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(71) Applicant (for all designated States except AL):
L'OREAL [FR/FR]; 14 Rue Royale, 75008 Paris (FR).

(72) Inventors; and

(71) Applicants (for AL only): **ISHII Daisuke** [JP/JP]; c/o NIHON L'OREAL K.K., KSP R&D, 3-2-1, Sakado, Takatsu-ku, Kawasaki-shi, Kanagawa, 2130012 (JP). **LI Quinghua** [CN/JP]; c/o NIHON L'OREAL K.K., KSP R&D, 3-2-1, Sakado, Takatsu-ku, Kawasaki-shi, Kanagawa, 2130012 (JP). **ALKAHWAJI Amer** [FR/JP]; c/o NIHON L'OREAL K.K., KSP R&D, 3-2-1, Sakado, Takatsu-ku, Kawasaki-shi, Kanagawa, 2130012 (JP).

(74) Agents: **MURAYAMA, Yasuhiko** et al.; 1-9-2, Marunouchi, Chiyoda-ku, Tokyo, 1006620 (JP).

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(54) Title: COMPOSITION FOR KERATIN FIBERS

(57) Abstract: The present invention relates to a composition for keratin fibers, such as hair, comprising: (a) at least one reducing agent; (b) at least one aliphatic amino acid or a salt thereof, and (c) at least one aromatic amino acid or a salt thereof, as well as a method for reshaping, in particular, permanent waving or straightening, keratin fibers, preferably the hair, comprising the steps of: applying onto the keratin fibers the composition as explained above; optionally rinsing the keratin fibers; applying onto the keratin fibers an oxidizing composition comprising at least one oxidizing agent; and optionally rinsing and/or drying the keratin fibers. The composition or method according to the present invention can be used to deform or reshape keratin fibers, preferably hair, and can provide the keratin fibers with sufficient reshaping efficiency such as strong wave intensity, distinct wave deepness, regularity of curl, and elasticity and suppleness of the curled keratin fibers.

DESCRIPTION

COMPOSITION FOR KERATIN FIBERS

5

TECHNICAL FIELD

The present invention relates to a composition, in particular a cosmetic composition, for keratin fibers such as hair.

10

BACKGROUND ART

In long-lasting deformation of keratin fibers such as hair, first the disulphide bonds -S-S- of the keratin (cystine) are opened using a composition containing a suitable reducing agent (reduction stage), then optionally rinsing the hair thus treated, secondly the disulphide bonds are reconstituted by applying, on the keratin fibers previously put under tension (curlers etc.), an oxidizing composition (oxidation stage, also called fixation) so as finally to give the keratin fibers the desired form. This technique thus makes it possible to carry out either waving or straightening of the keratin fibers. For example, JP-B-S62-9566 or USP 4459284 discloses a standard process for permanent waving or straightening keratin fibers such as hair in line with the above steps.

The new shape imposed on the keratin fibers by chemical treatment as described above is relatively long-lasting and notably withstands the action of washing with water or shampoo, in contrast to the simple conventional techniques of temporary styling by using foams, styling gels, or lacquers.

Many compositions and processes for the above chemical treatment have been proposed. Generally, they offer good performances on the day of treatment.

However, there are various drawbacks as follows in the above chemical treatment process that may not be suitable from the view-point of consumer's or hair-dresser's expectations:

- Insufficient long-lastingness against environmental stress (mechanical constraints from brushing, frequent shampoos, light exposure, high humidity and the like);
- Insufficient reshaping efficiency;
- 35 - High levels of keratin fiber degradation, especially in repeated applications or in combination with other chemical treatments such as oxidative coloration;
- Long processing time; and
- Malodor of thiol-compounds during and after the deformation process.

40 In particular, sufficient reshaping efficiency is important. There is indeed a need to improve a deformation process of keratin fibers to provide sufficient reshaping efficiency, such as strong wave intensity, distinct wave deepness, regularity of curl, and elasticity and suppleness of the curled keratin fibers.

45

DISCLOSURE OF INVENTION

An objective of the present invention is to provide a composition, preferably a cosmetic composition, for keratin fibers, such as hair, which can be used to deform or reshape the keratin fibers, and can provide the keratin fibers with sufficient reshaping efficiency such as strong wave intensity, distinct wave deepness, regularity of curl, and elasticity and suppleness of the curled keratin fibers.

The above objective of the present invention can be achieved by a composition, in particular a cosmetic composition, for keratin fibers, such as hair, comprising:

- (a) at least one reducing agent;
- (b) at least one aliphatic amino acid or a salt thereof different from the reducing agent (a), and
- (c) at least one aromatic amino acid or a salt thereof different from the reducing agent (a).

The (a) reducing agent may be selected from the group consisting of thioglycolic acid, thiolactic acid, cysteine, N-acetylcysteine, cysteamine, lactonethiol compounds such as butyrolactonethiol, glyceryl monothioglycolate, sulfite or bisulfite compounds, and thioglycerine, their derivatives and their salts.

The amount of the (a) reducing agent(s) in the composition according to the present invention may be from 0.01 to 25% by weight, preferably from 0.1 to 20% by weight, and more preferably from 1.0 to 15% by weight, relative to the total weight of the composition.

The (b) aliphatic amino acid or a salt thereof may be selected from neutral amino acids or salts thereof.

The (b) aliphatic amino acid or a salt thereof may be selected from alpha-amino acids or salts thereof.

It is preferable that the (b) aliphatic amino acid or a salt thereof be glycine or a salt thereof.

The amount of the (b) aliphatic amino acid (s) or salt(s) thereof in the composition according to the present invention may be from 0.01 to 10% by weight, preferably from 0.05 to 5% by weight, and more preferably from 0.1 to 1% by weight, relative to the total weight of the composition.

The (c) aromatic amino acid or a salt thereof may be selected from neutral amino acids or salts thereof.

The (c) aromatic amino acid or a salt thereof may be selected from alpha-amino acids or salts thereof.

It is preferable that the (c) aromatic amino acid be selected from the group consisting of phenylalanine, tyrosine, histidine, and tryptophan.

5 The amount of the (c) aromatic amino acid(s) or salt(s) thereof in the composition according to the present invention may be from 0.01 to 10% by weight, preferably from 0.05 to 5% by weight, and more preferably from 0.1 to 1% by weight, relative to the total weight of the composition.

10 The weight ratio of the (b) aliphatic amino acid(s) or salt(s) thereof to the (c) aromatic amino acid(s) or salt(s) thereof in the composition according to the present invention may be from 1:10 to 10:1, preferably from 2:8 to 8:2 and more preferably from 4:6 to 6:4.

The composition according to the present invention may further comprise at least one surfactant.

15 The composition according to the present invention may further comprise at least one alkaline agent different from the amino acids.

20 The composition according to the present invention can be used to deform or reshape keratin fibers, preferably hair, and can provide the keratin fibers with sufficient reshaping efficiency such as strong wave intensity, distinct wave deepness, regularity of curl, and elasticity and suppleness of the curled keratin fibers.

The present invention also relates to a method for reshaping, in particular permanent waving or straightening, keratin fibers, preferably the hair, comprising the steps of:
25 applying onto the keratin fibers the composition as explained above;
optionally rinsing the keratin fibers;
applying onto the keratin fibers an oxidizing composition comprising at least one oxidizing agent; and
optionally rinsing and/or drying the keratin fibers.

30 The method according to the present invention can be used to deform or reshape keratin fibers, preferably hair, and can provide the keratin fibers with sufficient reshaping efficiency such as strong wave intensity, distinct wave deepness, regularity of curl, and elasticity and suppleness of the curled keratin fibers.

35 BEST MODE FOR CARRYING OUT THE INVENTION

After diligent research, the inventors have found that the use of a combination of at least one aliphatic amino acid and at least one aromatic amino acid in a composition for reshaping keratin fibers, in particular hair, can enhance the reshaping efficiency, such as strong wave
40 intensity, distinct wave deepness, regularity of curl, and elasticity and suppleness of the curled keratin fibers, to be provided to the keratin fibers.

Thus, the composition, preferably a cosmetic composition, for keratin fibers, preferably hair, according to the present invention comprises:

45 (a) at least one reducing agent;

- (b) at least one aliphatic amino acid or a salt thereof different from the reducing agent (a), and
- (c) at least one aromatic amino acid or a salt thereof different from the reducing agent (a).

5

Hereafter, the composition according to the present invention and the method according to the present invention will each be described in a detailed manner.

[Composition]

10

The composition for keratin fibers according to the present invention comprises:

- (a) at least one reducing agent;
- (b) at least one aliphatic amino acid or a salt thereof different from the reducing agent (a), and
- (c) at least one aromatic amino acid or a salt thereof different from the reducing agent (a).

15

It is preferable that the composition according to the present invention be a cosmetic composition, in particular for reshaping keratin fibers. It is preferable that the keratin fibers be hair.

20

(Reducing Agent)

The composition according to the present invention comprises at least one reducing agent. Two or more reducing agent may be used in combination. Thus, a single type of reducing agent or a combination of different types of reducing agents may be used.

25

The reducing agent(s) may be present in the composition according to the present invention, for example, from 0.01 to 25% by weight, preferably from 0.1 to 20% by weight, and more preferably from 1.0 to 15% by weight, relative to the total weight of the composition.

30

The reducing agent may be selected from thiol reducing agents and non-thiol reducing agents.

(i) Thiol Reducing Agent

35

The "thiol reducing agent" here means a reducing agent with at least one thiol group.

The thiol reducing agent may preferably be chosen from the group consisting of thioglycolic acid and derivatives thereof, in particular esters thereof such as glycerol or glycol monothioglycolate; thiolactic acid and derivatives thereof, in particular esters thereof such as glycerol monothioglycolate; 3-mercaptopropionic acid and derivatives thereof, in particular esters thereof such as glycerol 3-mercaptopropionate and ethyleneglycol 3-mercaptopropionate; cysteamine and derivatives thereof, in particular C₁₋₄ acyl derivatives thereof such as N-acetylcysteamine and N-propionylcysteamine; mono-thioglycerol and derivatives thereof, in particular esters; cysteine and derivatives thereof, in particular esters

45

such as N-acetylcysteine, N-alkanoylcysteine and cysteine alkyl esters; thioglycerine and derivatives thereof, in particular s-alkyl derivatives, and salts thereof.

As the above salts, mention may be made of, for example, ammonium salts; primary-,
5 secondary- or tertiary-amine salts; alkaline metal salts; and, alkaline earth metal salts. As
the primary-, secondary- or tertiary-amine, for example, monoethanolamine,
di-isopropanolamine or triethanolamine, respectively, may be mentioned.

Other suitable examples of the thiol reducing agent that may be used in the cosmetic
10 composition for the present invention include, but are not limited to, sugar N-mercapto alkyl
amides such as N-(mercapto-2-ethyl)gluconamide, β -mercaptopropionic acid and derivatives
thereof; thiomalic acid; pantheteine; N-(mercaptoalkyl) ω -hydroxyalkyl amides such as those
described in European Patent Application No. 0 354 835 and N-mono- or
N,N-dialkylmercapto 4-butyramides such as those described in European Patent Application
15 No. 0 368 763; aminomeraptoalkyl amides such as those described in European Patent
Application No. 0 432 000 and alkylaminomeraptoalkylamides such as those described in
European Patent Application No. 0 514 282; (2/3) hydroxy-2 propyl thioglycolate; and the
hydroxy-2 methyl-1 ethyl thioglycolate-based mixture (67/33) described in French Patent
Application No. 2 679 448.

20

It is preferable that the reducing agent be selected from the group consisting of thioglycolic
acid, thiolactic acid, cysteine, N-acetylcysteine, cysteamine, lactonethiol compound such as
butyrolactonethiol, glyceryl monothioglycolate, sulfite or bisulfite compounds, thioglycerine,
their derivatives, and their salts.

25

(ii) Non-Thiol Reducing Agent

The "non-thiol reducing agent" here means a reducing agent with no thiol group.

