Abstract: The present invention relates to a composition for dyeing keratin fibers, comprising: - at least one oxidation dye chosen from pyrazolone oxidation bases; - at least one nonionic ether of a polyoxyalkylated fatty alcohol of formula (i) R-(O-Alk)ₙ-O'R (i); in which formula (i); R denotes a linear or branched, saturated or unsaturated C₁₀₋₃₀ hydrocarbon-based radical, R' denotes a linear or branched, saturated or unsaturated C₁₀₋₃₀ hydrocarbon-based radical, which may be substituted with a hydroxyl radical, n is an integer between 1 and 100 inclusive, and Alk represents a linear or branched, preferably linear, (C₁₋₃₀)alkylene group such as ethylene or propylene, preferably ethylene; - at least one chemical oxidizing agent. The present invention also relates to a process using this composition, and to multicompartiment devices that are suitable for implementing the invention.
DYE COMPOSITION USING A LONG-CHAIN ETHER OF AN ALKOXYLATED FATTY ALCOHOL AND A PYRAZOLONE OXIDATION BASE, PROCESSES AND DEVICES USING THE SAME

The present invention relates to a composition for dyeing keratin fibers, comprising at least one oxidation dye chosen from pyrazolone oxidation bases, at least one nonionic compound such as a long-chain ether of a polyoxyalkylenated fatty alcohol, and at least one chemical oxidizing agent.

The present invention also relates to a dyeing process using this composition, and to multi-compartment devices that are suitable for using this composition.

Many people have sought for a long time to modify the color of their hair and in particular to mask their gray hair.

One of the dyeing methods is "permanent" or oxidation dyeing, which uses dye compositions containing oxidation dye precursors, generally known as oxidation bases. These oxidation bases are colorless or weakly colored compounds, which, when combined with oxidizing products, may give rise to colored compounds by a process of oxidative condensation.

It is also known that the shades obtained with these oxidation bases may be varied by combining them with couplers or coloration modifiers, the latter being chosen especially from aromatic meta-diamines, meta-aminophenols, meta-diphenols and certain heterocyclic compounds such as indole compounds. The variety of molecules used as oxidation bases and couplers allows a wide range of colors to be obtained.

It is also possible to use direct dyes in order especially to afford tints on the coloration obtained. These direct dyes are colored and coloring molecules that have affinity for fibers. Examples that may be mentioned include benzenic, anthraquinone, nitropyridine, azo, xanthene, acridine, azine and triarylmethane direct dyes.

Permanent dyeing processes thus consist in using, with the dye composition, an aqueous composition comprising at least one oxidizing agent. This oxidizing agent has several roles. The first is to bring about condensation of the oxidation dyes (bases and couplers), enabling appearance of the color. The second is to degrade partially the melanin of the hair, which, depending on the nature of the oxidizing agent present, leads to more or less pronounced lightening of the fibers. The oxidizing agent used is generally hydrogen peroxide.

Thus, the compositions used in processes of this type must be able to be mixed easily, and the rheology of the resulting mixture must be such that it can be spread easily without running beyond the areas to be dyed once in place, and must do so throughout the entire treatment.
Moreover, the mixtures must result in uniform colorations between the end of the hairs and the root (they are also said to be sparingly selective), and must be chromatic and powerful.

European patent application EP 1 106 167 describes oxidation dye compositions comprising, besides colorants, a nonionic compound derived from a long-chain ether of a polyoxyethylenated fatty alcohol. These compositions represented an improvement over the existing compositions, not only in terms of viscosity and viscosity stability during the leave-on time on the hair, but also in terms of dyeing results.

However, there is an ongoing search for ever more efficient colorations in terms of results, especially improvement of the uptake of the coloration and better color uniformity. There is also an ongoing search for compositions with improved use qualities especially in terms of ease of distribution on the head of hair and of removal on rinsing.

One of the objects of the present invention is to propose compositions for dyeing human keratin fibers such as the hair that do not have the drawbacks of the existing compositions.

These aims and others are achieved by the present invention, one subject of which is thus a composition for dyeing keratin fibers, in particular human keratin fibers such as the hair, comprising:

- at least one oxidation dye chosen from pyrazolone oxidation bases;
- at least one nonionic ether of a polyoxyalkylenated fatty alcohol of formula (i)
  \[ R-(0-Alk) \_n OR' \] (i);
  in which:
  - \( R \) denotes a linear or branched, saturated or unsaturated \( \text{C}_{10} \text{C}_3 \) hydrocarbon-based radical,
  - \( R' \) denotes a linear or branched, saturated or unsaturated \( \text{C}_{10} \text{C}_3 \) hydrocarbon-based radical, which may be substituted with a hydroxyl radical,
  - \( n \) is an integer between 1 and 100 inclusive,
  - \( \text{Alk} \) represents a linear or branched, preferably linear, \((\text{CrC}_6)\)alkylene group such as ethylene or propylene, preferably ethylene;

- at least one chemical oxidizing agent.

A subject of the invention is also a dyeing process using the abovementioned composition.

The invention also relates to a multi-compartment device for using the composition of the invention, comprising a first compartment containing a formulation (A) free of chemical oxidizing agent and comprising at least one oxidation dye chosen from pyrazolone oxidation bases, at least one nonionic ether of a polyoxyalkylenated fatty alcohol of formula (i) and comprising a second compartment containing formulation (B) comprising at least one chemical oxidizing agent.
Finally, the invention also relates to a second multi-compartment device comprising a first compartment containing a formulation (A') free of chemical oxidizing agent and comprising at least one fatty substance; a second compartment containing a formulation (B') free of chemical oxidizing agent and comprising at least one oxidation base chosen from pyrazolone oxidation bases and at least one nonionic ether of polyoxyalkylenated fatty alcohol of formula (i); and at least a third compartment comprising a formulation (C) containing at least one chemical oxidizing agent.

Thus, the use of the dye composition of the invention leads to powerful uniform colorations. These compositions distribute easily on the head of hair and are easily removed on rinsing.

Other characteristics and advantages of the invention will emerge more clearly on reading the description and the examples that follow.

The present invention also covers the mesomeric forms and the stereoisomers of the various oxidation dyes of the invention.

In the text hereinbelow, and unless otherwise indicated, the limits of a range of values are included in that range.

The human keratin fibers treated via the process according to the invention are preferably the hair.

The expression "at least one" is equivalent to the expression "one or more".

The term "direct emulsion" means a microscopically heterogeneous and macroscopically homogeneous mixture of two mutually immiscible liquid substances of oil-in-water (O/W) type. The emulsion is composed of an oily phase dispersed in an aqueous phase.

For the purposes of the present invention, the term "emulsion" thus means true emulsions, which are to be distinguished from microemulsions, which are thermodynamically stable systems, unlike true emulsions. The size of the droplets of the dispersed phase of the emulsions of the invention is preferably between 10 nm and 100 nm, and preferably between 200 nm and 500 nm. This is the mean diameter \( D(3.2) \), which may be measured especially using a laser granulometer. The direct emulsion may be prepared via standard emulsion preparation processes that are well known to those skilled in the art.

The term "oxidizing agent" or "chemical oxidizing agent" according to the invention means an oxidizing agent other than atmospheric oxygen.

**Oxidation dyes:**

The composition according to the invention comprises at least one oxidation dye chosen from pyrazolone oxidation bases.

More particularly, the pyrazolone oxidation base(s) are chosen from the compounds of formula (I) below:
in which:

- $R_1$, $R_2$, $R_3$ and $R_4$, which may be identical or different, represent, independently of each other:
  - a hydrogen atom;
  - a linear or branched $C_1$-$C_{10}$ and preferably $C_1$-$C_6$ alkyl group, optionally substituted with one or more groups chosen from groups OR$_6$, NR$_6$R$_7$, and carboxyl, sulfonic, carboxamido CONR$_6$R$_7$ and sulfonamido S$_2$NR$_6$R$_7$ groups, aliphatic heterocycles such as piperidine, aryls optionally substituted with one or more groups chosen from $C_1$-$C_4$ alkyl, hydroxyl, $CrC_2$ alkoxy, amino and (di)(Ci-$C_2$)alkylamino groups;
  - an aryl group optionally substituted with one or more groups chosen from $C_1$-$C_4$ alkyl, hydroxyl, $C_1$-$C_2$ alkoxy, amino and (di)(Ci-$C_2$)alkylamino groups;

- a 5- or 6-membered heteroaryl group, optionally substituted with one or more groups chosen from $C_1$-$C_4$ alkyl and $C_1$-$C_2$ alkoxy groups;

- a hydrogen atom;

- a linear or branched $C_1$-$C_4$ and preferably $C_1$-$C_2$, alkyl group, optionally substituted with one or more groups chosen from hydroxyl, $C_1$-$C_2$ alkoxy, carboxamido CONRsRg, sulfonyl S$_2$R$_6$, aryl optionally substituted with a $C_1$-$C_4$ alkyl, hydroxyl, $C_1$-$C_2$ alkoxy, amino or (di)(Ci-$C_2$)alkylamino group;

- an aryl group optionally substituted with one or more groups chosen from $C_1$-$C_4$ alkyl, hydroxyl, $C_1$-$C_2$ alkoxy, amino and (di)(Ci-$C_2$)alkylamino groups;

- a carboxamido group CONRsRg;

- a sulfonyl group S$_2$R$_6$;

- $R_5$, $R_6$ and $R_7$, which may be identical or different, represent:
  - a hydrogen atom;

- a linear or branched $C_1$-$C_4$ and preferably $C_1$-$C_2$, alkyl group, optionally substituted with one or more groups chosen from hydroxyl, $C_1$-$C_2$ alkoxy group, (di)(Cr-$C_4$)alkylamino, (di)hydroxy(Ci-$C_2$)alkylamino, hydroxyl, carboxyl, carboxamido, (di)(Ci-
C₂alkylcarboxamido, C₁₋C₂ alkoxy and C₁₋C₄ alkyl groups optionally substituted with one or more groups chosen from hydroxyl, amino, (di)alkylamino, alkoxy, carboxyl and sulfonfyl groups; said heterocycles formed by R₁ and R₂, on the one hand, and R₃ and R₄, on the other hand, with the nitrogen atom(s) to which they are attached, possibly being identical or different, and the ring members forming said heterocycles possibly being chosen, preferably, from carbon, nitrogen and oxygen atoms.

According to one particular embodiment, R₁ and R₂, which may be identical or different, are chosen, independently of each other, from:
- a C₆ alkyl group optionally substituted with one or more groups chosen from hydroxyl, C₁₋C₂ alkoxy, amino and (di)(C₂alkylamino groups; and
- a phenyl, methoxyphenyl, ethoxyphenyl or benzyl group.

Preferably, R₁ and R₂, which may be identical or different, are chosen, independently of each other, from methyl, ethyl, 2-hydroxyethyl, 3-hydroxypropyl, 2-hydroxypropyl and phenyl groups.

According to another embodiment, R₁ and R₂ form, together with the nitrogen atoms to which they are attached, a saturated or unsaturated 5- or 6-membered ring, optionally substituted with one or more groups chosen from halogen atoms, amino, (di)(Cr C₄alkylamino, (di)hydroxy(Ci-C₂alkylamino, hydroxyl, carboxyl, carboxamido, (di)(Ci-C₂alkylcarboxamido and C₁₋C₂ alkoxy groups, and C₁₋C₄ alkyl groups optionally substituted with one or more groups chosen from hydroxyl, amino, (di)alkylamino, alkoxy, carboxyl and sulfonfyl groups.

Preferably, R₁ and R₂ form, together with the nitrogen atoms to which they are attached, a pyrazolidine or pyridazolidine ring, optionally substituted with one or more groups chosen from C₁₋C₄ alkyl, hydroxyl, C₁₋C₂ alkoxy, carboxyl, carboxamido, amino and (di)(Ci-C₂alkylamino groups.

Preferably, R₁ and R₂ form, together with the nitrogen atoms to which they are attached, a pyrazolidine or pyridazolidine ring, optionally substituted with one or more groups chosen from C₁₋C₄ alkyl, hydroxyl, C₁₋C₂ alkoxy, carboxyl, carboxamido, amino and (di)(Ci-C₂alkylamino groups.

Even more advantageously, R₁ and R₂ form, together with the nitrogen atoms to which they are attached, a pyrazolidine, pyridazoline or pyridazolidine ring.

As regards R₃ and R₄, these radicals, which may be identical or different, are more particularly chosen from a hydrogen atom; a linear or branched CrC₆ alkyl group, optionally substituted with one or more groups chosen from hydroxyl, C₁₋C₂ alkoxy, amino, (di)(Ci-C₂alkylamino groups and aliphatic heterocycles such as piperidine; a phenyl group optionally substituted with one or more groups chosen from hydroxyl, amino and Ci-C₂ alkoxy groups.

Preferably, R₃ and R₄, which may be identical or different, are chosen from a hydrogen atom and methyl, ethyl, isopropyl, 2-hydroxyethyl, 3-hydroxypropyl, 2-
hydroxypropyl and 2-carboxyethyl, 2-dimethylaminoethyl, pyrrolidin-1-yl, 3-hydroxypropyrrolidin-1-yl, 4-piperidin-1-yl, 4-methylpiperidin-1-yl and 3-dimethylaminopiperidin-1-yl groups.

According to one particular embodiment, the groups R₃ and R₄ represent a hydrogen atom.

According to another embodiment, R₃ and R₄ form, together with the nitrogen atom to which they are attached, a 5- to 7-membered ring chosen from pyrrolidine, piperidine, homopiperidine, piperazine and homopiperazine heterocycles; said ring possibly being substituted or N-substituted with one or more groups chosen from hydroxyl, amino, (di)(Ci-C₂)alkylamino, (di)hydroxy(Ci-C₂)alkylamino, carboxyl, carboxamido, (di)(Ci-C₂)alkylcarboxamido and C₁-C₄ alkyl groups optionally substituted with one or more groups chosen from hydroxyl, amino and (di)(Ci-C₂)alkylamino.

