is an alkylene group having 2 to 5 carbon atoms, preferably, ethylene, propylene and butylene; R^3 is hydrogen, methyl, ethyl, propyl, butyl or hydroxyalkylene group having 1 to 4 carbon atoms; and R^4 is hydrogen, methyl, ethyl, propyl, butyl or hydroxyalkylene group having 1 to 4 carbon atoms;

25

the amido-tertiary amine is preferably selected from the group consisting of almondamidopropyl dimethylamine, avocadamidopropyl dimethylamine, babassuamidopropyl dimethylamine, behenamidopropyl dimethylamine, brassicamidopropyl dimethylamine, cocamidopropyl dimethylamine, isostearamidopropyl dimethylamine, lauramidopropyl dimethylamine, linoleamidopropyl dimethylamine, myristamidopropyl dimethylamine, oatamidopropyl dimethylamine, oleamidopropyl dimethylamine, olivamidopropyl dimethylamine, palmitamidopropyl dimethylamine, ricinoleamidopropyl dimethylamine, sesamidopropyl dimethylamine, soyamidopropyl dimethylamine, stearamidopropyl dimethylamine, wheat germamidopropyl dimethylamine, palmitamidopropyl diethylamine, stearamidoethyl diethylamine, stearamidopropyl diethylamine, dilinoleamidopropyl dimethylamine, and mixtures thereof;

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- (ii) 10 to 90 wt%, preferably from 20 to 80 wt% of one or more polyethylene glycols having a number average molecular weight of 100 to 10000, preferably, having a number average molecular weight of 100-6000, preferably selected from the group consisting of PEG-4,

PEG-6, PEG-7, PEG-8, PEG-9, PEG-10, PEG-12, PEG-14, PEG-16, PEG-18, PEG-20, PEG-32, PEG-33, PEG-40, PEG-45, PEG-55, PEG-60, PEG-75, PEG-80, PEG-90, PEG-100, PEG-135, PEG-150, PEG-180, PEG-200, PEG-220, PEG-240, PEG-350, PEG-400, PEG-450, PEG-500, PEG-800, and mixtures thereof;

- 5 (iii) 0.1 to 50 wt%, preferably from 1 to 20 wt% of one or more polyhydric alcohol monomers selected from C₂-C₁₀ polyol monomers, preferably from the group consisting of ethylene glycol, 1,3-propylene glycol, 1,2-propylene glycol, 1,4-butylene glycol, 1,3-butylene glycol, 1,2-butylene glycol, 2,3-butylene glycol, pentanediols, hexanediols, heptanediols, octanediols, nonanediols, decanediol, glycerol, sorbitol, and mixtures thereof;
- 10 (iv) 0.1 to 40 wt%, preferably from 2 to 10 wt% one or more fatty alcohols selected from fatty alcohols having 8 to 36 carbon atoms, preferably having 12 to 22 carbon atoms, preferably selected from the group consisting of brassica alcohol, cetearyl alcohol, stearyl alcohol, cetyl alcohol, behenyl alcohol, lauryl alcohol, myristyl alcohol, and coco alcohol; and
- 15 (v) optionally, one or more additives selected from the group consisting of perfume, plant extracts, proteins, emulsifiers, dyes, colorants, preservatives, silicone oils, emollients, pH adjust agents, and viscosity modifiers.

20 In still another aspect, it is provided a self-warming hair conditioner in a form of two or more packages, consisting of the above-stated components (i) to (v) as well as (vi) water, with the proviso that the component (vi) water is contained in a different package from the components (ii) and (iii).

25 In the context of the self-warming hair conditioners according to the present invention, the self-warming hair conditioners do not contain quaternary ammonium compounds that are commonly used in the conventional hair conditioners.

30 In the context of the self-warming hair conditioners according to the present invention, the conditioners can be in a form of one-package, or a in a form of two or more packages. When the self-warming hair conditioners according to the present invention are in the form of one-package, the one-package conditioners are water-free. When the self-warming conditioners according to the present invention are in the form of two or more packages, water and the self-warming component are not contained in the same package, and immediately before application, the ingredients in all packages can be mixed together such that the self-warming component is in contact with water so as to generate heat.