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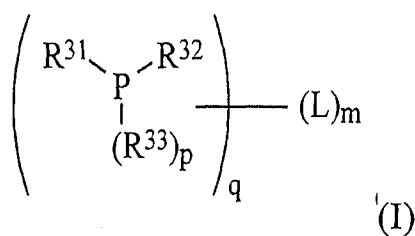
The non-thiol reducing agent may preferably be chosen from the group consisting of sulfites,
bisulfites, sulfinates, phosphines, sugars, reductones and hydrides. More preferably, the
non-thiol reducing agent may be selected from ammonium sulfites and bisulfites as well as
metal sulfites and bisulfites, more preferably alkali metal or alkali earth metal sulfites and
bisulfites, and more preferably sodium sulfites and bisulfites.

35

As the sulfinates, mention may be made of sulfinic acid salts, and benzenesulfinic acid salts
such as sodium salts thereof. The sulfinic acid derivatives as described in FR-A-2814948
can also be used. A preferred sulfinic acid compound is 2-hydroxy-2-sulfinatoacetic acid,
disodium salt.

40

As the phosphines, mention may be made of monophosphine and diphosphines as described
in FR-A-2870119. According to one particular embodiment of the present invention, the
phosphine(s) can be chosen from the compounds of formula (I) below:



in which:

L is a linker that represents a covalent bond or a divalent hydrocarbon-based radical optionally comprising one or more hetero atoms chosen from an oxygen atom, a sulfur atom,

5 a nitrogen atom and a silicon atom;

m is an integer equal to 0 or 1;

q is an integer equal to 1 or 2;

p is an integer equal to 0 or 1;

R^{31} , R^{32} and R^{33} , which may be identical or different, represent:

10 a hydrogen atom;

a halogen atom;

a hydroxyl radical;

a carboxyl radical;

a monovalent hydrocarbon-based radical optionally comprising one or more hetero atoms

15 chosen from a sulfur atom, an oxygen atom, a nitrogen atom, a phosphorus atom and a silicon atom, optionally substituted with one or more radicals chosen from:

a halogen atom,

a hydroxyl radical,

an alkoxy radical,

20 a haloalkyl radical,

an amino radical,

a carboxyl radical,

an alkoxy carbonyl radical,

an amido radical,

25 an alkylaminocarbonyl radical,

an acylamino radical,

a mono- or di(alkyl)amino radical,

a mono- or di(hydroxyalkyl)amino radical,

an N-aryl-N-alkylamino radical,

30 an aromatic or heteroaromatic ring, which is unsubstituted or substituted with one or more radicals chosen from a halogen atom, a hydroxyl radical, an alkoxy radical and a mono- or di(alkyl)amino radical,

a cyano radical,

a radical that increases the solubility of the phosphine in water, such as sulfonate, sulfinate,

35 phosphonate or carboxylate radicals,

a substituted or unsubstituted, aromatic or non-aromatic heterocyclic radical;

a substituted or unsubstituted aryl radical;

a substituted or unsubstituted arylalkyl radical;

an arylalkyloxy radical;

a substituted or unsubstituted, aromatic or non-aromatic heterocyclic radical;
a silyl radical;

it being understood that:

when $q=1$, $m=0$ and $p=1$;

5 when $q=2$, $m=1$ and $p=0$ or 1 , with:

when $p=0$, the linker L is attached to the phosphorus atom; and

when $p=1$, the linker L is attached to one of the radicals R^{31} , R^{32} and R^{33} ,
and acid-addition salts thereof.

10 In all the above definitions, when a radical is substituted, the substituents are chosen from halo, hydroxyl, alkyl, haloalkyl, alkoxy, amino, mono- or dialkylamino, mono- or dihydroxyalkylamino and carboxyl. For example, the radical p-methoxyphenyl is a substituted aryl radical.

15 Preferably, the radicals R^{31} , R^{32} and R^{33} do not simultaneously represent a hydrogen atom.

Advantageously, but optionally, at least one of the radicals R^{31} , R^{32} and R^{33} denotes, as a hydrocarbon-based radical, an optionally substituted alkyl radical.

20 According to one particular embodiment of the invention, R^{31} , R^{32} and R^{33} are chosen from a hydrogen atom; an alkyl radical; a cycloalkyl radical optionally substituted with one or more alkyl radicals; an alkoxy radical; an alkoxyalkyl radical; a haloalkyl radical; a cyanoalkyl radical; a hydroxyalkyl radical; a carboxyalkyl radical; a halogen atom; a hydroxyl radical; a carboxyl radical; an alkenyl radical; a mono- or dialkylamino radical; an

25 N-aryl-N-alkylaminoalkyl radical; an aryl radical optionally substituted with one or more radicals chosen from an alkyl radical, an alkoxy radical, a mono- or dialkylamino radical, a mono- or dialkylaminoalkyl radical, a haloalkyl radical, a hydroxyl radical, a carboxyl radical, a halogen atom, and an aryl radical substituted with a mono- or dialkylaminoalkyl radical; an arylalkyl radical; an arylalkyloxy radical; a pyrrolidino radical; a furyl radical; a morpholino
30 radical; a thienyl radical; a pyridyl radical; a trialkylsilyl radical; and an alkyl radical substituted with a pyrrolidino radical, a furyl radical, a morpholino radical or a thienyl radical.

By way of example, R^{31} , R^{32} and R^{33} may be chosen from a hydrogen atom; a methyl radical; an ethyl radical; a propyl radical; an isopropyl radical; an n-butyl radical; an isobutyl radical;
35 a tert-butyl radical; an octyl radical; a cyclohexyl radical; a cyclopentyl radical; a methoxy radical; an ethoxy radical; a methoxypropyl radical; a chloroethyl radical; a cyanoethyl radical; a hydroxymethyl radical; a hydroxypropyl radical; a carboxyethyl radical; a chlorine atom; a hydroxyl radical; a carboxyl radical; a trifluoromethyl radical; a chloromethyl radical; an allyl radical; a vinyl radical; a dimethylamino radical; a diethylamino radical; a

40 di(isopropyl)amino radical; a phenyl radical; an o-tolyl radical; an m-tolyl radical; a p-tolyl radical; a dimethylphenyl radical; a trimethylphenyl radical; an o-methoxyphenyl radical; an m-methoxyphenyl radical; a p-methoxyphenyl radical; a dimethoxyphenyl radical; a trimethoxyphenyl radical; an o-(dimethylamino)phenyl radical; an m-(dimethylamino)phenyl radical; a p-(dimethylamino)phenyl radical; a di(tert-butyl)phenyl radical; a
45 tri(tert-butyl)phenyl radical; a trifluoromethylphenyl radical; a bis(trifluoromethyl)phenyl

radical; an o-fluorophenyl radical; an m-fluorophenyl radical; a p-fluorophenyl radical; an o-chlorophenyl radical; an m-chlorophenyl radical; a p-chlorophenyl radical; an o-hydroxyphenyl radical; an m-hydroxyphenyl radical; a p-hydroxyphenyl radical; a 4-(diethylaminomethyl)phenyl radical; a 3,5-dimethyl-4-methoxyphenyl radical; a
 5 2-methylbiphenyl radical; a benzyl radical; a benzyloxy radical; a naphthyl radical; a morpholino radical; a morpholinomethyl radical; a pyrrolidino radical; a furyl radical; a pyridyl radical; a thienyl radical; a trimethylsilyl radical; a 2-(4-diethylaminomethyl-phenyl)phenyl radical; a 5-methyl-2-isopropylcyclohexyl radical; an N-methyl-N-phenylaminomethyl radical; and a carboxyphenyl radical.

10

The phosphines that are useful in the context of the invention may be optionally salified with strong mineral acids, for instance HCl, HBr, H₂SO₄ or HBF₄ or organic acids, for instance acetic acid, lactic acid, tartaric acid, citric acid or succinic acid.

15 According to one particular embodiment of the invention, the phosphine(s) that is (are) useful in the context of the invention is (are) chosen from monophosphines. For example, when the phosphine(s) is (are) of formula (I), q is then preferably equal to 1.

Examples of monophosphines that may be mentioned include tri(hydroxymethyl)phosphine;
 20 tri(hydroxypropyl)phosphine; bis(hydroxymethyl)(phenyl)phosphine; allyldiphenylphosphine; benzylidiphenylphosphine; bis(3,4,5-trimethoxyphenyl)chlorophosphine; bis(3,4,5-trimethoxyphenyl)phosphine; benzyloxy(diisopropylamino)methylphosphine; bis(diisopropylamino)chlorophosphine; bis(2-cyanoethyl)phosphine; bis(3,5-di-tert-butylphenyl)chlorophosphine; bis(3,5-di-tert-butyl-phenyl)phosphine;
 25 bis(diethylamino)methylphosphine; bis(diethylamino)chlorophosphine; bis(diethylamino)phenylphosphine; bis(3,5-dimethyl-4-methoxyphenyl)chlorophosphine; bis(3,5-dimethyl-4-methoxyphenyl)phosphine; bis(3,5-dimethylphenyl)chlorophosphine; bis(3,5-dimethylphenyl)diethylaminophosphine; bis(3,5-dimethylphenyl)phosphine; bis(3,5-ditrifluoromethylphenyl)chlorophosphine; bis(3,5-ditrifluoromethylphenyl)phosphine;
 30 bis(4-fluorophenyl)chlorophosphine; bis(2-furyl)chlorophosphine; bis(2-furyl)phosphine; bis(hydroxymethyl)phenylphosphine; bis(4-methoxyphenyl)phenylphosphine; bis(3,5-dimethylphenyl)phosphine; bis(3,5-di-tert-butylphenyl)chlorophosphine; bis(3,5-di-tert-butylphenyl)phosphine; bis(3,5-ditrifluoromethylphenyl)chlorophosphine; bis(3,5-ditrifluoromethylphenyl)phosphine;
 35 bis(4-methoxyphenyl)chlorophosphine; bis(4-methoxyphenyl)phenylphosphine; bis(4-methylphenyl)chlorophosphine; bis(4-methylphenyl)phosphine; bis(4-trifluoromethylphenyl)chlorophosphine; bis(4-trifluoromethylphenyl)phosphine; bis(diethylamino)methylphosphine; bis(diethylamino)phenylphosphine; bis(hydroxymethyl)phenylphosphine; bis(o-tolyl)chlorophosphine; bis(o-tolyl)phosphine;
 40 bis(pyrrolidino)methylphosphine; butyldichlorophosphine; butyldiphenylphosphine; tert-butylidiphenylphosphine; cyclohexyl(diethylamino)chlorophosphine; cyclohexyl(dimethyl-amino)chlorophosphine; cyclohexyldichlorophosphine; cyclohexyldiphenylphosphine; 2-chloroethyldiphenylphosphine; 2-(dicyclohexylphosphino)biphenyl;
 45 2-dicyclo-hexylphosphino-2'-(N,N-dimethylamino)biphenyl; diethyl-aminodiethylphosphine;