More particularly, R₃ and R₄ form, together with the nitrogen atom to which they are attached, a 5- to 7-membered ring chosen from pyrrolidine, 2,5-dimethylpyrrolidine, pyrrolidine-2-carboxylic acid, 3-hydroxypyrrolidine-2-carboxylic acid, 4-hydroxypyrrolidine-2-carboxylic acid, 2,4-dicarboxypyrrolidine, 3-hydroxy-2-hydroxymethylpyrrolidine, 2-carboxamidopyrrolidine, 3-hydroxy-2-carboxamidopyrrolidine, 2-(diethylcarboxamido)pyrrolidine, 2-hydroxymethylpyrrolidine, 3,4-dihydroxy-2-hydroxymethylpyrrolidine, 3-hydroxypropyrrolidine, 3,4-dihydroxypropyrrolidine, 3-aminopyrrolidine, 3-methylaminopyrrolidine, 3-dimethylaminopyrrolidine, 4-amino-3-hydroxypropyrrolidine, 3-hydroxy-4-(2-hydroxyethyl)aminopyrrolidine, piperidine, 2,6-dimethylpiperidin, 2-carboxypiperidin, 2-carboxamidopiperidine, 2-hydroxymethylpiperidine, 3-hydroxy-2-hydroxymethylpiperidine, 2-hydroxypiperidine, 3-hydroxypiperidine, 4-hydroxypiperidine, 3-hydroxymethylpiperidine, homopiperidine, 2-carboxyhomopiperidine, 2-carboxamidohomopiperidine, homopiperazine, N-methylhomopiperazine and N-(2-hydroxyethyl)homopiperazine.

Preferably, R₃ and R₄ form, together with the nitrogen atom to which they are attached, a 5- to 7-membered ring chosen from pyrrolidine, 3-hydroxypyrrolidine, 3-aminopyrrolidine, 3-dimethylaminopyrrolidine, pyrrolidine-2-carboxylic acid, 3-hydroxypyrrolidine-2-carboxylic acid, piperidine, hydroxypiperidine, homopiperidine, 1,4-diazepane, N-methylhomopiperazine and N-β-hydroxyethylhomopiperazine.

In accordance with an even more preferred embodiment of the invention, R₃ and R₄ form, together with the nitrogen atom to which they are attached, a 5-membered ring such as pyrrolidine, 3-hydroxypyrrolidine, 3-aminopyrrolidine or 3-dimethylaminopyrrolidine.

The compounds of formula (I) may optionally be salified with strong mineral acids, for instance HCl, HBr, HI, H₂SO₄ or H₃PO₄, or organic acids, for instance acetic acid, lactic acid, tartaric acid, citric acid, succinic acid, benzenesulfonic acid, paratoluensulfonic acid, formic acid or methanesulfonic acid.
They may also be in the form of solvates, for example a hydrate or a solvate of a linear or branched alcohol such as ethanol or isopropanol.

As examples of derivatives of formula (I), mention may be made of the compounds below, and the addition salts thereof:

4,5-diamino-1,2-dimethyl-1,2-dihydropyrazol-3-one;
4-amino-5-methylamino-1,2-dimethyl-1,2-dihydropyrazol-3-one;
4-amino-5-dimethylamino-1,2-dimethyl-1,2-dihydropyrazol-3-one;
4-amino-5-(2-hydroxyethyl)amino-1,2-dimethyl-1,2-dihydropyrazol-3-one;
4-amino-5-(pyrrolidin-1-yl)-1,2-dimethyl-1,2-dihydropyrazol-3-one;
4-amino-5-(piperidin-1-yl)-1,2-dimethyl-1,2-dihydropyrazol-3-one;
4,5-diamino-1,2-bis(2-hydroxyethyl)-1,2-dihydropyrazol-3-one;
4-amino-5-methylamino-1,2-bis(2-hydroxyethyl)-1,2-dihydropyrazol-3-one;
4-amino-5-dimethylamino-1,2-bis(2-hydroxyethyl)-1,2-dihydropyrazol-3-one;
4-amino-5-(2-hydroxyethyl)amino-1,2-bis(2-hydroxyethyl)-1,2-dihydropyrazol-3-one;
4-amino-5-(pyrrolidin-1-yl)-1,2-bis(2-hydroxyethyl)-1,2-dihydropyrazol-3-one;
4-amino-5-(piperidin-1-yl)-1,2-bis(2-hydroxyethyl)-1,2-dihydropyrazol-3-one;
4,5-diamino-1,2-diethyl-1,2-dihydropyrazol-3-one;
4,5-diamino-1-phenyl-2-methyl-1,2-dihydropyrazol-3-one;
4,5-diamino-1-(2-hydroxyethyl)-2-methyl-1,2-dihydropyrazol-3-one;
4,5-diamino-2-(2-hydroxyethyl)-1-methyl-1,2-dihydropyrazol-3-one;
2,3-diamino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one;
2-amino-3-methylamino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one;
2-amino-3-dimethylamino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one;
2-amino-3-ethylamino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one;
2-amino-3-isopropylamino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one;
2-amino-3-(2-hydroxyethyl)amino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one;
2-amino-3-(2-hydroxypropyl)amino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one;
2-amino-3-bis(2-hydroxyethyl)amino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one;
2-amino-3-(pyrrolidin-1-yl)-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one;
2-amino-3-(3-hydroxypyrrolidin-1-yl)-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one;
2-amino-3-(piperidin-1-yl)-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one;
2,3-diamino-5,8-dihydro-1 H,6H-pyridazino[1,2-a]pyrazol-1-one; 4-amino-5-dimethylamino-1,2-diethyl-1,2-dihydropyrazol-3-one; 4-amino-1,2-diethyl-5-ethylamino-1,2-dihydropyrazol-3-one; 4-amino-1,2-diethyl-5-isopropylamino-1,2-dihydropyrazol-3-one; 4-amino-1,2-diethyl-5-(2-hydroxyethylamino)-1,2-dihydropyrazol-3-one; 4-amino-5-(2-dimethylaminoethylamino)-1,2-diethyl-1,2-dihydropyrazol-3-one; 4-amino-1,2-diethyl-5-(3-imidazol-1-ylpropylamino)-1,2-dihydropyrazol-3-one; 4-amino-1,2-diethyl-5-(3-hydroxypyrrolidin-1-yl)-1,2-dihydropyrazol-3-one; 4-amino-5-pyrrolidin-1-yl-1,2-diethyl-1,2-dihydropyrazol-3-one; 4-amino-5-(3-dimethylaminopyrrolidin-1-yl)-1,2-diethyl-1,2-dihydropyrazol-3-one; 4-amino-1,2-diethyl-5-(4-methylpiperazin-1-yl)pyrazolidin-3-one.

Among these compounds, the pyrazolone oxidation bases of formula (I) that are particularly preferred are the following:

2,3-diamino-6,7-dihydro-1 H,5H-pyrazolo[1,2-a]pyrazol-1-one; 2-amino-3-ethylamino-6,7-dihydro-1 H,5H-pyrazolo[1,2-a]pyrazol-1-one; 2-amino-3-isopropylamino-6,7-dihydro-1 H,5H-pyrazolo[1,2-a]pyrazol-1-one; 2-amino-3-(pyrrolidin-1-yl)-6,7-dihydro-1 H,5H-pyrazolo[1,2-a]pyrazol-1-one; 4,5-diamino-1,2-diethyl-1,2-dihydropyrazol-3-one; 4,5-diamino-1,2-bis(2-hydroxyethyl)-1,2-dihydropyrazol-3-one; 2-amino-3-(2-hydroxyethyl)amino-6,7-dihydro-1 H,5H-pyrazolo[1,2-a]pyrazol-1-one; 2-amino-3-dimethylamino-6,7-dihydro-1 H,5H-pyrazolo[1,2-a]pyrazol-1-one; 2,3-diamino-5,6,7,8-tetrahydro-1 H,6H-pyridazino[1,2-a]pyrazol-1-one; 4-amino-1,2-diethyl-5-pyrrolidin-1-yl-1,2-dihydropyrazol-3-one; 4-amino-5-(3-dimethylaminopyrrolidin-1-yl)-1,2-diethyl-1,2-dihydropyrazol-3-one; 2,3-diamino-6-hydroxy-6,7-dihydro-1 H,5H-pyrazolo[1,2-a]pyrazol-1-one.

Even more particularly preferred is 2,3-diamino-6,7-dihydro-1 H,5H-pyrazolo[1,2-a]pyrazol-1-one or addition salts thereof, such as 2,3-diamino-6,7-dihydro-1 H,5H-pyrazolo[1,2-a]pyrazol-1-one dimethylsulfonate, of formula:

![Pyrazolone oxidation base formula]

The pyrazolone oxidation base(s) each advantageously represent from 0.0001% to 10% by weight relative to the total weight of the composition, and preferably from 0.005% to 5% by weight relative to the total weight of the composition.
**Additional oxidation dyes:**

The composition according to the invention may also comprise one or more additional oxidation dyes other than the abovementioned pyrazolone oxidation bases.

By way of example, the additional oxidation bases may be chosen from para-phenylenediamines, bis(phenyl)alkylenediamines, para-aminophenols, ortho-aminophenols, heterocyclic bases other than the pyrazolones of the invention, and addition salts thereof.


Among the bis(phenyl)alkylenediamines that may be mentioned, for example, are N,N'-bis (P-hydroxyethyl)-N,N'-bis(4'-aminophenyl)-1,3-diaminopropanol, N,N'-bis (β-hydroxyethyl)-N,N'-bis(4'-aminophenyl)ethylenediamine, N,N'-bis(4-aminophenyl)tetramethylenediamine, N,N'-bis (P-hydroxyethyl)-N,N'-bis(4'-aminophenyl)tetrathymethylenediamine, N,N'-bis(4-methylaminophenyl)tetramethylenediamine and 1,8-bis(2,5-diaminophenoxy)-3,6-dioxaocetane, and addition salts thereof.
Among the para-aminophenols that may be mentioned, for example, are para-
aminophenol, 4-amino-3-methylphenol, 4-amino-3-fluorophenol, 4-amino-3-chlorophenol,
4-amino-3-hydroxyphenyl, 4-amino-2-methylphenol, 4-amino-2-
hydroxyphenyl, 4-amino-2-methoxyphenyl, 4-amino-2-
aminophenol, 4-amino-2-(P-hydroxyethylaminomethyl)phenol and 4-amino-2-fluorophenol, and addition
salts thereof.

Among the ortho-aminophenols that may be mentioned, for example, are 2-
aminophenol, 2-amino-5-methylphenol, 2-amino-6-methylphenol and 5-acetamido-2-
aminophenol, and addition salts thereof.

Among the pyridine oxidation bases that may be mentioned are the compounds
described, for example, in patents GB 1 026 978 and GB 1 153 196, for instance 2,5-
diaminopyrazidine, 2-(4-methoxyphenyl)amino-3-aminopyridine and 3,4-diaminopyridine, and addition salts thereof.

Other pyridine oxidation bases that are useful in the present invention are the 3-
aminopyrazolo[1,5-a]pyridine oxidation bases or addition salts thereof described, for example, in patent application FR 2 801 308. Examples that may be mentioned include pyrazolo[1,5-a]pyrid-3-ylamine, 2-acetylaminoxopyrazolo[1,5-a]pyrid-3-ylamine, 2-
morpholin-4-ylpyrazolo[1,5-a]pyrid-3-ylamine, 3-aminopyrazolo[1,5-a]pyridine-2-
carboxylic acid, 2-methoxypyrazolo[1,5-a]pyrid-3-ylamine, (3-aminopyrazolo[1,5-a]pyrid-
7-yl) methanol, 2-(3-aminopyrazolo[1,5-a]pyrid-5-yl)ethanol, 2-(3-aminopyrazolo[1,5-
apyrind-7-yl)ethanol, (3-aminopyrazolo[1,5-a]pyrid-2-yl)methanol, 3,6-
diaminopyrazolo[1,5-a]pyridine, 3,4-diaminopyrazolo[1,5-a]pyridine, pyrazolo[1,5-
apyrindine-3,7-diamine, 7-morpholin-4-ylpyrazolo[1,5-a]pyrid-3-ylamine, pyrazolo[1,5-
apyrindine-3,5-diamine, 5-morpholin-4-ylpyrazolo[1,5-a]pyrid-3-ylamine, 2-(3-
aminopyrazolo[1,5-a]pyrid-5-yl)(2-hydroxyethyl)amino)ethanol, 2-(3-aminopyrazolo[1,5-
apyrind-7-yl)(2-hydroxyethyl)amino)ethanol, 3-aminopyrazolo[1,5-a]pyridin-5-ol, 3-
aminopyrazolo[1,5-a]pyridin-4-ol, 3-aminopyrazolo[1,5-a]pyridin-6-ol and 3-
aminopyrazolo[1,5-a]pyridin-7-ol, and addition salts thereof.

Among the pyrimidine oxidation bases that may be mentioned are the compounds
described, for example, in patents DE 2 359 399; JP 88-169 571; JP 05-63124; EP 0 770
375 or patent application WO 96/15765, for instance 2,4,5,6-tetraaminopyrimidine, 4-
hydroy-2,5,6-triaminopyrimidine, 2-hydroxy-4,5,6-triaminopyrimidine, 2,4-dihydroxy-5,6-
diaminopyrimidine and 2,5,6-triaminopyrimidine, and addition salts thereof, and the
tautomeric forms thereof, when a tautomeric equilibrium exists.

Among the pyrazole oxidation bases that may be mentioned are the compounds
described in patents DE 3 843 892 and DE 4 133 957, and patent applications WO
94/08969, WO 94/08970, FR-A-2 733 749 and DE 195 43 988, for instance 4,5-diamino-
1-methylpyrazole, 4,5-diamino-1-(P-hydroxyethyl)pyrazole, 3,4-diaminopyrazole, 4,5-
diamino-1-(4'-chlorobenzyl)pyrazole, 4,5-diamino-1,3-dimethylpyrazole, 4,5-diamino-3-
methyl-1-phenylpyrazole, 4,5-diamino-1-methyl-3-phenylpyrazole, 4-amino-1,3-dimethyl-5-hydrazinopyrazole, 1-benzyl-4,5-diamino-3-methylpyrazole, 4,5-diamino-3-tert-butyl-1-methylpyrazole, 4,5-diamino-1-tert-butyl-3-methylpyrazole, 4,5-diamino-1-((β-hydroxyethyl)-3-methylpyrazole, 4,5-diamino-1-ethyl-3-methylpyrazole, 4,5-diamino-1-ethyl-3-(4'-methoxyphenyl)pyrazole, 4,5-diamino-1-ethyl-3-hydroxymethylpyrazole, 4,5-diamino-3-hydroxymethyl-1-methylpyrazole, 4,5-diamino-3-hydroxymethyl-1-isopropylpyrazole, 4,5-diamino-3-methyl-1-isopropylpyrazole, 4-amino-5-(2'-aminoethyl)amino-1,3-dimethylpyrazole, 3,4,5-triaminopyrazole, 1-methyl-3,4,5-triaminopyrazole, 3,5-diamino-1-methyl-4-methylaminopyrazole and 3,5-diamino-4-((β-hydroxyethyl)amino-1-methylpyrazole, and addition salts thereof. 4,5-Diamino-1-((β-methoxyethyl)pyrazole, and addition salts thereof, may also be used.