35 All embodiments and features, as well as preferred embodiments and features, in the context of use of the amido-tertiary amine can also be applied to the product self-warming hair conditioners, except that the self-warming hair conditioners according to the present invention do not contain quaternary ammonium compounds .

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Examples

The invention will now be described by way of the following examples. The following examples are intended to assist one skilled in the art to better understand and practice the present invention. The scope of the invention is not limited by the examples but is defined in the appended claims. All parts and percentages are based on weight unless otherwise stated.

Examples 1a, 1c and 1d and Comparative Examples 1b, 1e and 1f: Preparation of one-package conditioners

Conditioners 1a to 1f were formulated with the components in the following Table 1:

Table 1: Formulations of Conditioners 1a to 1f

	components	Ex. 1a (wt%)	Ex. 1b (wt%) (Com.)	Ex. 1c (wt%)	Ex. 1d (wt%)	Ex. 1e (wt%) (Com.)	Ex. 1f (wt%) (Com.)
Group 1	Stearamidopropyl dimethylamine	4					
	Cocamidopropyl dimethylamine			4			
	brassicamidopropyl dimethylamine				4		
	Behentrimonium chloride		2			4	
	Distearyldimonium chloride		2				
	Behenoyl PG-Trimonium Chloride						4
	1,3-butylene glycol	10	10	10	10	10	10
	Cetearyl alcohol	5	5	5	5	5	5
	Octyldodecanol	15	15	15	15	15	15
Group 2	PEG-8	50	50	50	50	50	50
	PEG-150	14.5	14.5	14.5	14.5	14.5	14.5
Group 3	perfume	0.5	0.5	0.5	0.5	0.5	0.5

Preparation procedure:

Self-warming hair conditioners 1a to 1f were prepared using the components and their amounts stated in Table 1 according to the following procedure:

- mixing the components of group 1 and heating them to about 90 °C with stirring until a clear liquid (1) was obtained;

- mixing the components of group 2 and heating them to about 70 °C with stirring until a clear liquid (2) was obtained;
- mixing the clear liquids (1) and (2) together with stirring until a mixture above 80 °C was obtained;
- cooling down to about 58 °C with stirring and homogenizing the mixture at a speed of 500 rpm/min;
- 5 - cooling down to about 45 °C and then adding perfume of group 3 with stirring at a speed of 200 rpm/min until the perfume was evenly dispersed;
- cooling down to room temperature.

Example 2

Conditioning effects of conditioners 1a to 1f were tested according to the following method.

The bleached Asian hair tresses were washed by commercially available non-silicone shampoo (Syoss si-free shampoo from Henkel), and then self-warming hair conditioners 1a to 1f were applied to the shampooed hair tresses separately, rubbed by hand and left in hair for 3 minutes, then completely rinsed off by water. The conditioned hair tresses were blow-dried for 5 minutes and then left in open air overnight and then subjected to combing machine evaluation (Combing tester produced by JAU CHUNG machinery corp.) for combing force, each tress was tested for 5 times and the obtained combing forces were averaged. The results are shown in Table 2 as well as Figure 1.

Table 2: Combing force after treated by conditioners 1a to 1f

	Ex. 1a	Ex. 1b (Com.)	Ex. 1c	Ex. 1d	Ex. 1e (Com.)	Ex. 1f (Com.)
Combing force (Kgf)	61.9808	92.4489	56.5796	58.4410	77.9952	91.5132

The test procedure for combing force:

1. attaching the hair tresses onto the combing tester;
2. calibrating the machine;
3. starting the combing tester by combing the attached hair tresses from the top to the tips;
4. repeating step 3 for 5 times;
5. the combing force curves were generated automatically and the average combing force was given.

It can be seen from Table 2 that use of the amido-tertiary amines in self-warming hair conditioners significantly improved combability of the hair stresses, compared with use of the quaternary ammonium compound in self-warming hair conditioners. In other words, the self-warming hair conditioners comprising the amido-tertiary amine can achieve better combability than those comprising quaternary ammonium compound.