dimethylaminodichlorophosphine; (4-dimethylaminophenyl)diphenylphosphine;
 N-[(diphenyl-phosphinyl)methyl]-N-methylaniline; o-diphenylphosphinobenzoic acid;
 2-methoxy(dichlorophosphino)benzene; 4-methoxyphenyl(diethylamino)chlorophosphine;
 4-methoxyphenyl(dimethylamino)chlorophosphine;
 5 (2-methoxyphenyl)methylphenylphosphine; 2-methoxyphosphinobenzene;
 (5-methyl-2-isopropylcyclohexyl)diphenylphosphine; triphenylphosphine;
 diallylphenylphosphine; dibenzylphosphine; dibutylphenylphosphine; dibutylphosphine;
 dicyclohexylchlorophosphine; dicyclohexylphenylphosphine; dicyclohexylphosphine;
 diethylchlorophosphine; diethylphenylphosphine; diethylphosphine; diisobutylphosphine;
 10 diisopropylchlorophosphine; diisopropylphosphine; dimethyl(phenyl)phosphine;
 dimethyl(trimethylsilyl)phosphine; dimethylchlorophosphine; diphenyl(o-tolyl)phosphine;
 diphenyl(p-tolyl)phosphine; diphenyl(trimethylsilyl)phosphine; diphenylchlorophosphine;
 diphenylphosphine; diphenylpropylphosphine; diphenylvinylphosphine;
 di-tert-butylchlorophosphine; di-tert-butylhydroxyphosphine; di-tert-butylmethylphosphine;
 15 di-tert-butylphenylphosphine; di-tert-butylphosphine; divinylphenylphosphine;
 ethyl-dichlorophosphine; ethyldiphenylphosphine; isopropyl-dichlorophosphine;
 methoxydiethoxyphosphine; methyl-dichlorophosphine; methyldiphenylphosphine;
 methyl-phenylchlorophosphine; phenylphosphine; propyldichlorophosphine;
 tert-butylbis(trimethylsilyl)phosphine; tert-butylchlorophosphine;
 20 tert-butyl-diethylphosphine; tert-butyl-diphenylphosphine; tert-butylphosphine;
 tri(m-tolyl)phosphine; tri(o-tolyl)phosphine; tri(p-tolyl)phosphine; tricyclohexylphosphine;
 tricyclopentylphosphine; triethylphosphine; triisobutylphosphine; triisopropylphosphine;
 trimethylphosphine; tri-n-butylphosphine; tri-n-octylphosphine; tripropylphosphine;
 tris(1-naphthyl)phosphine; tris(2,4,6-trimethylphenyl)phosphine;
 25 tris(2,6-dimethoxyphenyl)phosphine; tris(2-carboxyethyl)phosphine;
 tris(2-cyanoethyl)phosphine; tris(2-furyl)phosphine; tris(2-methoxyphenyl)phosphine;
 tris(2-thienyl)phosphine; tris(3,5-dimethyl-4-methoxy)phosphine;
 tris(3-chlorophenyl)phosphine; tris(3-fluoro-phenyl)phosphine;
 tris(3-methoxyphenyl)phosphine; tris(3-methoxypropyl)phosphine;
 30 tris(4-chlorophenyl)phosphine; tris(4-fluorophenyl)phosphine;
 tris(4-methoxyphenyl)phosphine; tris(4-morpholino)phosphine;
 tris(hydroxymethyl)phosphine; tris(trimethylsilyl)phosphine;
 tris[3,5-bis(trifluoromethyl)phenyl]phosphine; tri-tert-butylphosphine;
 2-cyanoethyldiphenylphosphine; 2-dicyclohexylphosphino-2'-methylbiphenyl;
 35 bis(2,4,6-trimethylphenyl)phosphine; and 2-(di-tert-butyl-phosphino)biphenyl.
 Preferably, the monophosphines are chosen from trihydroxymethylphosphine;
 trihydroxypropylphosphine; and bis(hydroxymethyl)phenylphosphine.

According to another particular embodiment of the invention, the phosphine(s) that is (are)
 40 useful in the context of the invention is (are) diphosphines. When the phosphine(s) is (are) of
 formula (I), q is then preferably equal to 2.

Preferably, p is equal to 0 and the linker L is a covalent bond or a divalent radical chosen from
 a binaphthylene radical; a methylene radical; an ethylene radical; a propylene radical; a
 45 butylene radical; a pentylene radical; a hexylene radical; a phenylene radical; a

meta-dimethylenebenzene radical; an N-methyl-N'-methylhydrazo radical; a vinylene radical; and a diethyleneoxy radical.

As examples of diphosphines that are useful in the context of the invention, mention may be
 5 made of 2,2'-bis(dicyclohexylphosphino)-1,1'-binaphthyl;
 2,2'-bis[bis(3,5-dimethylphenylphosphino)]-1,1'-binaphthyl;
 1,4-bis[bis(3,5-dimethylphenyl)phosphino]butane;
 1,2-bis[bis(3,5-dimethylphenyl)phosphino]ethane;
 bis[bis(3,5-dimethylphenyl)phosphino]methane;
 10 1,5-bis[bis(3,5-dimethylphenyl)phosphino]pentane;
 1,3-bis[bis(3,5-dimethylphenyl)phosphino]propane;
 2,2'-bis[bis(3,5-difluoromethylphenyl)phosphino]-1,1'-binaphthyl;
 1,4-bis[bis(3,5-difluoromethylphenyl)phosphino]butane;
 1,2-bis[bis(3,5-difluoromethylphenyl)phosphino]ethane;
 15 bis[bis(3,5-difluoromethylphenyl)phosphino]methane;
 1,5-bis-[bis(3,5-difluoromethylphenyl)phosphino]pentane;
 1,3-bis[bis(3,5-difluoromethylphenyl)phosphino]-propane;
 1,2-bis(di-tert-butylphosphino)benzene; 1,4-bis(di-tert-butylphosphino)butane;
 1,2-bis(di-tert-butylphosphino)ethane; 1,3-bis(di-tert-butylphosphinomethyl)benzene;
 20 1,3-bis(di-tert-butylphosphino)propane; 1,2-bis(dichlorophosphino)benzene;
 1,3-bis(dichlorophosphino)benzene; 1,4-bis(dichlorophosphino)benzene;
 1,4-bis(dichlorophosphino)butane; 1,2-bis(dichlorophosphino)-1,2-dimethylhydrazine;
 1,2-bis(dichlorophosphino)ethane; bis(dichlorophosphino)methane;
 1,3-bis(dichlorophosphino)propane; 1,2-bis(dicyclohexyl-phosphino)benzene;
 25 2,2'-bis(dicyclohexylphosphino)-1,1'-binaphthyl; 1,4-bis(dicyclohexylphosphino)butane;
 (2R,3R)bis(dicyclohexylphosphino)butane; (2S,3S)-bis(dicyclohexylphosphino)butane;
 1,2-bis(dicyclohexylphosphino)ethane; bis(dicyclohexylphosphino)methane;
 1,3-bis(dicyclohexylphosphino)propane;
 bis[2-(4-diethylaminomethylphenyl)phenylphosphino]ethylether;
 30 1,2-bis(diethylphosphino)ethane; 1,2-bis(dimethyl-phosphino)benzene;
 1,4-bis(dimethylphosphino)butane; 1,2-bis(dimethylphosphino)ethane;
 bis(dimethylphosphino)methane; 1,3-bis(dimethylphosphino)propane;
 1,2-bis(diphenylphosphino)benzene; 1,3-bis(diphenylphosphino)benzene;
 1,4-bis(diphenylphosphino)benzene; 2,2'-bis(diphenylphosphino)-1,1'-binaphthyl;
 35 1,4-bis(di-phenylphosphino)butane; 1,2-bis(diphenylphosphino)ethane;
 cis-1,2-bis(diphenylphosphino)ethylene; trans-1,2-bis(diphenylphosphino)ethylene;
 bis(2-diphenylphosphino)ethyl ether; 1,6-bis(diphenylphosphino)hexane;
 bis(diphenylphosphino)methane; 1,5-bis(diphenylphosphino)pentane;
 1,3-bis(diphenylphosphino)propane; 1,2-bis(difluoromethylphosphino)ethane;
 40 1,2-bis[(2-methoxyphenyl)phenylphosphino]ethane; 1,2-bis-(phenylphosphino)ethane;
 1,3-bis(phenylphosphino)propane; bis-2-[(phenyl)(3-pyridyl)phosphinoethyl]ether;
 1,2-bis(phosphino)benzene; 1,2-bis(phosphino)ethane; bis(phosphino)methane;
 1,2-bis(trifluoro-methyl)phosphino)ethane; bis(di-tert-butylphosphino)pentane; and
 tetraphenylbiphosphine.

45

According to one particular embodiment of the invention, the phosphine(s) that is (are) useful in the context of the invention is (are) soluble in a cosmetically acceptable medium. Preferably, the phosphine(s) that is (are) useful in the context of the invention is (are) water-soluble.

5

In the context of the present invention, the term "water-soluble" means any phosphine whose solubility in water is greater than 0.01%, preferably greater than 1%, and even preferably greater than 2 or 5% by weight at 20°C and at atmospheric pressure (760 mm Hg, i.e. 1,013.105 Pa). Preferably, the phosphine is trihydroxymethylphosphine.

10

As the sugars, mention may be made of ribose, glucose, maltose, galactose, lactose, and xylose.

As the reductones, mention may be made of ascorbic acid and erythorbic acid.

15

As the hydrides, mention may be made of boron hydrides such as sodium borohydride, lithium hydride, and phosphorous hydride. Precursors of hydrides and especially of boron hydrides such as diborane, tetraborane, pentaborane, decaborane and dodecaborane can be used.

20

Preferred non-thiol-based reducing agents are chosen from sulfites, bisulfites and phosphines.

In one embodiment, it may be preferable to use non-thiol reducing agent(s) because the malodor derived from sulfur atom(s) can be reduced or avoided.

25

(Aliphatic Amino Acid)

The composition according to the present invention also comprises at least one aliphatic amino acid different from the reducing agent. Two or more aliphatic amino acids may be used in combination. Thus, a single type of aliphatic amino acid or a combination of different types of aliphatic amino acids may be used.

30

The term "amino acid" here means a compound which has at least one amine function and at least one acid function, and is not obtained by polycondensation of identical or different amino acids. The acid function(s) may be carboxylic, sulfonic, phosphonic or phosphoric, and are preferably carboxylic.

35

As the salt of the amino acid, mention may be made of alkali metal or alkali earth metal salts such as sodium salt, magnesium salt, potassium salt, and calcium salt.

40

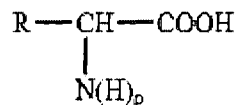
The term "aliphatic amino acid" here means an amino acid including no aromatic group.

It is preferable that aliphatic amino acid or a salt thereof be selected from neutral amino acids or salts thereof. More preferably, the neutral amino acid has the same number of amine function(s) and acid function(s).

45

It is preferable that the aliphatic amino acid or a salt thereof be selected from alpha-amino acids or salts thereof.

- 5 The α -amino acids as the aliphatic amino acids may be represented by the following formula:



in which:

p is 1 or 2, and

- 10 when p=2, R represents a hydrogen atom, a C₁₋₁₂ aliphatic group optionally containing at least one heteroatom such as a nitrogen atom, or a saturated C₅₋₈ heterocyclic group, and when p=1, R can form a saturated heterocyclic group with the nitrogen atom of -N(H)_p, wherein the saturated C₅₋₈ heterocyclic group is preferably a saturated 5-membered ring optionally substituted with one or more C₁₋₄ alkyl or hydroxyl groups.

- 15 Preferably, the C₁₋₁₂ aliphatic group may be a linear or branched C₁₋₄ alkyl group; a linear or branched, hydroxyl C₁₋₄ alkyl group; a linear or branched, carbamoyl C₁₋₄ alkyl group; a linear or branched, (C₁₋₄ alkyl)thio (C₁₋₄)alkyl group; a linear or branched, carboxy C₁₋₄ alkyl group; a linear or branched, ureidoalkyl group, or a linear or branched guanidinoalkyl group, the alkyl portions of these last two groups comprising from one to four carbon atoms.

20

As examples of the α -amino acids, mention may be made of alanine, arginine, glycine, isoleucine, leucine, methionine, proline, serine, threonine, and valine.

It is preferable that the aliphatic amino acid be glycine.

25

The aliphatic amino acid(s) or salt(s) thereof may be present in the composition according to the present invention, for example, from 0.01 to 10% by weight, preferably from 0.05 to 5% by weight, and more preferably from 0.1 to 1% by weight, relative to the total weight of the composition.

30

(Aromatic Amino Acid)

- 35 The composition according to the present invention also comprises at least one aromatic amino acid different from the reducing agent. Two or more aromatic amino acids may be used in combination. Thus, a single type of aromatic amino acid or a combination of different types of aromatic amino acids may be used.

- 40 Again, the term "amino acid" here means a compound which has at least one amine function and at least one acid function, and is not obtained by polycondensation of identical or different amino acids. The acid function(s) may be carboxylic, sulfonic, phosphonic or phosphoric, and are preferably carboxylic.

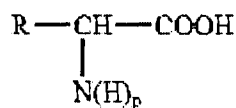
As the salt of the amino acid, mention may be made of alkali metal or alkali earth metal salts such as sodium salt, magnesium salt, potassium salt, and calcium salt.