A 4,5-diaminopyrazole will preferably be used as pyrazole compound, and even more preferentially 4,5-diamino-1-((β-hydroxyethyl)pyrazole and/or an addition salt thereof.

The additional oxidation base(s) other than the pyrazolone oxidation bases, if the composition contains any, each advantageously represent from 0.0001% to 10% by weight relative to the total weight of the composition, and preferably from 0.005% to 5% by weight relative to the total weight of the composition.

The composition according to the invention may optionally comprise one or more couplers advantageously chosen from those conventionally used in the dyeing of keratin fibers.

Among these couplers, mention may be made especially of meta-phenylenediamines, meia-aminophenols, meia-diphenols, naphthalene-based couplers and heterocyclic couplers, and also addition salts thereof.

Mention may be made, for example, of 1,3-dihydroxybenzene, 1,3-dihydroxy-2-methylbenzene, 4-chloro-1,3-dihydroxybenzene, 2,4-diamino-1-(3-hydroxyethyl)benzene, 2-amino-4-((β-hydroxyethylamino)-1-methoxy-benzene, 1,3-dimino-n-benzene, 1,3-bis(2,4-diaminophenoxy) propane, 3-ureidoaniline, 3-ureido-1-dimethylaminobenzene, sesamol, 1-β-hydroxyethylaminobenzene-3,4-methylenedioxybenzene, α-naphthol, 2-methyl-1-naphthol, 6-hydroxyindole, 4-hydroxyindole, 4-hydroxy-N-methylindole, 2-amino-3-hydroxypyridine, 6-hydroxybenzomorpholine, 3,5-diamino-2,6-dimethoxypyridine, 1-N-(β-hydroxyethyl)amino-3,4-methylenedioxybenzene, 2,6-bis(β-hydroxyethylamino)toluene, 6-hydroxyindoline, 2,6-dihydroxy-4-methylpyridine, 2,6-dimethylpyrazole[1,5-b]-1,2,4-triazole, 2,6-dimethyl-[3,2-c]-1,2,4-triazole and 6-methylpyrazole[1,5,a]benzimidazole, addition salts thereof, and mixtures thereof.

The coupler(s), if they are present, each advantageously represent from 0.0001% to 10% by weight relative to the total weight of the composition and preferably from 0.005% to 5% by weight relative to the total weight of the composition.
In general, the addition salts of the pyrazolone or additional oxidation bases and of the couplers that may be used in the context of the invention are especially selected from the addition salts with an acid such as the hydrochlorides, hydrobromides, sulfates, citrates, succinates, tartrates, lactates, tosylates, benzenesulfonates, phosphates and acetates.

Additional direct dyes:

The composition of the invention may also comprise one or more additional dyes chosen from direct dyes.

The latter dyes are more particularly chosen from ionic or nonionic species, preferably cationic or nonionic species. These direct dyes may be synthetic or of natural origin.

Examples of suitable direct dyes that may be mentioned include azo dyes; methine dyes; carbonyl dyes; azine dyes; nitro(hetero)aryl dyes; tri(hetero)arylmethane dyes; porphyrin dyes; phthalocyanine dyes, and natural direct dyes, alone or as mixtures.

More particularly, the azo dyes comprise an \(-\text{N=N-}\) function in which the two nitrogen atoms are not simultaneously engaged in a ring. However, it is not excluded for one of the two nitrogen atoms of the sequence \(-\text{N=N-}\) to be engaged in a ring.

The dyes of the methine family are more particularly compounds comprising at least one sequence selected from \(>\text{C=C<}\) and \(-\text{N=C<}\) in which the two atoms are not simultaneously engaged in a ring. However, it is pointed out that one of the nitrogen or carbon atoms of the sequences may be engaged in a ring. More particularly, the dyes of this family are derived from compounds of the type such as methines, azomethines, mono- and diarylmethanes, indoamines (or diphenylamines), indophenols, indoanilines, carbocyanins, azacarbocyanins and isomers thereof, diazacarbocyanins and isomers thereof, tetraazacarbocyanins and hemicyanins.

As regards the dyes of the carbonyl family, examples that may be mentioned include dyes chosen from acridone, benzoquinone, anthraquinone, naphthoquinone, benzanthrone, anthranthrone, pyranthrone, pyrazolanthrone, pyrimidinoanthrone, flavanthrone, idanthrone, flavone, (iso)violanthrone, isoindolinone, benzimidazolone, isoquinolinone, anthrapyridone, pyrazoloquinazolone, perinone, quinacridone, quinophthalone, indigoid, thiindigo, naphthalimide, anthrapyrimidine, diketopyrrolopyrrole and coumarin.

As regards the dyes of the cyclic azine family, mention may be made especially of azine, xanthene, thioxanthene, fluorindine, acridine, (di)oxazine, (di)thiazine and pyronin.

The nitro(hetero)aromatic dyes are more particularly nitrobenzene or nitropyridine direct dyes.
As regards the dyes of porphyrin or phthalocyanine type, it is possible to use
cationic or non-cationic compounds, optionally comprising one or more metals or metal
ions, for instance alkali metals, alkaline-earth metals, zinc and silicon.

Examples of particularly suitable direct dyes that may be mentioned include
nitrobenzene dyes; azo direct dyes; azomethine direct dyes; methine direct dyes;
azacarbocyanin direct dyes, for instance tetraazacarbocyanins (tetraazapentamethines);
quinone and in particular anthraquinone, naphthoquinone or benzoquinone direct dyes;
azine direct dyes; xanthene direct dyes; triarylmethane direct dyes; indigo direct
dyes; indigoid direct dyes; phthalocyanine direct dyes, porphyrin direct dyes and natural
direct dyes, alone or as mixtures.

Among the natural direct dyes that may be used according to the invention, mention
may be made of lawson, juglone, alizarin, purpurin, carminic acid, kermesic acid,
purpurogallin, protocatechaldehyde, indigo, isatin, curcumin, spinulosin, apigenidin and
orceins. Extracts or decoctions containing these natural dyes and in particular henna-
based poultries or extracts, may also be used.

When they are present, the direct dye(s) more particularly represent from 0.0001% to
10% by weight and preferably from 0.005% to 5% by weight of the total weight of the
composition.

**Nonionic ether of a polyoxyalkylated fatty alcohol:**

As indicated previously, the composition according to the invention comprises at
least one nonionic ether of a polyoxyalkylated fatty alcohol of formula (i)

\[ R-(0-\text{Alk})_n-\text{OR}' \]

and also the optical isomers and geometrical isomers thereof;

in which formula (i):

- \( R \) denotes a linear or branched, saturated or unsaturated \( C_{10}-C_{30} \) hydrocarbon-based
  radical,

- \( R' \) denotes a linear or branched, saturated or unsaturated \( C_{10}-C_{30} \) hydrocarbon-
  based radical, which may be substituted with a hydroxyl radical, the hydroxyl
  preferably being \( \beta \) to the ether function,

- \( n \) is an integer between 1 and 100 inclusive, and

- \( \text{Alk} \) represents a linear or branched, preferably linear, \( (C_1-C_6) \) alkylene group such as
  ethylene or propylene, preferably ethylene.

According to one particularly advantageous embodiment of the invention, the radical

\( \text{Alk} \) of formula (i) represents a group \(-\text{CH}_2\text{CH}_2\text{-}\).

More particularly, the nonionic ether of formula (i) is such that \( R \) and \( R' \),
independently of each other, denote a linear or branched, preferably linear, saturated or
unsaturated, preferably saturated, \( C_{12}-C_{20} \) and preferably \( C_{14}-\text{Cl}_{16} \) hydrocarbon-based
radical; \( R' \) possibly being substituted with at least one hydroxyl radical and \( n \) denotes an
integer greater than or equal to 20, for example ranging from 20 to 100 and preferably from 40 to 80.

Preferably, $R$ and $R'$ denote an alkyl radical.

According to a more preferred embodiment, the nonionic ether of formula (i) is such that: $R$ denotes a $C_{16}Cl_8$ alkyl radical, which is preferably linear, and $R'$ denotes a $C_{14}$ alkyl radical, which is preferably linear, substituted with an OH group, and $n$ is equal to 60.

Preferably, the ether of formula (i) has the following formula

$$\text{R-O-}O\text{CH}_3$$

with $\text{R}$ being a cetyl or stearyl group with $n = 60$.

Such a compound is known, for example, in the CTFA dictionary under the name Ceteareth 60 myristyl glycol or Hydrogenated talloweth 60 myristyl glycol. A Ceteareth 60 myristyl glycol is sold, for example, by the company Akzo under the trade name Elfacos GT 282 S.

Usually, the nonionic ether(s) of polyoxyalkylenated fatty alcohols of formula (i) are present in a content ranging from 0.001% to 10% by weight and preferably from 0.001% to 5% by weight relative to the total weight of the composition.

**Fatty substance:**

The composition of the invention may optionally comprise one or more fatty substances.

The term "fatty substance" means an organic compound that is insoluble in water at ordinary temperature (25°C) and at atmospheric pressure (760 mmHg) (solubility of less than 5%, preferably 1% and even more preferentially 0.1%). They have in their structure at least one hydrocarbon-based chain comprising at least 6 carbon atoms or a sequence of at least two siloxane groups. In addition, the fatty substances are generally soluble in organic solvents under the same temperature and pressure conditions, for instance chloroform, dichloromethane, carbon tetrachloride, ethanol, benzene, toluene, tetrahydrofuran (THF), liquid petroleum jelly or decamethylcyclopentasiloxane.

Preferably, the fatty substances of the invention do not contain any salified or unsalified carboxylic acid groups (COOH or COO$^-$). Particularly, the fatty substances of the invention are neither polyoxyalkylenated or polyglycerolated.

The term "oil" means a "fatty substance" that is liquid at room temperature (25°C) and at atmospheric pressure (760 mmHg).

The term "nonsilicone oil" means an oil not containing any silicon atoms (Si) and the term "silicone oil" means an oil containing at least one silicon atom.
More particularly, the fatty substance(s) are chosen from C₆-C₁₆ alkanes, nonsilicone oils of animal, plant, mineral or synthetic origin, fatty alcohols, esters of a fatty acid and/or of a fatty alcohol, nonsilicone waxes and silicones.

It is recalled that, for the purposes of the invention, fatty alcohols, esters and acids more particularly have at least one linear or branched, saturated or unsaturated hydrocarbon-based group comprising 6 to 30 carbon atoms, which is optionally substituted, in particular with one or more hydroxy groups (in particular 1 to 4). If they are unsaturated, these compounds may have one to three conjugated or nonconjugated carbon-carbon double bonds.

As regards the C₆-C₁₆ alkanes, they are linear or branched, and possibly cyclic. Examples that may be mentioned include hexane, dodecane and isoparaffins such as isohexadecane and isodecane.

As oils of animal, plant, mineral or synthetic origin that may be used in the composition of the invention, examples that may be mentioned include:

- hydrocarbon-based oils of animal origin, such as perhydrosqualene;
- triglyceride oils of plant or synthetic origin, such as liquid fatty acid triglycerides containing from 6 to 30 carbon atoms, for instance heptanoic or octanoic acid triglycerides, or alternatively, for example, sunflower oil, corn oil, soybean oil, marrow oil, grapeseed oil, sesame seed oil, hazelnut oil, apricot oil, macadamia oil, arara oil, castor oil, avocado oil, caprylic/capric acid triglycerides, for instance those sold by the company Stearineries Dubois or those sold under the names Miglyol® 810, 812 and 818 by the company Dynamit Nobel, jojoba oil and shea butter oil.
- linear or branched hydrocarbons of mineral or synthetic origin, containing more than 16 carbon atoms, such as liquid paraffins, petroleum jelly, liquid petroleum jelly, polydecenes, and hydrogenated polyisobutene such as Parleam®;
- fluoro oils, for instance perfluoromethylcyclopentane and perfluoro-1,3-dimethylcyclohexane, sold under the names Flutec® PC1 and Flutec® PC3 by the company BNFL Fluorochemicals; perfluoro-1,2-dimethylcyclobutane; perfluoroalkanes such as dodecafluoropentane and tetradecafluorohexane, sold under the names PF 5050® and PF 5060® by the company 3M, or bromoperfluoroocetyl sold under the name Foralkyl® by the company Atochem; nonfluoromethoxybutane and nonfluoroethoxyisobutane; perfluoromorpholine derivatives such as 4-trifluoromethyl perfluoromorpholine sold under the name PF 5052® by the company 3M.

The fatty alcohols that are suitable for use in the invention are non-oxyalkylenated and non-glycerolated. They are particularly of formula R-OH with R representing a linear or saturated C₆-C₁₀ alkyl group or a linear or branched C₆-C₄₀ alkenyl group. More particularly, the fatty alcohols are unsaturated or branched alcohols, comprising from 8 to 30 carbon atoms.
Examples that may be mentioned include cetyl alcohol, cetearyl alcohol and the mixture thereof (cetylstearyl alcohol), 2-octyldodecan-1-ol, 2-butyloctanol, 2-hexyldecanol, 2-undecylpentadecanol, oleyl alcohol and linoleyl alcohol. More particularly, the alcohols are of C_{20}-C_{22}.

As regards the esters of a fatty acid and/or of a fatty alcohol, which are advantageously different than the triglycerides mentioned above, mention may be made especially of esters of saturated or unsaturated, linear or branched C_{1}-C_{6} aliphatic mono- or polyacids and of saturated or unsaturated, linear or branched C_{1}-C_{6} aliphatic mono- or polyalcohols, the total carbon number of the esters being greater than or equal to 6 and more advantageously greater than or equal to 10.