Example 3: Preparation of two-package conditioner

Example 3 was formulated with the components in the following Table 3:

5 Table 3: Formulation of Example 3

Package 1		
	components	Ex. 3 (wt%)
Group 1A	Stearamidopropyl dimethylamine	4
	1,3-butylene glycol	10
	Cetearyl alcohol	5
	Jojoba oil	20
Group 1B	PEG-8	50
	PEG-150	10
Group 2	Silsoft A-843 ¹⁾	0.5
Group 3	perfume	0.5
Package 2		
	components	Ex. 3 (wt%)
Group 4	Water	93
	PQ-37 ²⁾	1
	PQ-10 ³⁾	0.2
	Glycerin	5
Group 5	Euxyl PE 9010 ⁴⁾	0.5
	Perfume	0.3

¹⁾ Silsoft A-843 is a product from Momentive Performance Materials Inc, US, INCI name: Bisamino PEG/PPG-41/3 Aminoethyl PG-Propyl Dimethicone

²⁾ PQ-37 is Polyquaternium-37, tradename Ultragel 300, from BASF

³⁾ PQ-10 id Polyquaternium-10, tradename Ucare JR 400, from Dow

⁴⁾ Euxyl PE 9010 is a preservative for cosmetics, commercially available from Schuelke & Mayr GmbH, Germany.

Preparation procedure of package 1:

15 Package 1 of Example 3 was prepared using the components and their amounts stated in Table 3 according to the following procedure:

- mixing the components of group 1A and heating them to about 90 °C with stirring until a clear liquid (1) was obtained; and filtering the clear liquid (1) at about 90 °C if necessary;
- mixing the components of group 1B and heating them to about 70 °C with stirring until a clear liquid (2) was obtained;
- mixing the clear liquids (1) and (2) together with stirring until a mixture above 80 °C was obtained;

- cooling down to about 58 °C with stirring and adding the component of Group 2 and homogenizing the mixture at a speed of 500 rpm/min;
- cooling down to about 45 °C and then adding perfume of group 3 with stirring at a speed of 200 rpm/min until the perfume was evenly dispersed;
- 5 - cooling down to room temperature.

Preparation procedure of package 2:

Package 2 of Example 3 was prepared using the components and their amounts stated in Table 3 according to the following procedure:

- mixing the components of group 4 at room temperature and heating them to about 70 °C with stirring until a clear liquid (3) was obtained;
- adding the components of group 5 into the clear liquid (3) with stirring until a clear liquid (4) was obtained;
- 15 - cooling down to room temperature.

Example 4: Preparation of two-package conditioner

Example 4 was formulated with the components in the following Table 4:

Table 4: Formulation of Example 4

Package 1		
	components	Ex. 4 (wt%)
Group 1A	Stearamidopropyl dimethylamine	2
	1,3-butylene glycol	10
	Cetearyl alcohol	5
	Glycerin	15
Group 1B	PEG-8	65.5
Group 2	Clay ¹⁾	2
Group 3	perfume	0.5
Package 2		
	components	Ex. 4 (wt%)
Group 4	Water	74
	Ethanol	20
	Glycerin	5
Group 5	Euxyl PE 9010 ²⁾	0.5
	Perfume	0.5

¹⁾ Clay, tradename Bereclay light red, from Clariant

²⁾ Euxyl PE 9010 is a preservative for cosmetics, commercially available from Schuelke & Mayr GmbH, Germany.

Preparation procedure of package 1:

Package 1 of Example 4 was prepared using the components and their amounts stated in Table 4 according to the following procedure:

- mixing the components of group 1A and heating them to about 90 °C with stirring until a clear liquid (1) was obtained; and filtering the clear liquid (1) at about 90 °C if necessary;
- heating the component of group 1B to about 70 °C with stirring until a clear liquid (2) was obtained;
- mixing the clear liquids (1) and (2) together with stirring until a mixture above 80 °C was obtained;
- cooling down to about 58 °C with stirring and adding the component of Group 2 and homogenizing the mixture at a speed of 500 rpm/min;
- cooling down to about 45 °C and then adding perfume of group 3 with stirring at a speed of 200 rpm/min until the perfume was evenly dispersed;
- cooling down to room temperature.