5 The term "aromatic amino acid" here means an amino acid including at least one aromatic group which may or may not include at least one heteroatom such as nitrogen atom. Thus, the aromatic group may be an aromatic moiety without any heteroatom, a hetero aromatic group including at least one heteroatom such as nitrogen atom, or a combination thereof.

10 It is preferable that aromatic amino acid or a salt thereof be selected from neutral amino acids or salts thereof. More preferably, the neutral amino acid has the same number of amine function(s) and acid function(s).

15 It is preferable that the aromatic amino acid or a salt thereof be selected from alpha-amino acids or salts thereof.

The α -amino acids as the aromatic amino acids may be represented by the following formula:



in which:

p is 1 or 2, and

20 when p=2, R represents a C₆₋₁₂ aryl group or a C₇₋₁₃ aralkyl group, including at least one aromatic group, preferably a phenyl group, an imidazolyl group or an indolyl group, or when p=1, R can form an aromatic heterocyclic group with the nitrogen atom of -N(H)_p, wherein the aromatic group or the aromatic heterocyclic group may optionally be substituted with one or more C₁₋₄ alkyl or hydroxyl groups.

25 Preferably, the alkylene moiety of the C₇₋₁₃ aralkyl group may be a linear or branched C₁₋₄ alkylene group, preferably a methylene group; a linear or branched C₁₋₄ alkylene group with at least one hydroxyl group; a linear or branched C₁₋₄ alkylene group with at least one carbamoyl group; a linear or branched (C₁₋₄)alkylene group with at least one (C₁₋₄ alkyl)thio group; or a linear or branched C₁₋₄ alkylene group with at least one carboxy group.

As examples of the α -amino acids, mention may be made of phenylalanine, tyrosine, histidine, and tryptophan.

35 It is preferable that the aromatic amino acid be phenylalanine, tyrosine, histidine, or tryptophan.

40 It is more preferable that the aromatic amino acid have at least one aromatic group, preferably a phenyl group, with at least one polar group such as a hydroxyl group, or the aromatic amino acid have at least one heteroaromatic group such as an indolyl group.

Therefore, it is more preferable that the aromatic amino acid be tyrosine or tryptophan.

It is even more preferable that the aromatic amino acid have at least one aromatic group, preferably a phenyl group, with at least one polar group such as a hydroxyl group. In particular, the aromatic group may be a 4-hydroxyphenyl group.

5

Therefore, it is even more preferable that the aromatic amino acid be tyrosine.

The aromatic amino acid(s) or salt(s) thereof may be present in the composition according to the present invention, for example, from 0.01 to 10% by weight, preferably from 0.05 to 5% by weight, and more preferably from 0.1 to 1% by weight, relative to the total weight of the composition.

The weight ratio of the aliphatic amino acid(s) or salt(s) thereof to the aromatic amino acid(s) or salt(s) thereof in the composition according to the present invention may be from 1:10 to 10:1, preferably from 2:8 to 8:2 and more preferably from 4:6 to 6:4.

15

(Surfactant)

The composition according to the present invention may include at least one surfactant. Two or more surfactants may be used. Thus, a single type of surfactant or a combination of different type of surfactants may be used.

20

Any surfactant may be used for the present invention. The surfactant may be selected from the group consisting of anionic surfactants, amphoteric surfactants, cationic surfactants and nonionic surfactants. Two or more surfactants may be used in combination. Thus, a single type of surfactant or a combination of different type of surfactants may be used.

25

According to one embodiment of the present invention, the amount of the surfactant(s) may range from 0.01 to 20% by weight, preferably from 0.1 to 15% by weight, and more preferably from 0.5 to 10% by weight, relative to the total weight of the composition according to the present invention.

30

(i) Anionic Surfactants

The composition may comprise at least one anionic surfactant. Two or more anionic surfactants may be used in combination.

35

It is preferable that the anionic surfactant be selected from the group consisting of (C₆-C₃₀)alkyl sulfates, (C₆-C₃₀)alkyl ether sulfates, (C₆-C₃₀)alkylamido ether sulfates, alkylaryl polyether sulfates, monoglyceride sulfates; (C₆-C₃₀)alkylsulfonates, (C₆-C₃₀)alkylamide sulfonates, (C₆-C₃₀)alkylaryl sulfonates, α -olefin sulfonates, paraffin sulfonates; (C₆-C₃₀)alkyl phosphates; (C₆-C₃₀)alkyl sulfosuccinates, (C₆-C₃₀)alkyl ether sulfosuccinates, (C₆-C₃₀)alkylamide sulfosuccinates; (C₆-C₃₀)alkyl sulfoacetates; (C₆-C₂₄)acyl sarcosinates; (C₆-C₂₄)acyl glutamates; (C₆-C₃₀)alkylpolyglycoside carboxylic ethers; (C₆-C₃₀)alkylpolyglycoside sulfosuccinates; (C₆-C₃₀)alkyl sulfosuccinamates; (C₆-C₂₄)acyl

45

isethionates; N-(C₆-C₂₄)acyl taurates; C₆-C₃₀ fatty acid salts; coconut oil acid salts or hydrogenated coconut oil acid salts; (C₈-C₂₀)acyl lactylates; (C₆-C₃₀)alkyl-D-galactoside uronic acid salts; polyoxyalkylenated (C₆-C₃₀)alkyl ether carboxylic acid salts; polyoxyalkylenated (C₆-C₃₀)alkylaryl ether carboxylic acid salts; and polyoxyalkylenated (C₆-C₃₀)alkylamido ether carboxylic acid salts; and corresponding acid forms.

In at least one embodiment, the anionic surfactants are in the form of salts such as salts of alkali metals, for instance sodium; salts of alkaline-earth metals, for instance magnesium; ammonium salts; amine salts; and amino alcohol salts. Depending on the conditions, they may also be in acid form.

It is more preferable that the anionic surfactant be selected from salts of (C₆-C₃₀)alkyl sulfate, (C₆-C₃₀)alkyl ether sulfates or polyoxyalkylenated (C₆-C₃₀)alkyl ether carboxylic acid saltified or not.

(ii) Amphoteric Surfactants

The composition may comprise at least one amphoteric surfactant. Two or more amphoteric surfactants may be used in combination.

The amphoteric or zwitterionic surfactants can be, for example (non-limiting list), amine derivatives such as aliphatic secondary or tertiary amine, and optionally quaternized amine derivatives, in which the aliphatic radical is a linear or branched chain including 8 to 22 carbon atoms and containing at least one water-solubilizing anionic group (for example, carboxylate, sulphonate, sulphate, phosphate or phosphonate).

The amphoteric surfactant may preferably be selected from the group consisting of betaines and amidoaminocarboxylated derivatives.

The betaine-type amphoteric surfactant is preferably selected from the group consisting of alkylbetaines, alkylamidoalkylbetaines, sulfobetaines, phosphobetaines, and alkylamidoalkylsulfobetaines, in particular, (C₈-C₂₄)alkylbetaines, (C₈-C₂₄)alkylamido(C₁-C₈)alkylbetaines, sulfobetaines, and (C₈-C₂₄)alkylamido(C₁-C₈)alkylsulphobetaines. In one embodiment, the amphoteric surfactants of betaine type are chosen from (C₈-C₂₄)alkylbetaines, (C₈-C₂₄)alkylamido(C₁-C₈)alkylsulphobetaines, sulphobetaines, and phosphobetaines.

Non-limiting examples that may be mentioned include the compounds classified in the CTFA International Cosmetic Ingredient Dictionary & Handbook, 15th Edition, 2014, under the names cocobetaine, laurylbetaine, cetylbetaine, coco/oleamidopropylbetaine, cocamidopropylbetaine, palmitamidopropylbetaine, stearamidopropylbetaine, cocamidoethylbetaine, cocamidopropylhydroxysultaine, oleamidopropylhydroxysultaine, cocohydroxysultaine, laurylhydroxysultaine, and cocosultaine, alone or as mixtures.

The betaine-type amphoteric surfactant is preferably an alkylbetaine and an

alkylamidoalkylbetaine, in particular cocobetaine and cocamidopropylbetaine.

Among the amidoaminecarboxylated derivatives, mention may be made of the products sold under the name Miranol, as described in U.S. Pat. Nos. 2,528,378 and 2,781,354 and
 5 classified in the CTFA dictionary, 3rd edition, 1982 (the disclosures of which are incorporated herein by reference), under the names Amphocarboxyglycinates and Amphocarboxypionates, with the respective structures:



10

in which:

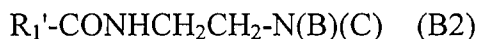
R₁ denotes an alkyl radical of an acid R₁-COOH present in hydrolysed coconut oil, a heptyl, nonyl or undecyl radical,

R₂ denotes a beta-hydroxyethyl group,

15 R₃ denotes a carboxymethyl group,

M⁺ denotes a cationic ion derived from alkaline metals such as sodium; ammonium ion; or an ion derived from an organic amine;

X⁻ denotes an organic or inorganic anionic ion such as halides, acetates, phosphates, nitrates, alkyl(C₁-C₄)sulfates, alkyl(C₁-C₄)- or alkyl(C₁-C₄)aryl-sulfonates, particularly methylsulfate

20 and ethylsulfate; or M⁺ and X⁻ are not present;

in which:

25 R₁' denotes an alkyl radical of an acid R₁'-COOH present in coconut oil or in hydrolysed linseed oil, an alkyl radical, such as a C₇, C₉, C₁₁ or C₁₃ alkyl radical, a C₁₇ alkyl radical and its iso-form, or an unsaturated C₁₇ radical,

B represents -CH₂CH₂OX',

C represents -(CH₂)_z-Y', with z=1 or 2,

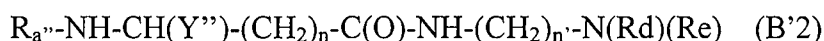
30 X' denotes a -CH₂-COOH group, -CH₂-COOZ', -CH₂CH₂-COOH, -CH₂CH₂-COOZ' or a hydrogen atom, and

Y' denotes -COOH, -COOZ', -CH₂-CHOH-SO₃Z', -CH₂-CHOH-SO₃H radical or a -CH₂-CH(OH)-SO₃-Z' radical,

wherein Z' represents an ion of an alkaline or alkaline earth metal such as sodium, an ion

35 derived from an organic amine or an ammonium ion;

and



40 in which:

Y'' denotes -C(O)OH, -C(O)OZ'', -CH₂-CH(OH)-SO₃H or -CH₂-CH(OH)-SO₃-Z'', wherein Z'' denotes a cationic ion derived from alkaline metal or alkaline-earth metals such as sodium, an ion derived from organic amine or an ammonium ion;

Rd and Re, denotes a C₁-C₄ alkyl or C₁-C₄ hydroxyalkyl radical;

45 R_{a''} denotes a C₁₀-C₃₀ group alkyl or alkenyl group from an acid, and

n and n' independently denote an integer from 1 to 3.

It is preferable that the amphoteric surfactant with formula B1 and B2 be selected from (C₈-C₂₄)-alkyl amphomonoacetates, (C₈-C₂₄)alkyl amphodiacetates, (C₈-C₂₄)alkyl amphomonopropionates, and (C₈-C₂₄)alkyl amphodipropionates

These compounds are classified in the CTFA dictionary, 5th edition, 1993, under the names Disodium Cocoamphodiacetate, Disodium Lauroamphodiacetate, Disodium Caprylamphodiacetate, Disodium Capryloamphodiacetate, Disodium Cocoamphodipropionate, Disodium Lauroamphopropionate, Disodium Caprylamphodipropionate, Disodium Caprylamphodipropionate, Lauroamphodipropionic acid and Cocoamphodipropionic acid.

By way of example, mention may be made of the cocoamphodiacetate sold under the trade name Miranol® C2M concentrate by the company Rhodia Chimie.

Among compounds of formula (B'2) mention may be made of sodium diethylaminopropyl cocoaspartamide (CTFA) marketed by CHIMEX under the denomination CHIMEXANE HB.

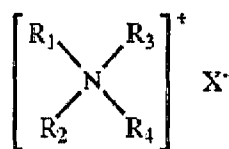
(iii) Cationic Surfactants

The composition may comprise at least one cationic surfactant. Two or more cationic surfactants may be used in combination.