Among the monoesters, mention may be made of dihydroabietyl behenate; octyldodecyl behenate; isocetyl behenate; cetyl lactate; C_{12}-C_{15} alkyl lactate; isostearyl lactate; lauryl lactate; linoleyl lactate; oleyl lactate; (iso)stearyl octanoate; isocetyl octanoate; octyl octanoate; cetyl octanoate; decyl oleate; isocetyl isostearate; isocetyl laurate; isocetyl stearate; isodecyl octanoate; isodecyl oleate; isononyl isononanoate; isostearyl palmitate; methylacetyl ricinoleate; myristyl stearate; octyl isononanoate; 2-ethylhexyl isononanoate; octyl palmitate; octyl pelargonate; octyl stearate; octyldodecyl erucate; oleyl erucate; ethyl and isopropyl palmitates, 2-ethylhexyl palmitate, 2-octyldodecyl palmitate, alkyl myristates such as isopropyl, butyl, cetyl, 2-octyldodecyl, myristyl or stearyl myristate, hexyl stearate, butyl stearate, isobutyl stearate; diocetyl malate, hexyl laurate, 2-hexyldodecyl laurate.

Still within the context of this variant, esters of C_{4}-C_{22} dicarboxylic or tricarboxylic acids and of C_{1}-C_{22} alcohols and esters of monocarboxylic, dicarboxylic or tricarboxylic acids and of C_{2}-C_{26} dihydroxy, trihydroxy, tetrahydroxy or pentahydroxy alcohols may also be used.

Mention may be made especially of: diethyl sebacate; diisopropyl sebacate; diisopropyl adipate; di-n-propyl adipate; diocetyl adipate; diisostearyl adipate; diocetyl maleate; glyceryl undecylenate; octyldodecyl stearoyl stearate; pentaerythrityl monoricinoleate; pentaerythrityl tetraisononanoate; pentaerythrityl tetrapelargonate; pentaerythrityl tetraisostearate; pentaerythrityl tetraoctanoate; propylene glycol dicaprylate; propylene glycol dicaprate; tridecyl erucate; trisopropyl citrate; triisostearyl citrate; glyceryl trilactate; glyceryl trioctanoate; trioctyldodecyl citrate; trioleyl citrate; propylene glycol dioctanoate; neopentyl glycol diheptanoate; diethylene glycol diisononanoate; and polyethylene glycol distearates.

Among the esters mentioned above, it is preferred to use ethyl, isopropyl, myristyl, cetyl or stearyl palmitate, 2-ethylhexyl palmitate, 2-octyldodecyl palmitate, alkyl myristates such as isopropyl, butyl, cetyl or 2-octyldodecyl myristate, hexyl stearate, butyl stearate, isobutyl stearate; diocetyl malate, hexyl laurate, 2-hexyldodecyl laurate, isononyl isononanoate or cetyl octanoate.
The composition may also comprise, as fatty ester, sugar esters and diesters of C₆-
C₃₀ and preferably C₁₂-C₂₂ fatty acids. It is recalled that the term "sugar" means oxygen-
bearing hydrocarbon-based compounds containing several alcohol functions, with or
without aldehyde or ketone functions, and which comprise at least 4 carbon atoms. These
sugars may be monosaccharides, oligosaccharides or polysaccharides.

Examples of suitable sugars that may be mentioned include sucrose (or
saccharose), glucose, galactose, ribose, fucose, maltose, fructose, mannose, arabinose,
xylose and lactose, and derivatives thereof, especially alkyl derivatives, such as methyl
derivatives, for instance methylglucose.

The sugar esters of fatty acids may be chosen especially from the group comprising
the esters or mixtures of esters of sugars described previously and of linear or branched,
saturated or unsaturated C₆-C₃₀ and preferably C₁₂-C₂₂ fatty acids. If they are
unsaturated, these compounds may have one to three conjugated or non-conjugated
carbon-carbon double bonds.

The esters according to this variant may also be chosen from monoesters, diesters,
triesters, tetraesters and polyesters, and mixtures thereof.

These esters may be, for example, oleates, laurates, palmitates, myristates,
behenates, cocoates, stearates, linoleates, linolenates, caprates and arachidonates, or
mixtures thereof such as, especially, oleopalmitate, oleostearate and palmitostearate
mixed esters.

More particularly, use is made of monoesters and diesters and especially sucrose,
glucose or methylglucose monooleates or dioleates, stearates, behenates,
oleopalmitates, linoleates, linolenates and oleostearates.

An example that may be mentioned is the product sold under the name Glucate®
DO by the company Amerchol, which is a methylglucose dioleate.

Examples of esters or mixtures of esters of sugar and of fatty acid that may also be
mentioned include:

- the products sold under the names F160, F140, F110, F90, F70 and SL40 by the
  company Crodesta, respectively denoting sucrose palmitostearates formed from 73%
  monoester and 27% diester and triester, from 61% monoester and 39% diester, triester
  and tetraester, from 52% monoester and 48% diester, triester and tetraester, from 45%
  monoester and 55% diester, triester and tetraester, from 39% monoester and 61%
  diester, triester and tetraester, and sucrose monolaurate;

- the products sold under the name Ryoto Sugar Esters, for example referenced
  B370 and corresponding to sucrose behenate formed from 20% monoester and 80% di-
  triester-polyester;

- the sucrose mono-dipalmito-stearate sold by the company Goldschmidt under the
  name Tegosoft® PSE.
The nonsilicone wax(es) are chosen in particular from carnauba wax, candelilla wax, esparto wax, paraffin wax, ozokerite, plant waxes, such as olive tree wax, rice wax, hydrogenated jojoba wax or absolute flower waxes, such as the blackcurrant blossom essential wax sold by Bertin (France), or animal waxes, such as beeswaxes or modified beeswaxes (cerabellina); other waxes or waxy raw materials that may be used according to the invention are in particular marine waxes, such as that sold by Sophim under the reference M82, polyethylene waxes or polyolefin waxes in general.

The silicones that may be used in the cosmetic compositions of the present invention are volatile or nonvolatile, cyclic, linear or branched silicones, which are unmodified or modified with organic groups, having a viscosity from 5×10⁻⁶ to 2.5 m²/s at 25°C, and preferably 1×10⁻⁵ to 1 m²/s.

The silicones that may be used in accordance with the invention may be in the form of oils, waxes, resins or gums.

Preferably, the silicone is chosen from polydialkylsiloxanes, especially polydimethylsiloxanes (PDMS), and organomodified polysiloxanes comprising at least one functional group chosen from poly(oxyalkylene) groups, amino groups and alkoxy groups.

Organopolysiloxanes are defined in greater detail in Walter Noll's "Chemistry and Technology of Silicones" (1968), Academic Press. They may be volatile or non-volatile.

When they are volatile, the silicones are more particularly chosen from those with a boiling point of between 60°C and 260°C, and even more particularly from:

(i) cyclic polydialkylsiloxanes containing from 3 to 7 and preferably from 4 to 5 silicon atoms. These are, for example, octamethylcyclotetrasiloxane sold in particular under the name Volatile Silicone® 7207 by Union Carbide or Silbione® 70045 V2 by Rhodia, decamethylcyclopentasiloxane sold under the name Volatile Silicone® 7158 by Union Carbide, and Silbione® 70045 V5 by Rhodia, and mixtures thereof.

Mention may also be made of cyclocopolymers of the dimethylsiloxane/methylalkylsiloxane type, such as Volatile Silicone® FZ 3109 sold by the company Union Carbide, of formula:

\[
\text{D}^{n} - \text{D} \quad \text{D}^{n} - \text{D}^{'}
\]

with \( \text{D}^{n} \): \( -\text{Si} - \text{O} - \text{Si} - \text{O} - \text{Si} - \text{H} \) and \( \text{D}^{'} \): \( -\text{Si} - \text{O} - \text{Si} - \text{H} \)

Mention may also be made of mixtures of cyclic polyalkysiloxanes with organosilicon compounds, such as the mixture of octamethylcyclotetrasiloxane and
tetratrimethylsilylpentaerythritol (50/50) and the mixture of octamethylcyclotetrasiloxane and oxy-1,1'-bis(2,2,2',2',3,3'-hexatrimethylsilyloxy)neopentane;

(ii) linear volatile polydialkylsiloxanes containing 2 to 9 silicon atoms and having a viscosity of less than or equal to 5x10⁻⁶ m²/s at 25°C. An example is decamethyltetrasiloxane sold in particular under the name SH 200 by the company Toray Silicone. Silicones belonging to this category are also described in the article published in Cosmetics and Toiletries, Vol. 91, Jan. 76, pp. 27-32, Todd & Byers "Volatile Silicone Fluids for Cosmetics".

Nonvolatile polydialkylsiloxanes, polydialkylsiloxane gums and resins, polyorganosiloxanes modified with the above organofunctional groups, and mixtures thereof, are preferably used.

These silicones are more particularly chosen from polydialkylsiloxanes, among which mention may be made mainly of polydimethylsiloxanes containing trimethylsilyl end groups. The viscosity of the silicones is measured at 25°C according to ASTM standard 445 Appendix C.

Among these polydialkylsiloxanes, mention may be made, in a nonlimiting manner, of the following commercial products:
- the Silbione® oils of the 47 and 70 047 series or the Mirasil® oils sold by Rhodia, for instance the oil 70 047 V 500 000;
- the oils of the Mirasil® series sold by the company Rhodia;
- the oils of the 200 series from the company Dow Corning, such as DC200 with a viscosity of 60 000 mm²/s;
- the Viscasil® oils from General Electric and certain oils of the SF series (SF 96, SF 18) from General Electric.

Mention may also be made of polydimethylsiloxanes containing dimethysilanol end groups known under the name dimethiconol (CTFA), such as the oils of the 48 series from the company Rhodia.

In this category of polydialkylsiloxanes, mention may also be made of the products sold under the names Abil Wax® 9800 and 9801 by the company Goldschmidt, which are poly(CrC₂)₂dialkylsiloxanes.

The silicone gums that can be used in accordance with the invention are especially polydialkylsiloxanes and preferably polydimethylsiloxanes with high number-average molecular weights of between 200 000 and 1 000 000, used alone or as a mixture in a solvent. This solvent can be chosen from volatile silicones, polydimethylsiloxane (PDMS) oils, polyphenylmethylsiloxane (PPMS) oils, isoparaffins, polyisobutlenes, methylene chloride, pentane, dodecane and tridecane, or mixtures thereof.

Products that can be used more particularly in accordance with the invention are mixtures such as:
mixtures formed from a polydimethylsiloxane hydroxylated at the chain end, or
dimethiconol (CTFA) and from a cyclic polydimethylsiloxane also known as
cyclomethicone (CTFA), such as the product Q2 1401 sold by the company Dow Corning;
- mixtures formed from a polydimethylsiloxane gum with a cyclic silicone, such as
the product SF 1214 Silicone Fluid from the company General Electric; this product is an
SF 30 gum corresponding to a dimethicone, having a number-average molecular weight
of 500 000, dissolved in the oil SF 1202 Silicone Fluid corresponding to
decamethylcyclopentasiloxane;
- mixtures of two PDMSs with different viscosities, and more particularly of a PDMS
gum and a PDMS oil, such as the product SF 1236 from the company General Electric.
The product SF 1236 is a mixture of a gum SE 30 defined above with a viscosity of 20
m²/s and of an oil SF 96 with a viscosity of 5x10⁻⁶ m²/s. This product preferably comprises
15% of gum SE 30 and 85% of an oil SF 96.
The organopolysiloxane resins that can be used in accordance with the invention
are crosslinked siloxane systems containing the following units:
\[ R_2SiO \_\frac{1}{2} , R3SiO1/2, RSiO3/2 \text{ and } SiO} \_\frac{1}{2} \]
in which R represents an alkyl containing 1 to 16 carbon atoms. Among these
products, the ones that are particularly preferred are those in which R denotes a C₁-C₄
lower alkyl group, more particularly methyl.
Among these resins, mention may be made of the product sold under the name
Dow Corning 593 or those sold under the names Silicone Fluid SS 4230 and SS 4267 by
the company General Electric, which are silicones of dimethyl/trimethylsiloxane structure.
Mention may also be made of the trimethyl siloxysilicate type resins sold in
particular under the names X22-4914, X21-5034 and X21-5037 by the company Shin-
Etsu.
The organomodified silicones that can be used in accordance with the invention are
silicones as defined above and comprising in their structure one or more organofunctional
groups attached via a hydrocarbon-based group.
Besides the silicones described above, the organomodified silicones may be
polydiarylsiloxanes, especially polydiphenylsiloxanes, and polyalkylarylsiloxanes
functionalized with the organofunctional groups mentioned previously.
The polyalkylarylsiloxanes are chosen particularly from linear and/or branched
polydimethyl/methylphenylsiloxanes and polydimethyl/diphenylsiloxanes with a viscosity
of from 1x10⁻⁵ to 5x10⁻² m²/s at 25°C.
Among these polyalkylarylsiloxanes, examples that may be mentioned include the
products sold under the following names:
- the Silbione® oils of the 70 641 series from Rhodia;
- the oils of the series Rhodorsil® 70 633 and 763 from Rhodia;
- the oil Dow Corning 556 Cosmetic Grade Fluid from Dow Corning;
. the silicones of the PK series from Bayer, such as the product PK20;
- the silicones of the PN and PH series from Bayer, such as the products PN1000 and PH1000;
- certain oils of the SF series from General Electric, such as SF 1023, SF 1154, SF 1250 and SF 1265.

Among the organomodified silicones, mention may be made of polyorganosiloxanes comprising:
- polyethylenoxo and/or polypropyleneoxy groups optionally comprising C₆-C₄ alkyl groups, such as the products known as dimethicone copolyol sold by the company Dow Corning under the name DC 1248 or the oils Silwet® L 722, L 7500, L 77 and L 711 by the company Union Carbide, and the (C₁₋₂)alkylmethicone copolyol sold by the company Dow Corning under the name Q2 5200;
- substituted or unsubstituted amine groups, such as the products sold under the name GP 4 Silicone Fluid and GP 7100 by the company Genesee, or the products sold under the names Q2 8220 and Dow Corning 929 or 939 by the company Dow Corning. The substituted amine groups are, in particular, C₁₋₄ aminoalkyl groups;
- alkoxy groups such as the product sold under the name Silicone Copolymer F-755 by SWS Silicones, and Abil Wax® 2428, 2434 and 2440 by the company Goldschmidt.

Preferably, the fatty substance(s) do not comprise any C₂₋₃ oxyalkylene units or any glycerolated units.

More particularly, the fatty substances are chosen from compounds that are liquid or pasty at room temperature (25°C) and at atmospheric pressure.

Preferably, the fatty substance is a compound that is liquid at a temperature of 25°C and at atmospheric pressure.

The fatty substance(s) are advantageously chosen from C₆-C₁₆ alkanes, nonsilicone oils of plant, mineral or synthetic origin, fatty alcohols, esters of a fatty acid and/or of a fatty alcohol, and silicones, or mixtures thereof.