Preparation procedure of package 2:

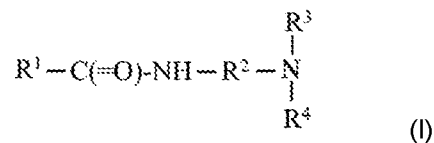
Package 2 of Example 4 was prepared using the components and their amounts stated in Table 4 according to the following procedure:

- mixing the components of group 4 at room temperature with stirring until a clear liquid (3) was obtained;
- adding the components of group 5 into the clear liquid (3) with stirring until a clear liquid (4) was obtained.

Although some preferred embodiments have been described, many modifications and variations may be made thereto in light of the above teachings. It is therefore to be understood that the invention may be practiced otherwise than as specifically described without departing from the scope of the appended claims.

What is claimed is:

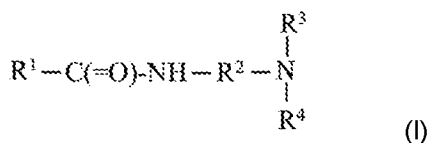
1. Use of an amido-tertiary amine in a self-warming hair conditioner for improving conditioning effects, especially improving smoothness/combability, wherein the amido-tertiary amine has the Formula (I):



wherein R^1 is a fatty acid residue having about 9 to about 21 carbon atoms; R^2 is an alkylene group having 2 to 5 carbon atoms, preferably, ethylene, propylene and butylene; R^3 is hydrogen, methyl, ethyl, propyl, butyl or hydroxyalkylene group having 1 to 4 carbon atoms; and R^4 is hydrogen, methyl, ethyl, propyl, butyl or hydroxyalkylene group having 1 to 4 carbon atoms.

2. The use according to claim 1, wherein the self-warming hair conditioner, apart from the amido-tertiary amine, further comprises:
 - (i) one or more polyethylene glycols having a number average molecular weight of 100 to 10000, preferably, having a number average molecular weight of 100-6000;
 - (ii) one or more polyhydric alcohol monomers; and
 - (iii) one or more fatty alcohols.
3. The use according to claim 1 or 2, wherein the amido-tertiary amine is selected from the group consisting of almondamidopropyl dimethylamine, avocadamidopropyl dimethylamine, babassuamidopropyl dimethylamine, behenamidopropyl dimethylamine, brassicamidopropyl dimethylamine, cocamidopropyl dimethylamine, isostearamidopropyl dimethylamine, lauramidopropyl dimethylamine, linoleamidopropyl dimethylamine, myristamidopropyl dimethylamine, oatamidopropyl dimethylamine, oleamidopropyl dimethylamine, olivamidopropyl dimethylamine, palmitamidopropyl dimethylamine, ricinoleamidopropyl dimethylamine, sesamidopropyl dimethylamine, soyamidopropyl dimethylamine, stearamidopropyl dimethylamine, wheat germamidopropyl dimethylamine, palmitamidopropyl diethylamine, stearamidoethyl diethylamine, stearamidopropyl diethylamine, dilinoleamidopropyl dimethylamine, and mixtures thereof.
4. The use according to claim 2 or 3, wherein the polyethylene glycol is selected from the group consisting of PEG-4, PEG-6, PEG-7, PEG-8, PEG-9, PEG-10, PEG-12, PEG-14, PEG-16, PEG-18, PEG-20, PEG-32, PEG-33, PEG-40, PEG-45, PEG-55, PEG-60, PEG-75, PEG-80, PEG-90, PEG-100, PEG-135, PEG-150, PEG-180, PEG-200, PEG-220, PEG-240, PEG-350, PEG-400, PEG-450, PEG-500, PEG-800, and mixtures thereof.
5. The use according to any one of claims 2 to 4, wherein the polyhydric alcohol monomer is selected from $\text{C}_2\text{-C}_{10}$ polyol monomers, preferably from the group consisting of ethylene glycol,