The cationic surfactant may be selected from the group consisting of optionally polyoxyalkylenated, primary, secondary or tertiary fatty amine salts, quaternary ammonium salts, and mixtures thereof.

Examples of quaternary ammonium salts that may be mentioned include, but are not limited to:

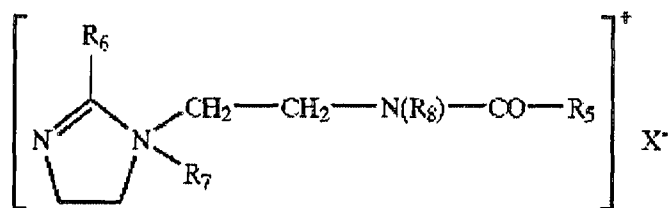
those of general formula (B3) below:



(B3)

wherein

R₁, R₂, R₃, and R₄, which may be identical or different, are chosen from linear and branched aliphatic radicals including from 1 to 30 carbon atoms and optionally including heteroatoms such as oxygen, nitrogen, sulfur and halogens. The aliphatic radicals may be chosen, for example, from alkyl, alkoxy, C₂-C₆ polyoxyalkylene, alkylamide, (C₁₂-C₂₂)alkylamido(C₂-C₆)alkyl, (C₁₂-C₂₂)alkylacetate and hydroxyalkyl radicals; and aromatic radicals such as aryl and alkylaryl; and X⁻ is chosen from halides, phosphates, acetates, lactates, (C₂-C₆) alkyl sulfates and alkyl- or alkylaryl-sulfonates; quaternary ammonium salts of imidazoline, for instance those of formula (B4) below:



(B4)

wherein:

R₅ is chosen from alkenyl and alkyl radicals including from 8 to 30 carbon atoms, for example fatty acid derivatives of tallow or of coconut;

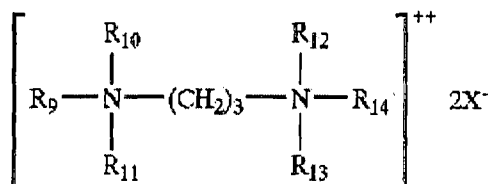
5 R₆ is chosen from hydrogen, C₁-C₄ alkyl radicals, and alkenyl and alkyl radicals including from 8 to 30 carbon atoms;

R₇ is chosen from C₁-C₄ alkyl radicals;

R₈ is chosen from hydrogen and C₁-C₄ alkyl radicals; and

10 X⁻ is chosen from halides, phosphates, acetates, lactates, alkyl sulfates, alkyl sulfonates, and alkylaryl sulfonates. In one embodiment, R₅ and R₆ are, for example, a mixture of radicals chosen from alkenyl and alkyl radicals including from 12 to 21 carbon atoms, such as fatty acid derivatives of tallow, R₇ is methyl and R₈ is hydrogen. Examples of such products include, but are not limited to, Quaternium-27 (CTFA 1997) and Quaternium-83 (CTFA 1997), which are sold under the names "Rewoquat®" W75, W90, W75PG and W75HPG by the company Witco;

15 Di or tri quaternary ammonium salts of formula (B5):



(B5)

wherein:

R₉ is chosen from aliphatic radicals including from 16 to 30 carbon atoms;

20 R₁₀ is chosen from hydrogen or alkyl radicals including from 1 to 4 carbon atoms or a group -(CH₂)₃ (R_{16a})(R_{17a})(R_{18a})N⁺X⁻;

R₁₁, R₁₂, R₁₃, R₁₄, R_{16a}, R_{17a}, and R_{18a}, which may be identical or different, are chosen from hydrogen and alkyl radicals including from 1 to 4 carbon atoms; and

X⁻ is chosen from halides, acetates, phosphates, nitrates, ethyl sulfates, and methyl sulfates.

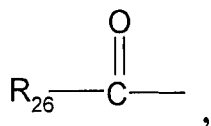
25 An example of one such diquaternary ammonium salt is FINQUAT CT-P of FINETEX(Quaternium-89) or FINQUAT CT (Quaternium-75);

and

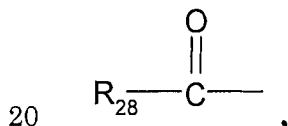
quaternary ammonium salts including at least one ester function, such as those of formula (B6) below:

identical or different, are equal to 2 or 3, for example equal to 2. The anion X^- may be chosen from, for example, halides, such as chloride, bromide, and iodide; and C_1 - C_4 alkyl sulfates, such as methyl sulfate. However, methanesulfonate, phosphate, nitrate, tosylate, an anion derived from an organic acid, such as acetate and lactate, and any other anion that is compatible with the ammonium including an ester function, are other non-limiting examples of anions that may be used according to the invention. In one embodiment, the anion X^- is chosen from chloride and methyl sulfate.

In another embodiment, the ammonium salts of formula (B6) may be used, wherein:
 10 R_{22} is chosen from methyl and ethyl radicals,
 x and y are equal to 1;
 z is equal to 0 or 1;
 r, s and t are equal to 2;
 R_{23} is chosen from:
 15 the radical below:



methyl, ethyl, and C_{14} - C_{22} hydrocarbon-based radicals, hydrogen;
 R_{25} is chosen from:
 the radical below:



and hydrogen;

R_{24} , R_{26} , and R_{28} , which may be identical or different, are chosen from linear and branched, saturated and unsaturated, C_{13} - C_{17} hydrocarbon-based radicals, for example from linear and branched, saturated and unsaturated, C_{13} - C_{17} alkyl and alkenyl radicals.

25 In one embodiment, the hydrocarbon-based radicals are linear.

Non-limiting examples of compounds of formula (B6) that may be mentioned include salts, for example chloride and methyl sulfate, of diacyloxyethyl-dimethylammonium, of
 30 diacyloxyethyl-hydroxyethyl-methylammonium, of
 monoacyloxyethyl-dihydroxyethyl-methylammonium, of triacyloxyethyl-methylammonium, of monoacyloxyethyl-hydroxyethyl-dimethylammonium, and mixtures thereof. In one embodiment, the acyl radicals may include from 14 to 18 carbon atoms, and may be derived, for example, from a plant oil, for instance palm oil and sunflower oil. When the compound
 35 includes several acyl radicals, these radicals may be identical or different.

These products may be obtained, for example, by direct esterification of optionally oxyalkylenated triethanolamine, triisopropanolamine, alkyldiethanolamine or alkyldiisopropanolamine onto fatty acids or onto mixtures of fatty acids of plant or animal

origin, or by transesterification of the methyl esters thereof. This esterification may be followed by a quaternization using an alkylating agent chosen from alkyl halides, for example methyl and ethyl halides; dialkyl sulfates, for example dimethyl and diethyl sulfates; methyl methanesulfonate; methyl para-toluenesulfonate; glycol chlorohydrin; and glycerol chlorohydrin.

Such compounds are sold, for example, under the names Dehyquart® by the company Cognis, Stepanquat® by the company Stepan, Noxanium® by the company Ceca, and "Rewoquat® WE 18" by the company Rewo-Goldschmidt.

Other non-limiting examples of ammonium salts that may be used in the compositions according to the invention include the ammonium salts including at least one ester function described in U.S. Pat. Nos. 4,874,554 and 4,137,180.

Among the quaternary ammonium salts mentioned above that may be used in compositions according to the invention include, but are not limited to, those corresponding to formula (I), for example tetraalkylammonium chlorides, for instance dialkyldimethylammonium and alkyltrimethylammonium chlorides in which the alkyl radical includes from about 12 to 22 carbon atoms, such as behenyltrimethylammonium, distearyldimethylammonium, cetyltrimethylammonium and benzyldimethylstearylammonium chloride; palmitylamidopropyltrimethylammonium chloride; and stearamidopropyl dimethyl(myristyl acetate)ammonium chloride, sold under the name "Ceraphyl® 70" by the company Van Dyk.

According to one embodiment, the cationic surfactant that may be used in the compositions of the invention is chosen from behenyltrimethylammonium chloride, cetyltrimethylammonium chloride, Quaternium-83, Quaternium-87, Quaternium-22, behenylamidopropyl-2,3-dihydroxypropyldimethylammonium chloride, palmitylamidopropyltrimethylammonium chloride, and stearamidopropyl dimethylamine.

(iv) Nonionic Surfactants

The composition comprises at least one nonionic surfactant. Two or more nonionic surfactants may be used in combination.

The nonionic surfactants are compounds well known in themselves (see, e.g., in this regard, "Handbook of Surfactants" by M. R. Porter, Blackie & Son publishers (Glasgow and London), 1991, pp. 116-178). Thus, they can, for example, be chosen from alcohols, alpha-diols, alkylphenols and esters of fatty acids, these compounds being ethoxylated, propoxylated or glycerolated and having at least one fatty chain comprising, for example, from 8 to 30 carbon atoms, it being possible for the number of ethylene oxide or propylene oxide groups to range from 2 to 50, and for the number of glycerol groups to range from 1 to 30. Maltose derivatives may also be mentioned. Non-limiting mention may also be made of copolymers of ethylene oxide and/or of propylene oxide; condensates of ethylene oxide and/or of propylene oxide with fatty alcohols; polyethoxylated fatty amides comprising, for example, from 2 to 30 mol of ethylene oxide; polyglycerolated fatty amides comprising, for example,

from 1.5 to 5 glycerol groups, such as from 1.5 to 4; ethoxylated fatty acid esters of sorbitan comprising from 2 to 30 mol of ethylene oxide; ethoxylated oils of plant origin; fatty acid esters of sucrose; fatty acid esters of polyethylene glycol; polyethoxylated fatty acid mono or diesters of glycerol (C₆-C₂₄)alkylpolyglycosides; N-(C₆-C₂₄)alkylglucamine derivatives; amine oxides such as (C₁₀-C₁₄)alkylamine oxides or N-(C₁₀-C₁₄)acylaminopropylmorpholine oxides; silicone surfactants; and mixtures thereof.

The nonionic surfactants may preferably be chosen from monooxyalkylenated, polyoxyalkylenated, monoglycerolated or polyglycerolated nonionic surfactants. The oxyalkylene units are more particularly oxyethylene or oxypropylene units, or a combination thereof, and are preferably oxyethylene units.

Examples of monooxyalkylenated or polyoxyalkylenated nonionic surfactants that may be mentioned include:

monooxyalkylenated or polyoxyalkylenated (C₈-C₂₄)alkylphenols, saturated or unsaturated, linear or branched, monooxyalkylenated or polyoxyalkylenated C₈-C₃₀ alcohols, saturated or unsaturated, linear or branched, monooxyalkylenated or polyoxyalkylenated C₈-C₃₀ amides, esters of saturated or unsaturated, linear or branched, C₈-C₃₀ acids and of polyalkylene glycols, monooxyalkylenated or polyoxyalkylenated esters of saturated or unsaturated, linear or branched, C₈-C₃₀ acids and of sorbitol, saturated or unsaturated, monooxyalkylenated or polyoxyalkylenated plant oils, condensates of ethylene oxide and/or of propylene oxide, inter alia, alone or as mixtures.

The surfactants preferably contain a number of moles of ethylene oxide and/or of propylene oxide of between 1 and 100 and most preferably between 2 and 50. According to one of the embodiments of the present invention, the polyoxyalkylenated nonionic surfactants are chosen from polyoxyethylenated fatty alcohol (polyethylene glycol ether of fatty alcohol) and polyoxyethylenated fatty ester (polyethylene glycol ester of fatty acid).