Preferably, the fatty substance(s) are chosen from liquid petroleum jelly, C₆-C₁₆ alkanes, polydecenes, liquid esters of fatty acids and/or of fatty alcohols, and liquid fatty alcohols, or mixtures thereof.

Better still, the fatty substance(s) are chosen from liquid petroleum jelly, C₆-C₁₆ alkanes and polydecenes.

The composition according to the invention preferably comprises at least 25% by weight of fatty substance, more particularly at least 30% by weight, advantageously at least 35% by weight and even more preferentially at least 40% by weight of fatty substance, relative to the weight of the composition.

The composition according to the invention more particularly has a fatty substance content ranging from 25% to 80% by weight, preferably from 40% to 70% by weight and
even more advantageously from 40% to 60% by weight relative to the weight of the composition.

**Surfactants:**

The composition of the invention may also comprise one or more surfactants other than the nonionic ethers of polyoxyalkyleneated fatty alcohols of formula (i) (also known as additional surfactants).

In particular, the additional surfactant(s) are chosen from anionic, amphoteric, zwitterionic, cationic and nonionic surfactants, and preferentially nonionic surfactants.

The term "anionic surfactant" means a surfactant comprising, as ionic or ionizable groups, only anionic groups. These anionic groups are preferably chosen from the groups 

\[
\text{C(O)OH, \ C(O)O}^-, \text{SO}_3^-, \text{OS(O)O}^2-, \text{P(O)OH, P(O)O}^-, \text{P(0)O}^2-, \text{P(0)O}^-, \text{P(0)OH}^-, \text{P(0)O}^-, \text{P(0)OH}^-, \text{POH}, \text{PO}^-, \text{P(0)O}^-, \text{P(0)OH}^-, \text{POH}, \text{PO}^-,
\]

the anionic parts comprising a cationic counterion such as an alkali metal, an alkaline-earth metal or an ammonium.

As examples of anionic surfactants that may be used in the composition according to the invention, mention may be made of alkyl sulfates, alkyl ether sulfates, alkylamido ether sulfates, alkylarylpolyether sulfates, monoglyceride sulfates, alkylsulfonates, alkylamidesulfonates, alkylarylsulfonates, alpha-olefin sulfonates, paraffin sulfonates, alkylsulfosuccinates, alkyether sulfosuccinates, alkylamide sulfosuccinates, alkylsulfoacetates, acysarcosinates, acylglutamates, alkylsulfosuccinamates, acylisethionates and N-acyltaurates, salts of alkyl monoesters of polyglycoside-polycarboxylic acids, acyllactylates, D-galactoside-uronic acid salts, alkyl ether carboxylic acid salts, alkylaryl ether carboxylic acid salts, alkylamido ether carboxylic acid salts; and the corresponding non-salified forms of all these compounds; the alkyl and acyl groups of all these compounds comprising from 6 to 24 carbon atoms and the aryl group denoting a phenyl group.

These compounds may be oxyethylenated and then preferably comprise from 1 to 50 ethylene oxide units.

The salts of \(C_6-C_{24}\) alkyl monoesters of polyglycoside-polycarboxylic acids can be selected from \(C_6-C_{24}\) alkyl polyglycoside-citrate, \(C_6-C_{24}\) alkyl polyglycoside-tartrates and \(C_6-C_{24}\) alkyl polyglycoside-sulfosuccinates.

When the anionic surfactant(s) are in salt form, they may be chosen from alkali metal salts such as the sodium or potassium salt and preferably the sodium salt, the ammonium salts, the amine salts and in particular amino alcohol salts or the alkaline-earth metal salts such as the magnesium salts.

Examples of amino alcohol salts that may especially be mentioned include monoethanolamine, diethanolamine and triethanolamine salts, monoisopropanolamine,
diisopropanolamine or triisopropanolamine salts, 2-amino-2-methyl-1-propanol salts, 2-
amino-2-methyl-1,3-propanediol salts and tris(hydroxymethyl)aminomethane salts.

Alkali metal or alkaline-earth metal salts, and in particular sodium or magnesium
salts, are preferably used.

Among the anionic surfactants mentioned, use is preferably made of (C₆₋C₄)alkyl
sulfates, (C₆₋C₄)alkyl ether sulfates comprising from 2 to 50 ethylene oxide units,
especially in the form of alkali metal, ammonium, amino alcohol and alkaline-earth metal
salts, or a mixture of these compounds.

It is particularly preferred to use (C₁₂₋C₂₀)alkyl sulfates, (C₁₂₋C₂₀)alkyl ether sulfates
comprising from 2 to 20 ethylene oxide units, especially in the form of alkali metal,
ammonium, amino alcohol and alkaline-earth metal salts, or a mixture of these compounds. Better still, use is made of sodium lauryl ether sulfate containing 2.2 mol of
ethylene oxide.

The amphoteric or zwitterionic surfactant(s), which are preferably nonsilicone,
which can be used in the present invention may especially be derivatives of optionally
quaternized aliphatic secondary or tertiary amines, in which derivatives the aliphatic
group is a linear or branched chain comprising from 8 to 22 carbon atoms, said amine
derivatives containing at least one anionic group, for instance a carboxylate, sulfonate,
sulfate, phosphate or phosphonate group. Mention may be made in particular of (C₆₋-
C₂₀)alkylbetaines, sulfobetaines, (C₈₋C₄₀)alkylamido(C₃₋C₈)alkylbetaines and (C₆₋-
C₂₀)alkylamido(C₆₋C₈)alkylsulfobetaines.

Among the optionally quaternized secondary or tertiary aliphatic amine derivatives
that can be used, as defined above, mention may also be made of the compounds of
respective structures (A1) and (A2):

\[ Rₐ-C(O)-NH-CH₂-CH₂-N⁺(Rₗ)(Rₗ)-CH₂-C(0)O⁻, \text{ } M⁺ , X⁻ \quad \text{(A1)} \]

in which formula (A1):

\[ Rₐ \text{ represents a C₁₀₋C₂₀ alkyl or alkenyl group derived from an acid } Rₐ-COOH \]

preferably present in hydrolyzed coconut oil, or a heptyl, nonyl or undecyl
group;

\[ Rₗ \text{ represents a beta-hydroxyethyl group; and } \]

\[ M⁺ \text{ represents a cationic counterion derived from an alkali metal or alkaline-} \]

earth metal, such as sodium, an ammonium ion or an ion derived from an
organic amine, and

\[ X⁻ \text{ represents an organic or inorganic anionic counterion, such as that chosen} \]

from halides, acetates, phosphates, nitrates, (CrC₄)alkyl sulfates, (CrC₄)alkyl-
or (Ci-C₄ₐ)alkylarylsulfonates, in particular methyl sulfate and ethyl sulfate; or
alternatively \( M⁺ \) and \( X⁻ \) are absent;

\[ Rₐ-C(O)-NH-CH₂-CH₂-N⁺(B)X⁻ \quad \text{(A2)} \]
in which formula (A2):

- B represents the group \(-\text{CH}_2\text{-CH}_2\text{-O-}X'\);
- B' represents the group \(-\text{CH}_2\text{ZY}\), with \(z = 1\) or \(2\);
- \(X'\) represents the group \(-\text{CH}_2\text{C(0)OH}, \ -\text{CH}_2\text{C(0)OZ}, \ -\text{CH}_2\text{-CH}_2\text{C(0)OH}, \ -\text{CH}_2\text{-CH}_2\text{C(0)OZ}\) or a hydrogen atom;
- \(Y'\) represents the group \(-\text{C(0)OH}, \ -\text{C(0)OZ}, \ -\text{CH}_2\text{-CH(OH)-S0}_{3}\text{H}\) or the group \(-\text{CH}_2\text{-CH(OH)-S0}_{3}\text{Z'}\);
- \(Z'\) represents a cationic counterion derived from an alkali metal or alkaline-earth metal, such as sodium, an ammonium ion or an ion derived from an organic amine;
- \(R_8'\) represents a \(C_{10}-C_3\) alkyl or alkenyl group of an acid \(R_8'\text{-C(0)OH}\) preferably present in coconut oil or in hydrolyzed linseed oil, an alkyl group, especially of \(C_{17}\) and its iso form, or an unsaturated \(C_{17}\) group.

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 lauroamphodipropionate, disodium caprylamphodipropionate, disodium capryloamphodipropionate, lauroamphodipropionic acid and cocoamphodipropionic acid.

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

Among the amphoteric or zwitterionic surfactants mentioned above, use is preferably made of \((C_6-C_{20})\) alkylbetaines such as cocoylbetaine, and \((C_8-C_{20})\) alkylamido \((C_3-C_8)\) alkylbetaines such as cocamidopropylbetaine, and mixtures thereof. More preferentially, the amphoteric or zwitterionic surfactant(s) are chosen from cocamidopropylbetaine and cocoyl betaine.

The cationic surfactant(s) that can be used in the compositions of the present invention comprise, for example, salts of optionally polyoxyalkylated primary, secondary or tertiary fatty amines, quaternary ammonium salts, and mixtures thereof.

Examples of quaternary ammonium salts that may especially be mentioned include:

- those corresponding to the general formula (A3) below:

\[
\left[ \begin{array}{c}
R_8 \\
N \\
R_10 \\
R_9 \\
R_11
\end{array} \right]^+ 
\times 
\]

(A3)

in which formula (A3):

- \(R_8\) to \(R_{11}\), which may be identical or different, represent a linear or branched aliphatic group comprising from 1 to 30 carbon atoms, or an aromatic group such as aryl or alkylaryl, it being understood that at least one of the groups \(R_8\) to \(R_{11}\)
comprises from 8 to 30 carbon atoms and preferably from 12 to 24 carbon atoms; and

- \( X^- \) represents an organic or inorganic anionic counterion, such as that chosen from halides, acetates, phosphates, nitrates, (CrC\(_4\))alkyl sulfates, (Cl-C\(_4\))alkyl- or (Cl-C\(_4\))alkylaryl sulfonates, in particular methyl sulfate and ethyl sulfate.

The aliphatic groups of \( R_8 \) to \( R_{11} \) may also comprise heteroatoms especially such as oxygen, nitrogen, sulfur and halogens.

The aliphatic groups of \( R_8 \) to \( R_{11} \) are chosen, for example, from C1-C30 alkyl, C1-C30 alkoxy, polyoxy(C\(_2\)-C\(_6\))alkylene, C1-C30 alkyamide, (Cl\(_2\)-C\(_{22}\))alkylamido(C2-C\(_6\))alkyl, (C12-C\(_2\))alkylacetate, \( \text{Ci-C}_{30} \) hydroxyalkyl, \( \text{X} \) is an anionic counterion chosen from halides, phosphates, acetates, lactates, (Cl-C\(_4\))alkyl sulfates, and (Cl-C\(_4\))alkyl- or (C\(_1\)-C\(_4\))alkylaryl sulfonates.

Among the quaternary ammonium salts of formula (A4), preference is given firstly to tetraalkylammonium chlorides, for instance dialkylidimethylammonium or alkytrimethylammonium chlorides in which the alkyl group contains approximately from 12 to 22 carbon atoms, in particular behenyltrimethylammonium chloride, distearyldimethylammonium chloride, cetyltrimethylammonium chloride, benzylidimethylstearylammonium chloride, or else, secondly, distearoylethylhydroxyethylmethylammonium methosulfate, dipalmitoylethylhydroxyethylammonium methosulfate or distearoylethylhydroxyethylammonium methosulfate, or else, lastly, palmitylaminopropyltrimethylammonium chloride or stearamidopropyldimethyl(myristyl acetate)ammonium chloride, sold under the name Ceraphyl® 70 by the company Van Dyk;

- quaternary ammonium salts of imidazoline, for instance those of formula (A4) below:

\[
\begin{array}{c}
\text{R}^{13} \\
\text{CH}_2\text{CH}_2\text{N}^{+}(\text{R}_{13})\text{CO}^{+} \end{array} \\
\text{X}^- \]

(A4)

in which formula (A4):

- \( \text{R}^{12} \) represents an alkenyl or alkyl group comprising from 8 to 30 carbon atoms, for example fatty acid derivatives of tallow;
- \( \text{R}_{13} \) represents a hydrogen atom, a C\(_1\)-C\(_4\) alkyl group or an alkenyl or alkyl group comprising from 8 to 30 carbon atoms;
- \( \text{R}^{14} \) represents a C\(_1\)-C\(_4\) alkyl group;
- \( \text{R}_{15} \) represents a hydrogen atom or a C\(_1\)-C\(_4\) alkyl group;
*X*" represents an organic or inorganic anionic counterion, such as that chosen from halides, acetates, phosphates, acetates, lactates, (CrC₄)alkyl sulfates, (CrC₄)alkyl- or (Ci-C₄)alkylarylsulfonates.

R₁₂ and R₁₃ preferably denote a mixture of alkyl or alkenyl groups comprising from 12 to 21 carbon atoms, derived for example from tallow fatty acids, R₁₄ denotes a methyl group, and R₁₅ denotes a hydrogen atom. Such a product is sold, for example, under the name Rewoquat® W 75 by the company Rewo;

- quaternary diammonium or triammonium salts, in particular of formula (A5) below:

\[
\begin{align*}
\left[ \begin{array}{cc}
R_{16} & R_{19} \\
R_{17} & R_{18}
\end{array} \right] \begin{array}{c}
- N-(CH₂)₂-N-R_{21} \\
R_{19} & R_{20}
\end{array} \right]^{2+} 2X^-
\end{align*}
\]

(A5)

in which formula (A5):

- R₁₆ denotes an alkyl group comprising from about 16 to 30 carbon atoms, which is optionally hydroxylated and/or interrupted with one or more oxygen atoms;

- R₁₇ is chosen from hydrogen, an alkyl group comprising from 1 to 4 carbon atoms or a group -\((CH₂)₃N^+\)(R₁₆₇)(R₁₈₄), X⁻;

- R₁₆₆, R₁₇₇, R₁₈₆, R₁₉, R₂₀ and R₂₁, which may be identical or different, are chosen from hydrogen and an alkyl group comprising from 1 to 4 carbon atoms; and

- X⁻, which may be identical or different, represents an organic or inorganic anionic counterion, such as that chosen from halides, acetates, phosphates, nitrates, (C₁-C₄)alkyl sulfates, (CrC₄)alkyl- or (Ci-C₄)alkylarylsulfonates, in particular methyl sulfate and ethyl sulfate.