- 1,3-propylene glycol, 1,2-propylene glycol, 1,4-butylene glycol, 1,3-butylene glycol, 1,2-butylene glycol, 2,3-butylene glycol, pentanediols, hexanediols, heptanediols, octanediols, nonanediols, decanediol, glycerol, sorbitol, and mixtures thereof.
6. The use according to any one of claims 2 to 5, wherein the fatty alcohol is selected from fatty alcohols having 8 to 36 carbon atoms, preferably having 12 to 22 carbon atoms, preferably selected from the group consisting of brassica alcohol, cetearyl alcohol, stearyl alcohol, cetyl alcohol, behenyl alcohol, lauryl alcohol, myristyl alcohol, coco alcohol, and mixtures thereof.
 7. The use according to any one of claims 2 to 6, wherein the conditioner further comprises one or more additives selected from the group consisting of perfume, plant extracts, proteins, emulsifiers, dyes, colorants, preservatives, silicone oils, emollients, pH adjust agents, and viscosity modifiers.
 8. The use according to any one of claims 2 to 7, wherein the polyethylene glycol is contained in the conditioner in an amount of from 10 to 90 wt%, preferably from 20 to 80 wt%, based on the total weight of the conditioner.
 9. The use according to any one of claims 2 to 8, wherein the polyhydric alcohol monomer is contained in the conditioner in an amount of from 0.1 to 50 wt%, preferably from 1 to 20 wt%, based on the total weight of the conditioner.
 10. The use according to any one of claims 1 to 9, wherein the amido-tertiary amine is contained in the conditioner in an amount of from 0.1 to 10 wt%, preferably from 0.5 to 7 wt%, based on the total weight of the conditioner.
 11. The use according to any one of claims 2 to 10, wherein the fatty alcohol is contained in the conditioner in an amount of from 0.1 to 40 wt%, preferably from 2 to 10 wt%, based on the total weight of the conditioner.
 12. A water-free self-warming hair conditioner consisting of, based on the total weight of the conditioner:
 - (i) 0.1 to 10 wt%, preferably from 0.5 to 7 wt% of one or more amido-tertiary amines having the Formula (I):



wherein R^1 is a fatty acid residue having about 9 to about 21 carbon atoms; R^2 is an alkylene group having 2 to 5 carbon atoms, preferably, ethylene, propylene and butylene; R^3 is hydrogen, methyl, ethyl, propyl, butyl or hydroxyalkylene group having 1 to 4 carbon atoms; and R^4 is hydrogen, methyl, ethyl, propyl, butyl or hydroxyalkylene group having 1 to 4 carbon atoms;

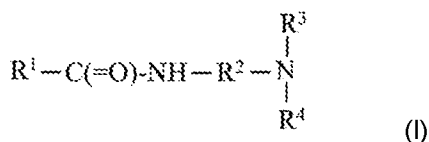
the amido-tertiary amine is preferably selected from the group consisting of almondamidopropyl dimethylamine, avocadamidopropyl dimethylamine, babassuamidopropyl dimethylamine, behenamidopropyl dimethylamine, brassicamidopropyl dimethylamine, cocamidopropyl dimethylamine, isostearamidopropyl dimethylamine, lauramidopropyl dimethylamine, linoleamidopropyl dimethylamine, myristamidopropyl dimethylamine, oatamidopropyl dimethylamine, oleamidopropyl dimethylamine, olivamidopropyl dimethylamine, palmitamidopropyl dimethylamine, ricinoleamidopropyl dimethylamine, sesamidopropyl dimethylamine, soyamidopropyl dimethylamine, stearamidopropyl dimethylamine, wheat germamidopropyl dimethylamine, palmitamidopropyl diethylamine, stearamidoethyl diethylamine, stearamidopropyl diethylamine, dilinoleamidopropyl dimethylamine, and mixtures thereof;