Examples of polyoxyethylenated fatty alcohol (or C₈-C₃₀ alcohols) that may be mentioned include the adducts of ethylene oxide with lauryl alcohol, especially those containing from 9 to 50 oxyethylene units and more particularly those containing from 10 to 12 oxyethylene units (Laureth-10 to Laureth-12, as the CTFA names); the adducts of ethylene oxide with behenyl alcohol, especially those containing from 9 to 50 oxyethylene units (Beheneth-9 to Beheneth-50, as the CTFA names); the adducts of ethylene oxide with cetearyl alcohol (mixture of cetyl alcohol and stearyl alcohol), especially those containing from 10 to 30 oxyethylene units (Cetareth-10 to Cetareth-30, as the CTFA names); the adducts of ethylene oxide with cetyl alcohol, especially those containing from 10 to 30 oxyethylene units (Ceteth-10 to Ceteth-30, as the CTFA names); the adducts of ethylene oxide with stearyl alcohol, especially those containing from 10 to 30 oxyethylene units (Steareth-10 to Steareth-30, as the CTFA names); the adducts of ethylene oxide with isostearyl alcohol,

especially those containing from 10 to 50 oxyethylene units (Isosteareth-10 to Isosteareth-50, as the CTFA names); and mixtures thereof.

As examples of monoglycerolated or polyglycerolated nonionic surfactants,
5 monoglycerolated or polyglycerolated C₈-C₄₀ alcohols are preferably used.

In particular, the monoglycerolated or polyglycerolated C₈-C₄₀ alcohols correspond to the following formula:



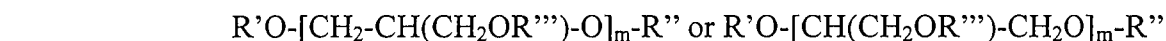
in which R represents a linear or branched C₈-C₄₀ and preferably C₈-C₃₀ alkyl or alkenyl radical, and m represents a number ranging from 1 to 30 and preferably from 1.5 to 10.

15 As examples of compounds that are suitable in the context of the present invention, mention may be made of lauryl alcohol containing 4 mol of glycerol (INCI name: Polyglyceryl-4 Lauryl Ether), lauryl alcohol containing 1.5 mol of glycerol, oleyl alcohol containing 4 mol of glycerol (INCI name: Polyglyceryl-4 Oleyl Ether), oleyl alcohol containing 2 mol of glycerol (INCI name: Polyglyceryl-2 Oleyl Ether), cetearyl alcohol containing 2 mol of glycerol,
20 cetearyl alcohol containing 6 mol of glycerol, oleocetyl alcohol containing 6 mol of glycerol, and octadecanol containing 6 mol of glycerol.

The alcohol may represent a mixture of alcohols in the same way that the value of m represents a statistical value, which means that, in a commercial product, several species of polyglycerolated fatty alcohol may coexist in the form of a mixture.
25

Among the monoglycerolated or polyglycerolated alcohols, it is preferable to use the C₈/C₁₀ alcohol containing 1 mol of glycerol, the C₁₀/C₁₂ alcohol containing 1 mol of glycerol and the C₁₂ alcohol containing 1.5 mol of glycerol.
30

The monoglycerolated or polyglycerolated C₈-C₄₀ fatty esters may correspond to the following formula:



in which each of R', R'' and R''' independently represents a hydrogen atom, or a linear or branched C₈-C₄₀ and preferably C₈-C₃₀ alkyl-CO- or alkenyl-CO-radical, with the proviso that at least one of R', R'' and R''' is not a hydrogen atom, and m represents a number ranging from 1 to 30 and preferably from 1.5 to 10.
40

Examples of polyoxyethylenated fatty esters that may be mentioned include the adducts of ethylene oxide with esters of lauric acid, palmitic acid, stearic acid or behenic acid, and mixtures thereof, especially those containing from 9 to 100 oxyethylene units, such as PEG-9 to PEG-50 laurate (as the CTFA names: PEG-9 laurate to PEG-50 laurate); PEG-9 to PEG-50 palmitate (as the CTFA names: PEG-9 palmitate to PEG-50 palmitate); PEG-9 to PEG-50
45

stearate (as the CTFA names: PEG-9 stearate to PEG-50 stearate); PEG-9 to PEG-50 palmitostearate; PEG-9 to PEG-50 behenate (as the CTFA names: PEG-9 behenate to PEG-50 behenate); polyethylene glycol 100 EO monostearate (CTFA name: PEG-100 stearate); and mixtures thereof.

5

According to one of the embodiments according to the present invention, the nonionic surfactant may be selected from esters of polyols with fatty acids with a saturated or unsaturated chain containing for example from 8 to 24 carbon atoms, preferably 12 to 22 carbon atoms, and polyoxyalkylenated derivatives thereof, preferably containing from 10 to 200, and more preferably from 10 to 100 oxyalkylene units, such as glyceryl esters of a C₈-C₂₄, preferably C₁₂-C₂₂, fatty acid or acids and polyoxyalkylenated derivatives thereof, preferably containing from 10 to 200, and more preferably from 10 to 100 oxyalkylene units; sorbitol esters of a C₈-C₂₄, preferably C₁₂-C₂₂, fatty acid or acids and polyoxyalkylenated derivatives thereof, preferably containing from 10 to 200, and more preferably from 10 to 100 oxyalkylene units; sugar (sucrose, maltose, glucose, fructose, and/or alkylglucose) esters of a C₈-C₂₄, preferably C₁₂-C₂₂, fatty acid or acids and polyoxyalkylenated derivatives thereof, preferably containing from 10 to 200, and more preferably from 10 to 100 oxyalkylene units; ethers of fatty alcohols; ethers of sugar and a C₈-C₂₄, preferably C₁₂-C₂₂, fatty alcohol or alcohols; and mixtures thereof.

20

As glyceryl esters of fatty acids, glyceryl stearate (glyceryl mono-, di- and/or tristearate) (CTFA name: glyceryl stearate) or glyceryl ricinoleate and mixtures thereof can be cited, and as polyoxyalkylenated derivatives thereof, mono-, di- or triester of fatty acids with a polyoxyalkylenated glycerol (mono-, di- or triester of fatty acids with a polyalkylene glycol ether of glycerol), preferably polyoxyethylenated glyceryl stearate (mono-, di- and/or tristearate), such as PEG-20 glyceryl stearate (mono-, di- and/or tristearate) can be cited.

25

Mixtures of these surfactants, such as for example the product containing glyceryl stearate and PEG-100 stearate, marketed under the name ARLACEL 165 by Uniqema, and the product containing glyceryl stearate (glyceryl mono- and distearate) and potassium stearate marketed under the name TEGIN by Goldschmidt (CTFA name: glyceryl stearate SE), can also be used.

30

The sorbitol esters of C₈-C₂₄ fatty acids and polyoxyalkylenated derivatives thereof can be selected from sorbitan palmitate, sorbitan isostearate, sorbitan trioleate and esters of fatty acids and alkoxyated sorbitan containing for example from 20 to 100 EO, such as for example sorbitan monostearate (CTFA name: sorbitan stearate), sold by the company ICI under the name Span 60, sorbitan monopalmitate (CTFA name: sorbitan palmitate), sold by the company ICI under the name Span 40, and sorbitan tristearate 20 EO (CTFA name: polysorbate 65), sold by the company ICI under the name Tween 65, polyethylene sorbitan trioleate (polysorbate 85) or the compounds marketed under the trade names Tween 20 or Tween 60 by Uniqema.

35

40

As esters of fatty acids and glucose or alkylglucose, glucose palmitate, alkylglucose sesquistearamates such as methylglucose sesquistearamate, alkylglucose palmitates such as methylglucose or ethylglucose palmitate, methylglucoside fatty esters, the diester of

45

methylglucoside and oleic acid (CTFA name: Methyl glucose dioleate), the mixed ester of methylglucoside and the mixture of oleic acid/hydroxystearic acid (CTFA name: Methyl glucose dioleate/hydroxystearate), the ester of methylglucoside and isostearic acid (CTFA name: Methyl glucose isostearate), the ester of methylglucoside and lauric acid (CTFA name: Methyl glucose laurate), the mixture of monoester and diester of methylglucoside and isostearic acid (CTFA name: Methyl glucose sesqui-isostearate), the mixture of monoester and diester of methylglucoside and stearic acid (CTFA name: Methyl glucose sesquistearate) and in particular the product marketed under the name Glucate SS by AMERCHOL, and mixtures thereof can be cited.

10 As ethoxylated ethers of fatty acids and glucose or alkylglucose, ethoxylated ethers of fatty acids and methylglucose, and in particular the polyethylene glycol ether of the diester of methylglucose and stearic acid with about 20 moles of ethylene oxide (CTFA name: PEG-20 methyl glucose distearate) such as the product marketed under the name Glucam E-20
15 distearate by AMERCHOL, the polyethylene glycol ether of the mixture of monoester and diester of methyl-glucose and stearic acid with about 20 moles of ethylene oxide (CTFA name: PEG-20 methyl glucose sesquistearate) and in particular the product marketed under the name Glucamate SSE-20 by AMERCHOL and that marketed under the name Grillocose PSE-20 by GOLDSCHMIDT, and mixtures thereof, can for example be cited.

20 As sucrose esters, saccharose palmito-stearate, saccharose stearate and saccharose monolaurate can for example be cited.

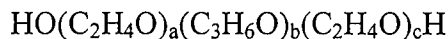
As sugar ethers, alkylpolyglucosides can be used, and for example decylglucoside such as the
25 product marketed under the name MYDOL 10 by Kao Chemicals, the product marketed under the name PLANTAREN 2000 by Henkel, and the product marketed under the name ORAMIX NS 10 by Seppic, caprylyl/capryl glucoside such as the product marketed under the name ORAMIX CG 110 by Seppic or under the name LUTENSOL GD 70 by BASF, laurylglucoside such as the products marketed under the names PLANTAREN 1200 N and
30 PLANTACARE 1200 by Henkel, coco-glucoside such as the product marketed under the name PLANTACARE 818/UP by Henkel, cetostearyl glucoside possibly mixed with cetostearyl alcohol, marketed for example under the name MONTANOV 68 by Seppic, under the name TEGO-CARE CG90 by Goldschmidt and under the name EMULGADE KE3302 by Henkel, arachidyl glucoside, for example in the form of the mixture of arachidyl and behenyl
35 alcohols and arachidyl glucoside marketed under the name MONTANOV 202 by Seppic, cocoyl ethylglucoside, for example in the form of the mixture (35/65) with cetyl and stearyl alcohols, marketed under the name MONTANOV 82 by Seppic, and mixtures thereof can in particular be cited.

40 Mixtures of glycerides of alkoxyated plant oils such as mixtures of ethoxylated (200 EO) palm and copra (7 EO) glycerides can also be cited.

The nonionic surfactant according to the present invention preferably contains alkenyl or branched C₁₂-C₂₂ acyl chain such as oleyl or isostearyl group. More preferably, the nonionic
45 surfactant according to the present invention is PEG-20 glyceryl triisostearate.

According to one of the embodiments according to the present invention, the nonionic surfactant may be selected from copolymers of ethylene oxide and of propylene oxide, in particular copolymers of the following formula:

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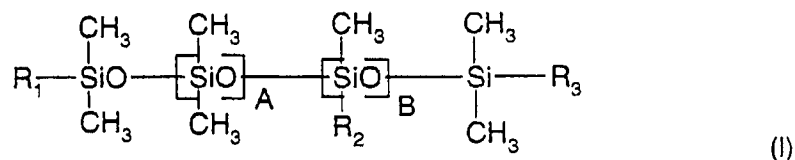


in which a, b and c are integers such that a+c ranges from 2 to 100 and b ranges from 14 to 60, and mixtures thereof.

10

According to one of the embodiments according to the present invention, the nonionic surfactant may be selected from silicone surfactants. Non-limiting mention may be made of those disclosed in documents US-A-5364633 and US-A-5411744.

15 The silicone surfactant may preferably be a compound of formula (I):



in which:

R₁, R₂ and R₃, independently of each other, represent a C₁-C₆ alkyl radical or a radical -(CH₂)_x-(OCH₂CH₂)_y-(OCH₂CH₂CH₂)_z-OR₄, at least one radical R₁, R₂ or R₃ not being an alkyl radical; R₄ being a hydrogen, an alkyl radical or an acyl radical;

20 A is an integer ranging from 0 to 200;

B is an integer ranging from 0 to 50; with the proviso that A and B are not simultaneously equal to zero;

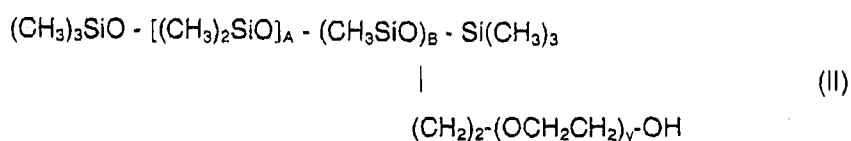
x is an integer ranging from 1 to 6;

25 y is an integer ranging from 1 to 30;

z is an integer ranging from 0 to 5.