Such compounds are, for example, Finquat CT-P, sold by the company Finetex (Quaternium 89), and Finquat CT, sold by the company Finetex (Quaternium 75);

- quaternary ammonium salts containing one or more ester functions, such as those of formula (A6) below:

\[
\begin{align*}
\text{O} & \quad \text{O} \\
\text{R}_{2₄} & \quad \text{R}_{2₅}
\end{align*}
\]

(A6)

in which formula (A6):

- R₁₂ is chosen from CrC₆ alkyl and CrC₆ hydroxyalkyl or dihydroxyalkyl groups;

- R₂₃ is chosen from:
  - the group \(R₂\),
  - the groups R₂₇, which are linear or branched, saturated or unsaturated C₁-C₂₂ hydrocarbon-based radicals,
- a hydrogen atom,

- \( R_{25} \) is chosen from:

\[
\begin{align*}
\text{- the group } & R_{26} \text{ of } \text{C}_{1-2} \text{ C}_{6} \text{ hydrocarbon-based radicals; } \\
\text{- a hydrogen atom; } & \end{align*}
\]

- \( R_{24}, R_{26} \) and \( R_{28} \), which may be identical or different, are chosen from linear or branched, saturated or unsaturated \( C_{7-21} \) hydrocarbon-based groups;

- \( r, s \) and \( t \), which may be identical or different, are integers ranging from 2 to 6;

- \( r1 \) and \( t1 \), which may be identical or different, are equal to 0 or 1, with \( r2 + r1 = 2r \) and \( t1 + t2 = 2t \);

- \( y \) is an integer ranging from 1 to 10;

- \( x \) and \( z \), which may be identical or different, are integers ranging from 0 to 10;

- \( X^- \) represents an organic or inorganic anionic counterion;

with the proviso that the sum \( x + y + z \) is from 1 to 15, that when \( x \) is 0 then \( R_{23} \) denotes \( R_{27} \), and that when \( z \) is 0 then \( R_{25} \) denotes \( R_{29} \).

The alkyl groups \( R_{22} \) may be linear or branched, and more particularly linear.

Preferably, \( R_{22} \) denotes a methyl, ethyl, hydroxyethyl or dihydroxypropyl group, and more particularly a methyl or ethyl group.

Advantageously, the sum \( x + y + z \) is from 1 to 10.

When \( R_{23} \) is a hydrocarbon-based group \( R_{27} \), it may be long and may contain from 12 to 22 carbon atoms, or may be short and may contain from 1 to 3 carbon atoms.

When \( R_{25} \) is a hydrocarbon-based group \( R_{29} \), it preferably contains 1 to 3 carbon atoms.

Advantageously, \( R_{24}, R_{26} \) and \( R_{28} \), which may be identical or different, are chosen from linear or branched, saturated or unsaturated \( C_{n-2} \) alkyl and alkenyl groups.

Preferably, \( x \) and \( z \), which may be identical or different, are equal to 0 or 1.

Advantageously, \( y \) is equal to 1.

Preferably, \( r, s \) and \( t \), which may be identical or different, are equal to 2 or 3, and even more particularly are equal to 2.

The anionic counterion \( X^- \) is preferably a halide, such as chloride, bromide or iodide; a \((\text{C}_{1-4})\text{alkyl sulfate or a (C}_{1-4})\text{alkyl- or (C}_{1-4})\text{alkylarylsulfonate. However, methanesulfonate, phosphate, nitrate, tosylate, an anion derived from an organic acid, such as acetate or lactate, or any other anion that is compatible with the ammonium containing an ester function, may be used.}
The anionic counterion \( X^- \) is even more particularly chloride, methyl sulfate or ethyl sulfate.

Use is made more particularly in the composition according to the invention of the ammonium salts of formula (A6) in which:

- \( R_{22} \) denotes a methyl or ethyl group,
- \( x \) 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:

  - the group \( R_{25}^{2-C} \)
  - methyl, ethyl or \( C_{14}-C_{22} \) hydrocarbon-based groups,
  - a hydrogen atom,

- \( R_{25} \) is chosen from:

  - the group \( R_{28}\)
  - a hydrogen atom,

- \( R_{24}, R_{26} \) and \( R_{2e} \), which may be identical or different, are chosen from linear or branched, saturated or unsaturated \( C_{13}-C_{17} \) hydrocarbon-based groups, and more particularly from linear or branched, saturated or unsaturated \( C_{13}-C_{17} \) alkyl and alkenyl groups.

Advantageously, the hydrocarbon-based radicals are linear.

Among the compounds of formula (A6), examples that may be mentioned include salts, especially the chloride or methyl sulfate, of diacyloxyethyltrimethylammonium, diacyloxyethylhydroxyethyltrimethylammonium, monoacyloxyethylthioacyloxyethyltrimethylammonium, triacyloxyethyltrimethylammonium or monoacyloxyethylhydroxyethyltrimethylammonium, and mixtures thereof. The acyl groups preferably contain 14 to 18 carbon atoms and are obtained more particularly from a plant oil such as palm oil or sunflower oil. When the compound contains several acyl groups, these groups may be identical or different.

These products are obtained, for example, by direct esterification of triethanolamine, triisopropanolamine, an alkylmethanaminol or an alkylpropanaminol, which are optionally oxyalkylenated, with fatty acids or with fatty acid mixtures of plant or animal origin, or by transesterification of the methyl esters thereof. This esterification is followed by a quaternization by means of an alkylating agent such as an alkyl halide, preferably methyl or ethyl halide, a dialkyi sulfate, preferably methyl or ethyl sulfate, methyl methanesulfonate, methyl para-toluenesulfonate, glycol chlorohydrin or glycerol chlorohydrin.
Such compounds are sold, for example, under the names Dehyquart® by the company Henkel, Stepanquat® by the company Stepan, Noxamium® by the company CECA or Rewoquat® WE 18 by the company Rewo-Witco.

The composition according to the invention may contain, for example, a mixture of quaternary ammonium salts of mono-, di- and triesters with a weight majority of diester salts.

It is also possible to use the ammonium salts containing at least one ester function that are described in patents USA4 874 554 and USA4 137 180.

Use may be made of behenoylhydroxypropyltrimethylammonium chloride sold by KAO under the name Quatarmin BTC 131.

Preferably, the ammonium salts containing at least one ester function contain two ester functions.

Among the cationic surfactants that may be present in the composition according to the invention, it is more particularly preferred to choose cetyltrimethylammonium, behenyltrimethylammonium and dipalmitoylethylhydroxyethylmethylammonium salts, and mixtures thereof, and more particularly behenyltrimethylammonium chloride, cetyltrimethylammonium chloride, and dipalmitoylethylhydroxyethylammonium methosulfate, and mixtures thereof.

Examples of nonionic surfactants that may be used in the composition used according to the invention are described, for example, in the "Handbook of Surfactants" by M.R. Porter, published by Blackie & Son (Glasgow and London), 1991, pp. 116-178. They are especially chosen from alcohols, alpha-diols and (Ci- C2o)alkyphenols, these compounds being polyethoxylated, polypropoxylated and/or polyglycerolated, and containing at least one fatty chain comprising, for example, from 8 to 18 carbon atoms, the number of ethylene oxide and/or propylene oxide groups possibly ranging especially from 2 to 50, and the number of glycerol groups possibly ranging especially from 2 to 30; these additional nonionic surfactants being different than the nonionic ethers of polyoxyalkylenated fatty alcohols of formula (i) of the invention.

Mention may also be made of copolymers of ethylene oxide and propylene oxide, optionally oxyethylated fatty acid esters of sorbitan, fatty acid esters of sucrose, polyoxyalkylenated fatty acid esters, optionally oxyalkylenated alkylpolyglycosides, alkylglucoside esters, derivatives of N-alkylglucamine and of N-acylmethylglucamine, aldobionamides and amine oxides.

The nonionic surfactants are more particularly chosen from monooxyalkylenated or polyoxyalkylenated, monoglycerolated or polyglycerolated nonionic surfactants. The oxyalkylene units are more particularly oxyethylene or oxypropylene units, or a combination thereof, preferably oxyethylene units; these compounds being different than the nonionic ethers of polyoxyalkylenated fatty alcohols of formula (i) of the invention.

Examples of oxyalkylenated nonionic surfactants that may be mentioned include:
• oxyalkylenated (C₈-C₁₄)alkylphenols;
• saturated or unsaturated, linear or branched oxyalkylenated C₆-C₉₀ alcohols different than the nonionic ethers of polyoxyalkylenated fatty alcohols of formula (i) of the invention;
• saturated or unsaturated, linear or branched, oxyalkylenated C₆-C₉₀ amides;
• esters of saturated or unsaturated, linear or branched C₆-C₉₀ acids and of polyethylene glycols;
• polyoxyethylenated esters of saturated or unsaturated, linear or branched C₆-C₉₀ acids and of sorbitol;
• saturated or unsaturated, oxyethylenated plant oils;
• condensates of ethylene oxide and/or of propylene oxide, inter alia, alone or as mixtures;
• oxyethylenated and/or oxypropylenated silicones.

The surfactants contain a number of moles of ethylene oxide and/or of propylene oxide of between 1 and 100, preferably between 2 and 50 and preferably between 2 and 30. Advantageously, the nonionic surfactants do not comprise any oxypropylene units.

In accordance with one preferred embodiment of the invention, the oxyalkylenated nonionic surfactants are chosen from oxyethylenated C₆-C₃₀ alcohols comprising from 1 to 100, preferably between 2 and 50 and even more particularly between 2 and 30 mol of ethylene oxide; polyoxyethylenated esters of linear or branched, saturated or unsaturated C₆-C₃₀ acids and of sorbitol comprising from 1 to 100 mol of ethylene oxide.

As examples of monoglycerolated or polyglycerolated nonionic surfactants, monoglycerolated or polyglycerolated C₆-C₉₀ alcohols are preferably used.

In particular, the monoglycerolated or polyglycerolated C₆-C₉₀ alcohols correspond to formulae (A7) and (A’7) below:

\[
\begin{align*}
R_{90} &\cdot [\text{CH}_{2}\cdot \text{CH} (\text{CH}_2 \text{OH}) \cdot \text{H}]_m \cdot \text{H} \quad (A7) \\
\text{H} \cdot [\text{OCH}_2 \cdot \text{CH} (\text{CH}_2 \text{OH})]_m \cdot \text{OR}_{29} \quad (A’7)
\end{align*}
\]

in which formulae (A7) and (A’7):

• \( R_{90} \) represents a linear or branched C₆-C₉₀ and preferably C₆-C₃₀ alkyl or alkenyl radical; and
• \( m \) represents a number ranging from 1 to 30 and preferably from 1 to 10.

As examples of compounds of formula (A7) or (A’7) that are suitable in the context of the 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, cetearyl alcohol containing 6 mol of glycerol, oleocetyl alcohol containing 6 mol of glycerol, and octadecanol containing 6 mol of glycerol.
The alcohol of formula (A7) or (A'7) 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 alcohols may coexist in the form of a mixture.

Among the monoglycerolated or polyglycerolated alcohols, it is more particularly preferred 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.

Preferably, the surfactant(s) are chosen from nonionic surfactants other than the nonionic ethers of polyoxyalkylenated fatty alcohols of formula (i) or from anionic surfactants. More particularly, the surfactant(s) present in the composition are chosen from nonionic surfactants, other than the nonionic ethers of polyoxyalkylenated fatty alcohols of formula (i).

Preferably, the nonionic surfactant(s) are monooxyalkylenated or polyoxyalkylenated nonionic surfactants, particularly monooxyethylenated or polyoxyethylenated, or monooxypropylenated or polyoxypropylenated nonionic surfactants, or a combination thereof, more particularly monooxyethylenated or polyoxyethylenated nonionic surfactants, other than the nonionic ethers of polyoxyalkylenated fatty alcohols of formula (i).

Even more preferentially, the nonionic surfactants are chosen from polyoxyethylenated esters of sorbitol, oxyethylenated C₆₋C₃₀ alcohols comprising from 1 to 100, preferably between 2 and 50 and even more particularly between 2 and 30 mol of ethylene oxide, other than the nonionic ethers of polyoxyalkylenated fatty alcohols of formula (i), and mixtures thereof. Even more preferentially, the nonionic surfactants are chosen from the abovementioned oxyethylenated C₆₋C₃₀ alcohols.

In the composition of the invention, the amount of surfactant(s) in the composition preferably ranges from 0.1% to 50% by weight and better still from 0.5% to 20% by weight relative to the total weight of the composition.

**The basifying agents:**

The composition according to the invention may also comprise one or more basifying agents.

The basifying agent(s) may be mineral or organic or hybrid.

The mineral basifying agent(s) are preferably chosen from aqueous ammonia, alkali metal carbonates or bicarbonates such as sodium or potassium carbonates and sodium or potassium bicarbonates, sodium hydroxide or potassium hydroxide, or mixtures thereof.

The organic basifying agent(s) are preferably chosen from organic amines with a pKₐ at 25°C of less than 12, preferably less than 10 and even more advantageously less than 6. It should be noted that it is the pKₐ corresponding to the function of highest
basicity. In addition, the organic amines do not comprise any alkyl or alkenyl fatty chains comprising more than ten carbon atoms.

The organic basifying agent(s) are chosen, for example, from alkanolamines, oxyethylenated and/or oxypropylenated ethylenediamines, amino acids and the compounds of formula (II) below:

\[
\begin{array}{c}
\text{R} \\
\text{N - W - N}
\end{array}
\]

\[
\begin{array}{c}
\text{R}_1 \\
\text{R}_2
\end{array}
\]

(II)

in which formula (II) \(W\) is a \(\text{CrC}_6\) divalent alkyne radical optionally substituted with one or more hydroxyl groups or a \(\text{CrC}_6\) alkyl radical, and/or optionally interrupted with one or more heteroatoms such as \(O\), or \(\text{NR}_W\), \(\text{R}_x\), \(\text{R}_y\), \(\text{R}_z\), \(\text{R}_t\) and \(\text{R}_u\), which may be identical or different, represent a hydrogen atom or a \(\text{Ci-C}_6\) alkyl or \(\text{Ci-C}_6\) hydroxyalkyl or \(\text{CrC}_6\) aminoalkyl radical.

Examples of amines of formula (II) that may be mentioned include 1,3-diaminopropane, 1,3-diamo-2-propanol, spermine and spermidine.