- (ii) 10 to 90 wt%, preferably from 20 to 80 wt% of one or more polyethylene glycols having a number average molecular weight of 100 to 10000, preferably, having a number average molecular weight of 100-6000; preferably selected from the group consisting of PEG-4, PEG-6, PEG-7, PEG-8, PEG-9, PEG-10, PEG-12, PEG-14, PEG-16, PEG-18, PEG-20, PEG-32, PEG-33, PEG-40, PEG-45, PEG-55, PEG-60, PEG-75, PEG-80, PEG-90, PEG-100, PEG-135, PEG-150, PEG-180, PEG-200, PEG-220, PEG-240, PEG-350, PEG-400, PEG-450, PEG-500, PEG-800, and mixtures thereof;
- (iii) 0.1 to 50 wt%, preferably from 1 to 20 wt% of one or more polyhydric alcohol monomers selected from C₂-C₁₀ polyol monomers, preferably from the group consisting of ethylene glycol, 1,3-propylene glycol, 1,2-propylene glycol, 1,4-butylene glycol, 1,3-butylene glycol, 1,2-butylene glycol, 2,3-butylene glycol, pentanediols, hexanediols, heptanediols, octanediols, nonanediols, decanediol, glycerol, sorbitol, and mixtures thereof;
- (iv) 0.1 to 40 wt%, preferably from 2 to 10 wt% one or more fatty alcohols selected from fatty alcohols having 8 to 36 carbon atoms, preferably having 12 to 22 carbon atoms, preferably selected from the group consisting of brassica alcohol, cetearyl alcohol, stearyl alcohol, cetyl alcohol, behenyl alcohol, lauryl alcohol, myristyl alcohol, and coco alcohol; and
- (v) optionally, one or more additives selected from the group consisting of perfume, plant extracts, proteins, emulsifiers, dyes, colorants, preservatives, silicone oils, emollients, pH adjust agents, and viscosity modifiers.

13. The self-warming hair conditioner according to claim 12, wherein the self-warming hair conditioner is in a form of one package, or in a form of two or more packages.

14. A self-warming hair conditioner in a form of two or more packages, consisting of, based on the total weight of the conditioner:

- (i) 0.1 to 10 wt%, preferably from 0.5 to 7 wt% of one or more amido-tertiary amines having the Formula (I):



wherein R^1 is a fatty acid residue having about 9 to about 21 carbon atoms; R^2 is an alkylene group having 2 to 5 carbon atoms, preferably, ethylene, propylene and butylene; R^3 is hydrogen, methyl, ethyl, propyl, butyl or hydroxyalkylene group having 1 to 4 carbon atoms; and R^4 is hydrogen, methyl, ethyl, propyl, butyl or hydroxyalkylene group having 1 to 4 carbon atoms;

the amido-tertiary amine is preferably selected from the group consisting of almondamidopropyl dimethylamine, avocadamidopropyl dimethylamine, babassuamidopropyl dimethylamine, behenamidopropyl dimethylamine, brassicamidopropyl dimethylamine, cocamidopropyl dimethylamine, isostearamidopropyl dimethylamine, lauramidopropyl dimethylamine, linoleamidopropyl dimethylamine, myristamidopropyl dimethylamine, oatamidopropyl dimethylamine, oleamidopropyl dimethylamine, olivamidopropyl dimethylamine, palmitamidopropyl dimethylamine, ricinoleamidopropyl dimethylamine, sesamidopropyl dimethylamine, soyamidopropyl dimethylamine, stearamidopropyl dimethylamine, wheat germamidopropyl dimethylamine, palmitamidopropyl diethylamine, stearamidoethyl diethylamine, stearamidopropyl diethylamine, dilinoleamidopropyl dimethylamine, and mixtures thereof;

- (ii) 10 to 90 wt%, preferably from 20 to 80 wt% of one or more polyethylene glycols having a number average molecular weight of 100 to 10000, preferably, having a number average molecular weight of 100-6000, preferably selected from the group consisting of PEG-4, PEG-6, PEG-7, PEG-8, PEG-9, PEG-10, PEG-12, PEG-14, PEG-16, PEG-18, PEG-20, PEG-32, PEG-33, PEG-40, PEG-45, PEG-55, PEG-60, PEG-75, PEG-80, PEG-90, PEG-100, PEG-135, PEG-150, PEG-180, PEG-200, PEG-220, PEG-240, PEG-350, PEG-400, PEG-450, PEG-500, PEG-800, and mixtures thereof;
- (iii) 0.1 to 50 wt%, preferably from 1 to 20 wt% of one or more polyhydric alcohol monomers selected from C_2 - C_{10} polyol monomers, preferably from the group consisting of ethylene glycol, 1,3-propylene glycol, 1,2-propylene glycol, 1,4-butylene glycol, 1,3-butylene glycol, 1,2-butylene glycol, 2,3-butylene glycol, pentanediols, hexanediols, heptanediols, octanediols, nonanediols, decanediol, glycerol, sorbitol, and mixtures thereof;
- (iv) 0.1 to 40 wt%, preferably from 2 to 10 wt% one or more fatty alcohols selected from fatty alcohols having 8 to 36 carbon atoms, preferably having 12 to 22 carbon atoms, preferably selected from the group consisting of brassica alcohol, cetearyl alcohol, stearyl alcohol, cetyl alcohol, behenyl alcohol, lauryl alcohol, myristyl alcohol, and coco alcohol;
- (v) optionally, one or more additives selected from the group consisting of perfume, plant extracts, proteins, emulsifiers, dyes, colorants, preservatives, silicone oils, emollients, pH adjust agents, and viscosity modifiers; and
- (vi) Water;