30 According to one preferred embodiment of the present invention, in the compound of formula (I), the alkyl radical is a methyl radical, x is an integer ranging from 2 to 6 and y is an integer ranging from 4 to 30.

As examples of silicone surfactants of formula (I), mention may be made of the compounds of formula (II):



35 in which A is an integer ranging from 20 to 105, B is an integer ranging from 2 to 10 and y is an integer ranging from 10 to 20.

As examples of silicone surfactants of formula (I), mention may also be made of the compounds of formula (III):



in which A' and y are integers ranging from 10 to 20.

10 Compounds of the present invention which may be used are those sold by the company Dow Corning under the names DC 5329, DC 7439-146, DC 2-5695 and Q4-3667. The compounds DC 5329, DC 7439-146 and DC 2-5695 are compounds of formula (II) in which, respectively, A is 22, B is 2 and y is 12; A is 103, B is 10 and y is 12; A is 27, B is 3 and y is 12.

15 The compound Q4-3667 is a compound of formula (III) in which A is 15 and y is 13.

(Alkaline Agent)

20 The composition according to the present invention may also comprise at least one alkaline agent different from the amino acids. Two or more alkaline agents may be used in combination. Thus, a single type of alkaline agent or a combination of different types of alkaline agents may be used.

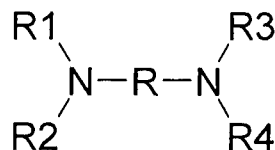
25 The alkaline agent may be an inorganic alkaline agent. It is preferable that the inorganic alkaline agent be selected from the group consisting of ammonia; alkaline metal hydroxides; alkaline earth metal hydroxides; alkaline metal phosphates and monohydrogenophosphates such as sodium phosphate or sodium monohydrogenophosphate.

30 As examples of the inorganic alkaline metal hydroxides, mention may be made of sodium hydroxide and potassium hydroxide. As examples of the alkaline earth metal hydroxides, mention may be made of calcium hydroxide and magnesium hydroxide. As inorganic alkaline agent, sodium hydroxide is preferable.

35 The alkaline agent may be an organic alkaline agent. It is preferable that the organic alkaline agent be selected from the group consisting of monoamines and derivatives thereof; diamines and derivatives thereof; polyamines and derivatives thereof; basic amino acids and derivatives thereof; oligomers of basic amino acids and derivatives thereof; polymers of basic amino acids and derivatives thereof; urea and derivatives thereof; and guanidine and derivatives thereof.

40

As examples of the organic alkaline agents, mention may be made of alkanolamines such as mono-, di- and tri-ethanolamine, and isopropanolamine; urea, guanidine and their derivatives; basic amino acids such as lysine, ornithine or arginine; and diamines such as those described in the structure below:



wherein R denotes an alkylene such as propylene optionally substituted by a hydroxyl or a C₁-C₄ alkyl radical, and R₁, R₂, R₃ and R₄ independently denote a hydrogen atom, an alkyl radical or a C₁-C₄ hydroxyalkyl radical, which may be exemplified by 1,3-propanediamine and derivatives thereof. Arginine, urea and monoethanolamine are preferable.

The alkaline agents may be used in a total amount of from 0.1 to 20% by weight, preferably from 0.2 to 10% by weight, more preferably from 0.3 to 5% by weight, relative to the total weight of the composition, depending on their solubility.

(Other Ingredients)

The composition according to the present invention may also comprise at least one additional ingredient.

The amount of the additional ingredient(s) is not limited, but may be from 0.1 to 10% by weight relative to the total weight of the reducing composition. The additional ingredient(s) may be selected from the group consisting of volatile or non-volatile, linear or cyclic, amine-type or not, silicones; cationic, anionic, nonionic or amphoteric polymers; peptides and derivatives thereof; protein hydrolyzates; synthetic or natural waxes, and especially fatty alcohols; swelling agents and penetrating agents; agents for combating hair loss; anti-dandruff agents; associative-type or not, natural or synthetic thickeners; suspending agents; sequestering agents; opacifying agents; dyes; sunscreen agents; vitamins or provitamins; mineral, vegetable or synthetic oils; as well as fragrances; preserving agents, stabilizers; and mixtures thereof.

The vehicle for the composition according to the present invention is preferably an aqueous medium consisting of water and may advantageously contain one or several cosmetically acceptable organic solvents, which particularly include alcohols, such as ethyl alcohol, isopropyl alcohol, benzyl alcohol and phenylethyl alcohol, or polyols or polyol ethers, such as ethylene glycol monomethyl, monoethyl and monobutyl ethers, propylene glycol or ethers thereof, such as propylene glycol monomethylether, butylene glycol, dipropylene glycol as well as diethylene glycol alkyl ethers, such as diethylene glycol monoethylether or monobutylether and glycerol. The water may be present in a concentration of from 5 to 90% by weight relative to the total weight of the composition. The organic solvent(s) may then be present in a concentration of from 0.1 to 20% by weight, and preferably from 1 to 10% by weight relative to the total weight of the composition.

The composition according to the present invention may exist in any form such as a lotion, a gel, thickened or not, a foam, or a cream. The composition according to the present invention may be contained in any container such as a spray bottle, a pump bottle or an aerosol.

[Method]

5 The present invention also relates to a method, preferably a cosmetic method, for reshaping, in particular permanent waving or straightening, keratin fibers, preferably hair.

The method for reshaping keratin fibers according to the present invention can be performed by:

- (i) applying onto the keratin fibers the composition as explained above;
- 10 (ii) optionally rinsing the keratin fibers;
- (iii) applying onto the keratin fibers an oxidizing composition comprising at least one oxidizing agent; and
- (iv) optionally rinsing and/or drying the keratin fibers.

15 The step (i) is to reduce the disulfide bond in keratin fibers.

In the step (i), the above-described reducing composition is applied to the keratin fibers.

The application of the reducing composition may be performed by any means, such as a brush and a comb. It may be possible that the keratin fibers after the application of the reducing
20 composition be left as they are for a certain amount of time typically from 1 minute to 1 hour, preferably from 1 to 15 minutes, if necessary, in order to let the reducing composition penetrate into the keratin fibers.

According to the present invention, keratin fibers such as hair may be subjected to mechanical
25 tension which is typically used for permanent deformation of the keratin fibers before and/or after the step (i), preferably before the step (iii).

The mechanical tension can be applied to the keratin fibers by any means to deform the keratin fibers to an intended shape. For example, the mechanical tension may be provided
30 by at least one reshaping means selected from the group consisting of a curler, a roller, a clip, a plate and an iron. The reshaping means may comprise at least one heater. If the keratin fibers are rolled around a curler, this rolling-up may be performed on the entire length of the keratin fibers or, for example, on half the length of the keratin fibers. Depending on, for example, the desired hairstyle shape and amount of curls, the rolling-up may be performed
35 with more or less thick locks.

In the step (ii), the keratin fibers may be rinsed preferably with water.

If necessary, the keratin fibers are provided with heat, for deforming or reshaping the keratin
40 fibers, preferably after the step (i) or the step (ii) if present. For example, the keratin fibers which may or may not be under mechanical tension are heated with a heating means such as a heating iron (when straightening) or a heating rod (when waving) at typically from 50 to 150°C, preferably 70 to 100°C for typically 5 minutes to 2 hours, preferably 10 minutes to 1 hour.

45

In step (iii), the keratin fibers are oxidized by an oxidizing composition. The oxidizing composition comprises at least one oxidizing agent. Preferably, the oxidizing agent(s) is (are) chosen from hydrogen peroxide, urea peroxide, alkali metal bromates or ferricyanides, and peroxygenated salts, for instance alkali metal or alkaline-earth metal persulfates, perborates and percarbonates, and peracids and precursors thereof. It is preferable that the oxidizing composition comprises sodium bromate, especially as an aqueous solution thereof (aqueous sodium bromate solution). The concentration of the sodium bromate in the oxidizing composition may range from 0.1 to 20% by weight, preferably 1 to 10% by weight, relative to the total weight of the oxidizing composition. In one embodiment, the oxidizing composition comprises hydrogen peroxide, especially as an aqueous solution thereof (aqueous hydrogen peroxide solution). The concentration of the hydrogen peroxide in the oxidizing composition may range from 0.1 to 20% by weight, preferably 1 to 10% by weight, relative to the total weight of the oxidizing composition.

The oxidizing composition may be aqueous or nonaqueous. The term "aqueous" means that the developer comprises more than 5% by weight of water, preferably more than 10% by weight of water and even more advantageously more than 20% by weight of water.

Usually, the pH of the oxidizing composition, when it is aqueous, is less than 8.

The oxidizing composition may also contain at least one additional ingredient explained in detail previously in the context of the reducing composition.

The oxidizing composition may be in various forms, for instance a shampoo, a gel, a mousse, a thickened lotion and a cream.

According to the present invention, it is preferable that the step (iii) performs mild oxidation by applying an oxidizing composition with a short, or with no, standing time on the keratin fibers. As the standing time, mention may be made of 3 minutes to 30 minutes, preferably 5 minutes to 15 minutes.

In step (iv), the keratin fibers may be rinsed preferably with water, and/or may be dried. The drying of the keratin fibers can be performed with a conventional drying means such as a hair drier.

The composition used in the step (i) for reducing the disulfide bonds in keratin fibers, can be used as a permanent waving or straightening composition for the keratin fibers.

EXAMPLES

The present invention will be described in a more detailed manner by way of examples. However, these examples should not be construed as limiting the scope of the present invention.

[Examples 1-3 and Comparative Examples 1-6]

The following compositions according to Examples 1-3 and Comparative Examples 1-6, shown in Table 1, were prepared by mixing the ingredients shown in Table 1. Specifically, water was poured into a container, and ammonium hydroxide was added to adjust the pH of the water in the container. Then, amino acid(s), if present, was/were charged into the container, and completely dissolved therein by stirring. Then, pentasodium pentetate, ammonium thioglycolate, and ammonium bicarbonate were charged into the container, and completely dissolved therein by stirring. Then, hexadimethrine chloride and cocamidopropyl betaine (and) glyceryl laurate were charged into the container, and completely dissolved therein by stirring. Then, Oleth-20 and fragrance were charged into the container, and completely dissolved therein by stirring. Lastly, amodimethicone (and) cetrimonium chloride (and) Trideceth-12 was charged into the container, and mixed homogeneously, to obtain the compositions according to Examples 1-3 and Comparative Examples 1-6. The numerical values for the amounts of the ingredients shown in Table 1 are all based on “% by weight” as active raw materials.