The term "alkanolamine" means an organic amine comprising a primary, secondary or tertiary amine function, and one or more linear or branched \(\text{CrC}_8\) alkyl groups bearing one or more hydroxyl radicals.

Organic amines chosen from alkanolamines such as monoalkanolamines, dialkanolamines or trialkanolamines comprising one to three identical or different \(\text{Ci-C}_4\) hydroxyalkyl radicals are in particular suitable for performing the invention.

Among the compounds of this type, mention may be made of monoethanolamine (MEA), diethanolamine, triethanolamine, monoisopropanolamine, diisopropanolamine, \(\text{N,N}-\text{dimethylethanolamine}, \ 2-\text{amino}-2-\text{methyl-1-propanol}, \ \text{trispropanolamine}, \ 2-\text{amino-2-methyl-1,3-propanediol}, \ 3-\text{amino-1,2-propanediol}, \ 3-\text{dimethylamino-1,2-propanediol} \) and \(\text{tris(}\text{hydroxymethylamino})\text{methane}\).

More particularly, the amino acids that may be used are of natural or synthetic origin, in their \(\text{L}, \ \text{D}\) or racemic form, and comprise at least one acid function chosen more particularly from carboxylic acid, sulfonic acid, phosphonic acid or phosphoric acid functions. The amino acids may be in neutral or ionic form.

As amino acids that may be used in the present invention, mention may be made especially of aspartic acid, glutamic acid, alanine, arginine, ornithine, citrulline, asparagine, carnitine, cysteine, glutamine, glycine, histidine, lysine, isoleucine, leucine, methionine, N-phenylalanine, proline, serine, taurine, threonine, tryptophan, tyrosine and valine.

Advantageously, the amino acids are basic amino acids comprising an additional amine function optionally included in a ring or in a ureido function.

Such basic amino acids are preferably chosen from those corresponding to formula (III) below, and also salts thereof:
in which formula (III) R represents a group chosen from:

![Chemical Structure](image)

The compounds corresponding to formula (III) are histidine, lysine, arginine, ornithine and citrulline.

The organic amine may also be chosen from organic amines of heterocyclic type. Besides histidine that has already been mentioned in the amino acids, mention may in particular be made of pyridine, piperidine, imidazole, triazole, tetrazole and benzimidazole.

The organic amine may also be chosen from amino acid dipeptides. As amino acid dipeptides that may be used in the present invention, mention may be made especially of carnosine, anserine and baleine.

The organic amine may also be chosen from compounds comprising a guanidine function. As amines of this type that may be used in the present invention, besides arginine, which has already been mentioned as an amino acid, mention may be made especially of creatine, creatinine, 1,1-dimethylguanidine, 1,1-diethylguanidine, glycocoyamine, metformin, agmatine, N-amidinoalanine, 3-guanidinopropionic acid, 4-guanidinobutyric acid and 2-{[amino(imino)methyl]amino}ethane-1-sulfonic acid.

Hybrid compounds that may be mentioned include the salts of the amines mentioned previously with acids such as carbonic acid or hydrochloric acid.

Guanidine carbonate or monoethanolamine hydrochloride may be used in particular.

Preferably, the basifying agent(s) present in the composition of the invention are chosen from aqueous ammonia, alkanolamines, amino acids in neutral or ionic form, in particular basic amino acids, and preferably corresponding to those of formula (III).

Even more preferentially, the basifying agent(s) are chosen from aqueous ammonia and alkanolamines, most particularly monoethanolamine (MEA).

Better still, the basifying agent(s) are chosen from alkanolamines, most particularly monoethanolamine (MEA).

Advantageously, the composition according to the invention has a content of basifying agent(s) ranging from 0.01% to 30% by weight and preferably from 0.1% to 20% by weight relative to the weight of the composition.
Chemical oxidizing agent:
The composition of the invention also comprises one or more chemical oxidizing agents.

The term "chemical oxidizing agent" means an oxidizing agent other than atmospheric oxygen.

More particularly, the chemical oxidizing agent(s) are chosen from hydrogen peroxide, urea peroxide, alkali metal bromates, peroxygenated salts, for instance persulfates, perborates, peracids and precursors thereof and percarbonates of alkali metals or alkaline-earth metals.

This oxidizing agent is advantageously formed from hydrogen peroxide especially in aqueous solution (aqueous hydrogen peroxide solution), the concentration of which may range more particularly from 0.1% to 50% by weight, even more preferentially from 0.5% to 20% by weight and better still from 1% to 15% by weight relative to the weight of the composition.

Preferably, the composition of the invention does not contain any peroxygenated salts.

Solvent:
The composition according to the invention may also comprise one or more organic solvents.

Examples of organic solvents that may be mentioned include linear or branched C₂-C₄ alkanols, such as ethanol and isopropanol; glycerol; polyols and polyol ethers, for instance 2-butoxyethanol, propylene glycol, dipropylene glycol, propylene glycol monomethyl ether, diethylene glycol monomethyl ether and monoethyl ether, and also aromatic alcohols or ethers, for instance benzyl alcohol or phenoxyethanol, and mixtures thereof.

The solvent(s), if they are present, represent a content usually ranging from 1% to 40% by weight and preferably from 5% to 30% by weight relative to the weight of the composition.

Other additives:
The composition according to the invention may also contain various adjuvants conventionally used in hair dye compositions, such as anionic, cationic, nonionic, amphoteric or zwitterionic polymers or mixtures thereof; mineral thickeners, and in particular fillers such as organophilic silicas, fumed silicas, clays, especially organophilic clays, talc; organic thickeners with, in particular, anionic, cationic, nonionic and amphoteric polymeric associative thickeners; antioxidants; penetrants; sequestrants; fragrances; dispersants; film-forming agents; ceramides; preserving agents; opacifiers.
The above adjuvants are generally present in an amount for each of them of between 0.01% and 20% by weight relative to the weight of composition.

The composition according to the invention preferably comprises at least one cationic polymer, more particularly chosen from substantive polymers such as alkyldiallylamine or dialkyldiallylammonium homopolymers (for instance Polyquaternium-6, Merquat 100, which is a dialkyldiallylammonium halide (in particular chloride) homopolymer sold by the company Nalco), and also copolymers of these monomers and of acrylamide (for example copolymers of diallyldimethylammonium halide (in particular chloride) and of acrylamide, sold especially under the name Merquat 550, Polyquaternium-7).

Also suitable are the polymers of formula:

\[ \mathbf{R}_1 \quad \mathbf{R}_3 \\
\mathbf{N}^+ (\mathbf{CH}_2)_n \mathbf{N}^+ (\mathbf{CH}_2)_p \]

\[ \mathbf{R}_2 \quad \mathbf{X}^- \quad \mathbf{R}_4 \quad \mathbf{X}^- \]

in which \( \mathbf{R}_1, \mathbf{R}_2, \mathbf{R}_3 \) and \( \mathbf{R}_4 \), which may be identical or different, denote a \( \mathbf{C}_1-\mathbf{C}_4 \) alkyl or hydroxyalkyl radical, \( n \) and \( p \) are integers ranging from 2 to 20 approximately, and \( \mathbf{X}^- \) is an anion derived from a mineral or organic acid.

According to one particular embodiment of the invention, use is made of polymers bearing repeating units of formulae (W) and (U) below:

(\[ \begin{array}{c}
\text{CH}_3 \\
\text{N}^+ (\text{CH}_2)_3 \\
\text{CH}_3 \\
\text{N}^+ (\text{CH}_2)_6 \\
\text{CH}_3 \\
\end{array} \]

(W)

and especially those whose molecular weight, determined by gel permeation chromatography, is between 9500 and 9900;

(\[ \begin{array}{c}
\text{CH}_3 \\
\text{C}_2\text{H}_5 \\
\text{N}^+ (\text{CH}_2)_3 \\
\text{Br}^- \\
\text{N}^+ (\text{CH}_2)_3 \\
\text{Br}^- \\
\text{CH}_3 \\
\text{C}_2\text{H}_5 \\
\end{array} \]

(U)

and especially those whose molecular weight, determined by gel permeation chromatography, is about 1200.

The concentration of cationic polymers in the composition, when they are present, ranges from 0.01% to 10% by weight relative to the weight of the composition, preferably from 0.1% to 5% by weight and better still from 0.2% to 3% by weight relative to the weight of the composition.

The composition may especially comprise one or more mineral thickeners chosen from organophilic clays and fumed silicas, or mixtures thereof.
The organophilic clay may be chosen from montmorillonite, bentonite, hectorite, attapulgite and sepiolite, and mixtures thereof. The clay is preferably a bentonite or a hectorite.

These clays may be modified with a chemical compound chosen from quaternary amines, tertiary amines, amine acetates, imidazolines, amine soaps, fatty sulfates, alkylarylsulfonates and amine oxides, and mixtures thereof.

Organophilic clays that may be mentioned include quaternium-18 bentonites such as those sold under the names Bentone 3, Bentone 38 and Bentone 38V by the company Rheox, Tixogel VP by the company United Catalyst, Claytone 34, Claytone 40 and Claytone XL by the company Southern Clay; stearamonium bentonites such as those sold under the names Bentone 27 by the company Rheox, Tixogel LG by the company United Catalyst and Claytone AF and Claytone APA by the company Southern Clay; quaternium-18/benzalkonium bentonites such as those sold under the names Claytone HT and Claytone PS by the company Southern Clay.

The fumed silicas may be obtained by high-temperature pyrolysis of a volatile silicon compound in an oxyhydric flame, producing a finely divided silica. This process makes it possible especially to obtain hydrophilic silicas having a large number of silanol groups at their surface. Such hydrophilic silicas are sold, for example, under the names Aerosil 130®, Aerosil 200®, Aerosil 255®, Aerosil 300® and Aerosil 380® by the company Degussa, and Cab-O-Sil HS5®, Cab-O-Sil EH5®, Cab-O-Sil LM-130®, Cab-O-Sil MS55® and Cab-O-Sil M-5® by the company Cabot.

It is possible to chemically modify the surface of the silica via chemical reaction in order to reduce the number of silanol groups. It is especially possible to substitute silanol groups with hydrophobic groups: a hydrophobic silica is then obtained.

The hydrophobic groups may be:
- trimethylsiloxy groups, which are obtained especially by treating fumed silica in the presence of hexamethyldisilazane. Silicas thus treated are known as "silica silylate" according to the CTFA (6th Edition, 1995). They are sold, for example, under the references Aerosil R812® by the company Degussa and Cab-O-Sil TS-530® by the company Cabot.
- dimethylsilyloxy or polydimethylsiloxane groups, which are especially obtained by treating fumed silica in the presence of polydimethylsiloxane or dimethyl dichlorosilane. Silicas thus treated are known as "silica dimethyl silylate" according to the CTFA (6th Edition, 1995). They are sold, for example, under the references Aerosil R972® and Aerosil R974® by the company Degussa, and Cab-O-Sil TS-610® and Cab-O-Sil TS-720® by the company Cabot.

The fumed silica preferably has a particle size that may be nanometric to micrometric, for example ranging from about 5 to 200 nm.
Preferably, the composition comprises a hectorite, an organomodified bentonite or an optionally modified fumed silica.

When it is present, the mineral thickener represents from 1% to 30% by weight relative to the weight of the composition.

The composition may also comprise one or more organic thickeners.

These thickeners may be chosen from fatty acid amides (coconut monoethanolamide or diethanolamide, oxyethylenated carboxylic acid monoethanolamide alkyl ether), polymeric thickeners such as cellulose-based thickeners (hydroxyethylcellulose, hydroxypropylcellulose or carboxymethylcellulose), guar gum and derivatives thereof (hydroxypropyl guar), gums of microbial origin (xanthan gum, scleroglucan gum), acrylic acid or acrylamidopropanesulfonic acid crosslinked homopolymers and associative polymers (polymers comprising hydrophilic regions and fatty-chain hydrophobic regions (alkyl or alkenyl containing at least 10 carbon atoms) that are capable, in an aqueous medium, of reversibly combining with each other or with other molecules).

According to one particular embodiment, the organic thickener is chosen from cellulose-based thickeners (hydroxyethylcellulose, hydroxypropylcellulose, carboxymethylcellulose), guar gum and derivatives thereof (hydroxypropyl guar), gums of microbial origin (xanthan gum or scleroglucan gum), crosslinked acrylic acid homopolymers whose INCI name is Carbomer, for instance the polymers sold by the company Lubrizol under the names Carbopol 980, 981 and Carbopol Ultrez 10, acrylate/Cio-C\textsubscript{3}o-alkylacrylate copolymers (INCI name Acrylates/C\textsubscript{10-30} Alkyl acrylate Crosspolymer) such as the products sold by the company Lubrizol under the trade names Pemulen TR1, Pemulen TR2, Carbopol 1382 and Carbopol EDT 2020, and optionally crosslinked acrylamidopropanesulfonic acid homopolymers or copolymers, and preferably from cellulose-based thickeners with, in particular, hydroxyethylcellulose and crosslinked acrylic acid homopolymers.

The content of organic thickener(s), if they are present, usually ranges from 0.01% to 20% by weight and preferably from 0.1% to 5% by weight relative to the weight of the composition.

The composition of the invention may be in various forms, for instance a solution, an emulsion (milk or cream) or a gel.

The pH of the composition according to the invention may range from 3 to 12 and preferably from 6 to 11.

**Processes of the invention:**

The composition described previously is applied to wet or dry keratin fibers.
It is usually left in place on the fibers for a time generally of from 1 minute to 1 hour and preferably from 5 minutes to 30 minutes.

The temperature during the dyeing process is conventionally between room temperature (between 15 and 25°C) and 80°C and preferably between room temperature and 60°C.

After the treatment, the human keratin fibers are advantageously rinsed with water. They may optionally be washed with a shampoo, followed by rinsing with water, and then dried or left to dry.

The composition applied in the process according to the invention is generally prepared extemporaneously before the application, by mixing at least two formulations, preferably two or three compositions and even more preferentially two formulations.

In particular, a formulation (A) free of chemical oxidizing agent and comprising at least one oxidation dye chosen from pyrazolone oxidation bases, at least one nonionic compound of formula (i) and a formulation (B) comprising at least one chemical oxidizing agent are mixed together.

Advantageously, formulations (A) and (B) are aqueous.

The term "aqueous formulation" means a composition comprising at least 5% by weight of water, relative to the weight of this formulation.

Preferably, an aqueous formulation comprises more than 10% by weight of water and even more advantageously more than 20% by weight of water.