With the proviso that the component (vi) water is contained in a different package from the components (ii)-(iii).

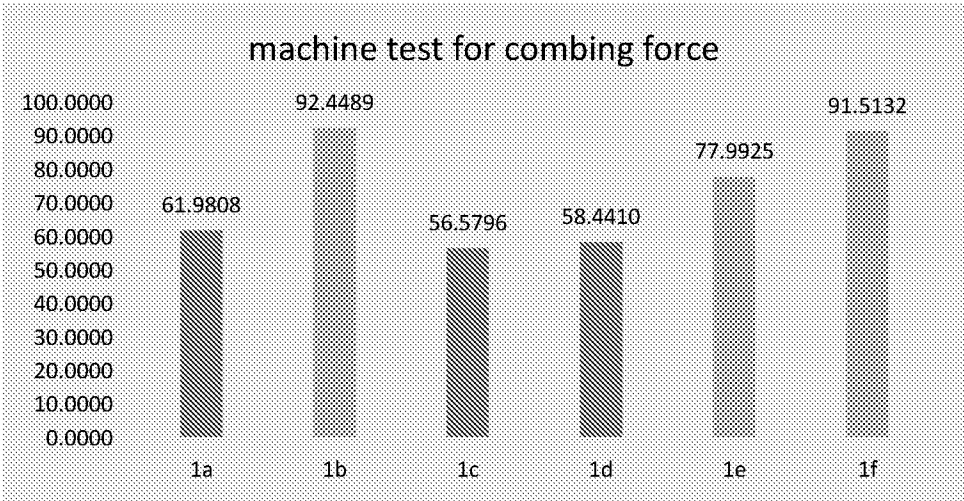


Fig. 1

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2020/111337

A. CLASSIFICATION OF SUBJECT MATTER

A61Q 5/12(2006.01)i; A61K 8/41(2006.01)i; A61K 8/42(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61Q5/-; A61K8/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT;WPI;EPODOC;ISI Web of Knowledge;CNKI:amido-tertiary amine,self-warming,hair conditioner,smoothness,combability,polyethylene glycol,PEG,polyhydric alcohol,fatty alcohol,amido,dimethylamine,diethylamine

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2016175209 A1 (THE PROCTER & GAMBLE COMPANY) 23 June 2016 (2016-06-23) description, paragraphs [0003], [0034] to [0074]	1-14
A	US 2001016201 A1 (JAUCHITRAPONVEJ B.) 23 August 2001 (2001-08-23) whole document	1-14
A	WO 2018058206 A1 (L'OREAL et al.) 05 April 2018 (2018-04-05) whole document	1-14
A	WO 2017097816 A1 (CLARIANT INTERNATIONAL LTD.) 15 June 2017 (2017-06-15) whole document	1-14
A	US 2018280270 A1 (L'OREAL) 04 October 2018 (2018-10-04) whole document	1-14

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

07 April 2021

Date of mailing of the international search report

30 April 2021

Name and mailing address of the ISA/CN

National Intellectual Property Administration, PRC
6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing
100088
China

Authorized officer

SUN,Xingchun

Facsimile No. (86-10)62019451

Telephone No. 86-(10)-53962293

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2020/111337

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				MX	2017008206	A	06 October 2017
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				EP	3386474	A1	17 October 2018

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2020/111337

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				ZA	201905792	B	29 July 2020
				EP	3615040	A4	16 December 2020
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				EP	3615040	A1	04 March 2020
				JP	2020512979	A	30 April 2020