Table 1

	Ex. 1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	Ex. 6	Ex. 7
PENTASODIUM PENTETATE	0.08	0.08	0.08	0.08	0.08	0.08	0.08
AMMONIUM THIOGLYCOLATE	7.33	7.33	7.33	7.33	7.33	7.33	7.33
AMMONIUM HYDROXIDE	0.51	0.51	0.51	0.51	0.51	0.51	0.51
HEXADIMETHRINE CHLORIDE	0.78	0.78	0.78	0.78	0.78	0.78	0.78
COCAMIDOPROPYL BETAINE	0.35	0.35	0.35	0.35	0.35	0.35	0.35
AMMONIUM BICARBONATE	3.4	3.4	3.4	3.4	3.4	3.4	3.4
OLETH-20	0.4	0.4	0.4	0.4	0.4	0.4	0.4
FRAGRANCE	0.3	0.3	0.3	0.3	0.3	0.3	0.3
AMODIMETHICONE	0.62	0.62	0.62	0.62	0.62	0.62	0.62
WATER	qs 100	qs 100	qs 100	qs 100	qs 100	qs 100	qs 100
GLYCINE	0.5	0.2	0.4	0.6	0.8	0.5	0.5
TYROSINE	0.5	0.8	0.6	0.4	0.2	-	-
TRYPTOPHANE	-	-	-	-	-	0.5	-
PHENYLALANINE	-	-	-	-	-	-	0.5
ALANINE	-	-	-	-	-	-	-
ARGININE	-	-	-	-	-	-	-
GLUTAMIC ACID	-	-	-	-	-	-	-
Wave Intensity	++	++	++	++	+	++	++
Deepness (defines wave)	++	++	++	++	+	++	+
Regularity of Curl	++	++	++	++	++	-	0
Wave Elasticity	++	++	++	++	++	0	0
Suppleness	+	0	+	+	+	-	-

Table 1 (continued)

	Comp. Ex. 1	Comp. Ex. 2	Comp. Ex. 3	Comp. Ex. 4	Comp. Ex. 5	Comp. Ex. 6
PENTASODIUM PENTETATE	0.08	0.08	0.08	0.08	0.08	0.2
AMMONIUM THIOGLYCOLATE	7.33	7.33	7.33	7.33	7.33	10.33
AMMONIUM HYDROXIDE	0.51	0.51	0.51	0.51	0.51	1.23
HEXADIMETHRINE CHLORIDE	0.78	0.78	0.78	0.78	0.78	1.3
COCAMIDOPROPYL BETAINE	0.35	0.35	0.35	0.35	0.35	1.4
AMMONIUM BICARBONATE	3.4	3.4	3.4	3.4	3.4	3.4
OLETH-20	0.4	0.4	0.4	0.4	0.4	0.4
FRAGRANCE	0.3	0.3	0.3	0.3	0.3	0.3
AMODIMETHICONE	0.62	0.62	0.62	0.62	0.62	2
WATER	qs 100	qs 100	qs 100	qs 100	qs 100	qs 100
GLYCINE	-	0.5	-	0.5	0.5	0.5
TYROSINE	-	-	0.5	-	-	-
TRYPTOPHANE	-	-	-	-	-	-
PHENYLALANINE	-	-	-	-	-	-
ALANINE	-	-	-	0.5	-	-
ARGININE	-	-	-	-	0.5	-
GLUTAMIC ACID	-	-	-	-	-	0.5
Wave Intensity	0	-	+	-	-	-
Deepness (defines wave)	0	-	+	0	-	0
Regularity of Curl	0	-	-	0	-	-
Wave Elasticity	0	-	0	0	-	0
Suppleness	0	0	-	0	0	0

Table 2 Oxidizing Lotion

INGREDIENTS	Wt%
SODIUM BROMATE	8
PHOSPHATE BUFFER	0.8
POLYQUATERNIUM – 6	0.5
LAURAMINE OXIDE	0.65
PRESERVATIVE	0.04
WATER	qs 100

[Evaluation]

5

The compositions according to Examples 1-3 and Comparative Examples 1-6 were used for permanent waving of the hair.

10

Each of the compositions according to Example 1-3 and Comparative Examples 1-6 in an amount of 40g was applied to the hair of half a head of 4 panelists, the hair was wound around a rod, and the hair was left for 30 min. Then, the hair was rinsed off with water. Next, a neutralizer was applied onto the hair, and the hair was left for 20 min. Then, the rod was removed, and the hair was rinsed off with water and dried.

15

The panelists evaluated the cosmetic properties, such as wave intensity, deepness, regularity of curl, wave elasticity and suppleness, provided by the compositions according to Examples 1-3 and Comparative Examples 1-6 in accordance with the criteria shown below.

(Wave Intensity)

20

Wave intensity: the more number of curls is formed, the stronger the wave intensity is.

The criteria of the evaluation were as follows.

25

- ++: significantly stronger wave intensity
- +: stronger wave intensity
- 0: benchmark
- : less wave intensity
- : significantly less wave intensity

30

(Deepness)

Deepness (defined wave): the shorter the hair length becomes after the permanent waving process becomes, the more deepness is.

35

The criteria of the evaluation were as follows.

- ++: significantly better defined wave
- +: better defined wave

- 0: benchmark
- : less defined wave
- : significantly less defined wave

5 (Regularity of Curl)

Regularity of curl: the more similar each curl size and curl shape from the root to the tip of the hair, the more regularity of curl.

10 The criteria of the evaluation were as follows.

- ++: significantly better regularity of curl
- +: better regularity of curl
- 0: benchmark
- : less regularity of curl
- 15 --: significantly less regularity of curl

(Wave Elasticity)

20 Wave elasticity: when pulling the wet waved hair to same length, and then release, the longer the bounce lasts, the more wave elasticity.

The criteria of the evaluation were as follows.

- ++: significantly better wave elasticity
- +: better wave elasticity
- 25 0: benchmark
- : less wave elasticity
- : significantly less wave elasticity

(Suppleness)

30

Suppleness: the property of being pliant and flexible

The criteria of the evaluation were as follows.

- ++: significantly more suppleness feel, 4 panelists said better suppleness than benchmark
- 35 +: more suppleness feel, 3 panelists said better suppleness than benchmark
- 0: benchmark
- : less suppleness feel, 3 panelists said less suppleness than benchmark
- : significantly less suppleness feel, 4 panelists said less suppleness than benchmark

40 The results of the evaluations are shown in Table 1.

Comparative Example 1 does not comprise any amino acid, and therefore, the cosmetic properties provided by the composition according to Comparative Example are the benchmark of the evaluations.

45

The evaluation results for Comparative Examples 2 and 3 show that the presence of either an aliphatic amino acid (glycine) or an aromatic amino acid (tyrosine) is insufficient to provide superior cosmetic effects.

- 5 The evaluation results for Comparative Examples 4-6 show that the use of an aliphatic amino acid (alanine, arginine, or glutamic acid) instead of an aromatic amino acid (tyrosine, tryptophan or phenylalanine), in combination with another aliphatic amino acid (glycine), cannot provide superior cosmetic effects.
- 10 The evaluation results for Examples 1-3 show that the use of a combination of an aliphatic amino acid and an aromatic amino acid can provide superior wave intensity. Further, Examples 1 and 2 show that when the aromatic moiety in the aromatic amino acid in the composition has a polar group such as a hydroxyl group or is a hetero aromatic group, the superiority in deepness can also be provided. Furthermore, Example 1 shows that when the
- 15 aromatic moiety in the aromatic amino acid in the composition is a phenyl group having a polar group such as a hydroxyl group, the superiority in regularity of curl, wave elasticity and suppleness can also be provided.

CLAIMS

1. A composition for keratin fibers, comprising:
 - (a) at least one reducing agent;
 - 5 (b) at least one aliphatic amino acid or a salt thereof different from the reducing agent (a), and
 - (c) at least one aromatic amino acid or a salt thereof different from the reducing agent (a).
- 10 2. The composition according to Claim 1, wherein the (a) reducing agent is selected from the group consisting of thioglycolic acid, thiolactic acid, cysteine, N-acetylcysteine, cysteamine, lactonethiol compounds such as butyrolactonethiol, glyceryl monothioglycolate, sulfite or bisulfite compounds, thioglycerine, their derivatives, and their salts.
- 15 3. The composition according to Claim 1 or 2, wherein the amount of the (a) reducing agent(s) in the composition is from 0.01 to 25% by weight, preferably from 0.1 to 20% by weight, and more preferably from 1.0 to 15% by weight, relative to the total weight of the composition.
- 20 4. The composition according to any one of Claims 1 to 3, wherein the (b) aliphatic amino acid or a salt thereof is selected from neutral amino acids or salts thereof.
- 25 5. The composition according to any one of Claims 1 to 4, wherein the (b) aliphatic amino acid or a salt thereof is selected from alpha-amino acids or salts thereof.
6. The composition according to any one of Claims 1 to 5, wherein the (b) aliphatic amino acid or a salt thereof is glycine or a salt thereof.
- 30 7. The composition according to any one of Claims 1 to 6, wherein the amount of the (b) aliphatic amino acid (s) or salt(s) thereof in the composition is from 0.01 to 10% by weight, preferably from 0.05 to 5% by weight, and more preferably from 0.1 to 1% by weight, relative to the total weight of the composition.
- 35 8. The composition according to any one of Claims 1 to 7, wherein the (c) aromatic amino acid or a salt thereof is selected from neutral amino acids or salts thereof.
9. The composition according to any one of Claims 1 to 8, wherein the (c) aromatic amino acid or a salt thereof is selected from alpha-amino acids or salts thereof.
- 40 10. The composition according to any one of Claims 1 to 9, wherein the (c) aromatic amino acid is selected from the group consisting of phenylalanine, tyrosine, histidine, and tryptophan.
- 45 11. The composition according to any one of Claims 1 to 10, wherein the amount of the

(c) aromatic amino acid(s) or salt(s) thereof in the composition is from 0.01 to 10% by weight, preferably from 0.05 to 5% by weight, and more preferably from 0.1 to 1% by weight, relative to the total weight of the composition.

- 5 12. The composition according to any one of Claims 1 to 11, wherein the weight ratio of the (b) aliphatic amino acid(s) or salt(s) thereof to the (c) aromatic amino acid(s) or salt(s) thereof in the composition is from 1:10 to 10:1, preferably from 2:8 to 8:2 and more preferably from 4:6 to 6:4.
- 10 13. The composition according to any one of Claims 1 to 12, further comprising at least one surfactant.
14. The composition according to any one of Claims 1 to 13, further comprising at least one alkaline agent different from the amino acids.
- 15 15. A method for reshaping, in particular permanent waving or straightening, keratin fibers, preferably the hair, comprising the steps of:
applying onto the keratin fibers the composition according to any one of Claims 1 to 14;
optionally rinsing the keratin fibers;
20 applying onto the keratin fibers an oxidizing composition comprising at least one oxidizing agent; and
optionally rinsing and/or drying the keratin fibers.

INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2015/082056

A. CLASSIFICATION OF SUBJECT MATTER
 INV. A61Q5/04 A61K8/44 A61K8/46 A61K8/49
 ADD.
 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)
 A45D A61Q A61K

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)
 EPO-Internal, WPI Data, EMBASE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE GNPD [Online] MINTEL; January 2003 (2003-01), Centura Brands: Toni Silkwave: "Improved Perm Kit", XP002752500, Database accession no. 10125590	1,2,4-6, 8-10, 12-15
Y	Product description Ingredients of wave lotion and neutralizer ----- -/--	3,7,11

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
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "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
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- "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

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Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040,
 Fax: (+31-70) 340-3016

Authorized officer

Steinheimer, K

INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2015/082056

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE GNPD [Online] MINTEL; March 2013 (2013-03), Schwarzkopf & Henkel: "Play it straight: Straightening Blow Dry Kit", XP002752501, Database accession no. 2013737	1,2,4-6, 8-10, 12-15
Y	Product description Ingredinetns of smoothing serum and sealing cream	3,7,11
X	----- DATABASE GNPD [Online] MINTEL; July 2013 (2013-07), Babaria: "Extra Strong Hold Styling Gel", XP002752502, Database accession no. 2117220	1,2,4-6, 8-10, 12-14
Y	Ingredients	3,7,11
X	----- US 2014/261518 A1 (SAVAIDES ANDREW [US] ET AL) 18 September 2014 (2014-09-18)	1,2,4-6, 8-10,12
Y	table 1a table 3 paragraph [0070] - paragraph [0073]	3,7, 11-15
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Y	----- EP 2 191 864 A1 (KPSS KAO GMBH [DE]) 2 June 2010 (2010-06-02) paragraph [0082] - paragraph [0085] claims 1-7	3,7,11, 12
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Y	----- US 2012/230935 A1 (KIM HACKSOO [KR] ET AL) 13 September 2012 (2012-09-13) paragraph [0013] paragraph [0015] - paragraph [0018] paragraph [0029] - paragraph [0030] claims 1-11	3,7,11, 12
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INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2015/082056

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 459 284 A (AZUMA TANEHIKO [JP] ET AL) 10 July 1984 (1984-07-10) cited in the application examples 1-9 claims 1-2 -----	3,7,11, 12

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