Preferably, formulation (A) comprises at least 50% by weight of fatty substances, and even more preferentially at least 50% by weight of fatty substances that are liquid at room temperature (25°C), relative to the weight of this formulation (A).

Advantageously, formulation (A) is a direct emulsion (oil-in-water: O/W) or an inverse emulsion (water-in-oil: W/O), and preferably a direct emulsion (O/W).

More particularly, formulation (A) comprises at least one basifying agent.

In this variant, formulations (A) and (B) are preferably mixed together in a weight ratio (A)/(B) ranging from 0.2 to 10 and better still from 0.5 to 2.

According to this preferred embodiment, the composition used in the process according to the invention, i.e. the composition derived from mixing together the two compositions (A) and (B), preferentially has a fatty substance content of at least 25% by weight of fatty substance, relative to the weight of the composition derived from mixing together the two abovementioned formulations.

Everything that has been stated previously concerning the ingredients of the composition according to the invention remains valid in the case of the formulations (A) and (B), the contents taking into account the degree of dilution during mixing.
In a second variant of the invention, the composition used in the process according
to the invention (thus in the presence of at least one chemical oxidizing agent) is derived
from the mixing of three formulations. In particular, the three formulations are aqueous or
alternatively at least one of them is anhydrous.

More particularly, for the purposes of the invention, the term "anhydrous cosmetic
formulation" means a cosmetic formulation with a water content of less than 5% by
weight, preferably less than 2% by weight and even more preferably less than 1% by
weight relative to the weight of said composition. It should be noted that the water present
in the composition is more particularly "bound water", such as water of crystallization in
salts, or traces of water absorbed by the starting materials used in the preparation of the
formulations according to the invention.

Preferably, use is made of two aqueous formulations (B') and (C) and an
anhydrous formulation (A').

The anhydrous formulation (A') (free of chemical oxidizing agent) then preferably
comprises at least one fatty substance, and more preferentially at least one fatty
substance that is preferably liquid.

Formulation (B') (free of chemical oxidizing agent) then preferably comprises at
least one oxidation base chosen from pyrazolones and at least one nonionic compound
of formula (i).

Formulation (C) then preferably comprises at least one chemical oxidizing agent.

According to this preferred embodiment of the second variant, one or more
basifying agents may be included in formulations (A') and/or (B') and preferably only in
formulation (B').

As regards the surfactant(s) that may be present, they are preferably included in at
least one of the formulations (A'), (B') and (C).

According to this preferred embodiment, the composition used in the process
according to the invention, i.e. the composition derived from the mixing of the three
formulations (A'), (B') and (C), preferentially has a fatty substance content of at least
25% by weight of fatty substance, relative to the weight of the composition derived from
the mixing of the three abovementioned formulations.

In this variant, formulations (A'), (B') and (C) are preferably mixed together in a
weight ratio [(A')+(B')]/(C) ranging from 0.2 to 10 and more particularly from 0.5 to 2 and
in a weight ratio (A')/(B') ranging from 0.5 to 10 and preferably from 1 to 5.

Everything that has been described previously regarding the ingredients of the
composition according to the invention remains valid in the case of formulations (A'), (B')
and (C), the contents taking into account the degree of dilution during mixing.

Devices:
Finally, the invention relates to a multi-compartment device that is suitable for implementing the composition and the process according to the invention, and comprising a first compartment containing formulation (A) as described above and a second compartment containing formulation (B) as described above.

The invention also relates to a second multi-compartment device comprising a first compartment containing formulation (A') as described above and a second compartment containing a cosmetic formulation (B') as described above and at least a third compartment comprising formulation (C) as described above.

The example that follows serves to illustrate the invention without, however, being limiting in nature.

**EXAMPLE**

The following compositions are prepared (in which the amounts are expressed in grams of active materials):

<table>
<thead>
<tr>
<th>Composition 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5-Amino-6-chloro-o-cresol</td>
<td>0.28</td>
</tr>
<tr>
<td>2,3-Diamino-6,7-dihydro-1 H,5H-pyrazolo[1,2-a] pyrazol-1-one dimethylsulfonate</td>
<td>1.36</td>
</tr>
<tr>
<td>p-Aminophenol</td>
<td>0.32</td>
</tr>
<tr>
<td>4-Amino-2-hydroxytoluene</td>
<td>0.5</td>
</tr>
<tr>
<td>2-Methyl-5-hydroxyethylaminophenol</td>
<td>0.29</td>
</tr>
<tr>
<td>Mineral oil (liquid paraffin)</td>
<td>60</td>
</tr>
<tr>
<td>Glycerol</td>
<td>5</td>
</tr>
<tr>
<td>Mixture of linear C18-C24 alcohols</td>
<td>4.6</td>
</tr>
<tr>
<td>Cetyl palmitate</td>
<td>2</td>
</tr>
<tr>
<td>Carbomer</td>
<td>0.1</td>
</tr>
<tr>
<td>Ceteareth-60 myristyl glycol</td>
<td>0.03</td>
</tr>
<tr>
<td>Deceth-5</td>
<td>1.08</td>
</tr>
<tr>
<td>Oleth-10</td>
<td>1</td>
</tr>
<tr>
<td>Oleth-20</td>
<td>4</td>
</tr>
<tr>
<td>Monoethanolamine</td>
<td>4.93</td>
</tr>
</tbody>
</table>
Ascorbic acid | 0.12
EDTA | 0.2
Sodium metabisulfite | 0.22
Water | q s 100

Composition 2:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cetearyl alcohol</td>
<td>6</td>
</tr>
<tr>
<td>Mineral oil (liquid paraffin)</td>
<td>20</td>
</tr>
<tr>
<td>Glycerol</td>
<td>0.5</td>
</tr>
<tr>
<td>Hydrogen peroxide</td>
<td>6</td>
</tr>
<tr>
<td>Hexadimethrine chloride</td>
<td>0.15</td>
</tr>
<tr>
<td>Polyquaternium-6</td>
<td>0.2</td>
</tr>
<tr>
<td>Rapeseed PEG-4 amide</td>
<td>1.2</td>
</tr>
<tr>
<td>Steareth-20</td>
<td>5</td>
</tr>
<tr>
<td>Tocopherol</td>
<td>0.1</td>
</tr>
<tr>
<td>Tetrasodium pyrophosphate</td>
<td>0.03</td>
</tr>
<tr>
<td>Sodium stannate</td>
<td>0.04</td>
</tr>
<tr>
<td>BHT</td>
<td>0.001</td>
</tr>
<tr>
<td>Pentasodium pentetate</td>
<td>0.06</td>
</tr>
<tr>
<td>Water</td>
<td>q s 100</td>
</tr>
</tbody>
</table>

Application method:

The two compositions are mixed together at the time of use in the following proportions:
- 10 g of composition 1
- 10 g of composition 2

The resulting mixture applies and is distributed easily onto natural hair containing 90% white hairs.

It is left to stand on the hair for 30 minutes at room temperature.

Removal with water is easy.

The hair is then washed with a standard shampoo and dried.

The hair coloration obtained is a strong coppery dark blond.
CLAIMS

1. A composition for dyeing keratin fibers, in particular human keratin fibers, comprising:
   - at least one oxidation dye chosen from pyrazolone oxidation bases;
   - at least one nonionic ether of a polyoxyalkylenated fatty alcohol of formula (i)
     \[ R-(0-{\text{Alk}})_n{\text{OR'}} \] (i);
     in which formula (i):
     o \( R \) denotes a linear or branched, saturated or unsaturated \( C_{10}-C_{30} \) hydrocarbon-based radical,
     o \( R' \) denotes a linear or branched, saturated or unsaturated \( C_{10}-C_{30} \) hydrocarbon-based radical, which may be substituted with a hydroxyl radical,
     o \( n \) is an integer between 1 and 100 inclusive,
   - at least one chemical oxidizing agent.

2. The composition according to the preceding claim, characterized in that the nonionic ether(s) of polyoxyalkylenated fatty alcohols are chosen from the compounds of formula (i) for which \( R \) and \( R' \), independently of each other, denote a linear or branched, preferably linear, saturated or unsaturated, preferably saturated, \( C_{12}-C_{20} \) and preferably \( C_{14}-C_{18} \) hydrocarbon-based radical; \( R' \) possibly being substituted with at least one hydroxyl radical and \( n \) denotes an integer greater than or equal to 20, for example ranging from 20 to 100 and preferably from 40 to 80.

3. The composition according to the preceding claim, characterized in that the nonionic ether(s) of polyoxyalkylenated fatty alcohols are chosen from the compounds of formula (i) for which \( R \) denotes a \( C_{14}-\text{C}_{18} \) alkyl radical, which is preferably linear, and \( R' \) denotes a \( C_{14} \) alkyl radical, which is preferably linear, substituted with a group OH that is preferably \( \beta \) to the ether function, and \( n \) is equal to 60.

4. The composition according to any one of the preceding claims, characterized in that the nonionic compound(s) (i) are present in a content ranging from 0.001% to 10% by weight and preferably from 0.001% to 5% by weight relative to the total weight of the composition.
5. The composition according to any one of the preceding claims, characterized in that the pyrazolone oxidation base(s) are chosen from the compounds of formula (I) below, or a salt thereof:

\[
\begin{array}{c}
\text{O} \\
\text{N} \\
\text{N} \\
\text{R}_1 \text{N} \\
\text{R}_2 \text{N} \\
\text{R}_3 \text{R}_4 \\
\end{array}
\]

(I)

in which:

- R₁, R₂, R₃, and R₄, which may be identical or different, represent, independently of each other:
  - a hydrogen atom;
  - a linear or branched C₁-C₄ and preferably C₁-C₆ alkyl group, optionally substituted with one or more groups chosen from groups OR₅, NR₆R₇, and carboxyl, sulfoxy, carboxamido CONR₆R₇, and sulfonamido SO₂NR₆R₇ groups, aliphatic heterocycles such as piperidine, aryls optionally substituted with one or more groups chosen from C₄ alkyl, hydroxyl, CrC₂ alkoxy, amino and (di)(C₂)alkylamino groups;
  - an aryl group optionally substituted with one or more groups chosen from C₄ alkyl, hydroxyl, C₃-C₅ alkoxy, amino and (di)(C₂)alkylamino groups;
  - a 5- or 6-membered heteroaryl group, optionally substituted with one or more groups chosen from C₄ alkyl and C₃-C₅ alkoxy groups;
  - R₅, R₆, and R₇, which may be identical or different, represent:
    - a hydrogen atom;
    - a linear or branched C₁-C₄ and preferably C₁-C₅ alkyl group, optionally substituted with one or more groups chosen from hydroxyl, C₃-C₅ alkoxy, carboxamido CONR₆S₇, sulfonyl SO₂R₈, aryl optionally substituted with a CrC₄ alkyl, hydroxyl, C₃-C₅ alkoxy, amino or (di)(C₂)alkylamino group;
    - an aryl group optionally substituted with one or more groups chosen from C₄ alkyl, hydroxyl, C₃-C₅ alkoxy, amino and (di)(C₂)alkylamino groups;
    - a carboxamido group CONR₆S₇;
    - a sulfonyl group SO₂R₈;
  - R₈ and R₉, which may be identical or different, represent a hydrogen atom; a linear or branched C₁-C₄ alkyl group, optionally substituted with one or more groups chosen from hydroxyl and C₃-C₅ alkoxy groups;
  - R₁, R₂, R₃, and R₄, on the one hand, and R₅ and R₆, on the other hand, may also form, together with the nitrogen atom(s) to which they are attached, a saturated or unsaturated 5- to 7-membered heterocycle, which is optionally substituted or N-substituted with one or more groups chosen from halogen atoms, amino, (di)(C₄)alkylamino, (di)hydroxy (Cr C₂)alkylamino, hydroxyl, carboxyl, carboxamido, (di)(C₂)alkylcarboxamido, C₁-C₂.
alkoxy and C1-C4 alkyl groups optionally substituted with one or more groups chosen from hydroxyl, amino, (di)alkylamino, alkoxy, carboxyl and sulfonyl groups; said heterocycles formed with $R_1$ and $R_2$, on the one hand, and $R_3$ and $R_4$, on the other hand, with the nitrogen atom(s) to which they are attached, possibly being identical or different, and the ring members forming said heterocycles possibly being chosen, preferably, from carbon, nitrogen and oxygen atoms.

6. The composition according to any one of the preceding claims, characterized in that the pyrazolone oxidation base is 2,3-diamino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one, or an addition salt thereof, preferably 2,3-diamino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one dimethylbenzenesulfonate.

7. The composition according to any one of the preceding claims, characterized in that the composition comprises an additional oxidation dye chosen from oxidation bases other than the abovementioned pyrazolones, and/or from couplers.

8. The composition according to any one of the preceding claims, characterized in that said composition comprises at least one fatty substance.

9. The composition according to the preceding claim, characterized in that the fatty substance(s) are chosen from C$_6$-C$_{16}$ alkanes, nonsilicone oils of mineral, plant, animal or synthetic origin, fatty alcohols, fatty acid esters, fatty alcohol esters, nonsilicone waxes and silicones.

10. The composition according to either of claims 8 and 9, characterized in that the fatty substance(s) are liquid at room temperature and at atmospheric pressure.

11. The composition according to any one of claims 8 to 10, characterized in that the fatty substance(s) are chosen from liquid petroleum jelly, C$_6$-C$_{16}$ alkanes, polydecenes, and esters of fatty acids or of fatty alcohols, which are liquid, or mixtures thereof.

12. The composition according to any one of claims 8 to 11, characterized in that the fatty substance concentration is at least 25% by weight relative to the total weight of the composition, and preferably ranges from 25% to 80% by weight relative to the total weight of the composition.

13. The composition according to any one of the preceding claims, characterized in that the composition comprises at least one basifying agent.
14. The composition according to the preceding claim, characterized in that the basifying agent(s) are mineral, organic or hybrid and are preferably chosen from aqueous ammonia, alkali metal carbonates or bicarbonates such as sodium carbonate or bicarbonate, potassium carbonate or bicarbonate, sodium hydroxide or potassium hydroxide, organic amines chosen from alkanolamines, oxyethylenated and/or oxypropylenated ethylenediamines, amino acids and the compounds of formula (II), or mixtures thereof:

![Chemical structure](image)

in which formula (II) W is a \( \text{CrC}_6 \) divalent alkyene radical optionally substituted with one or more hydroxyl groups or a \( \text{CrC}_6 \) alkyl radical, and/or optionally interrupted with one or more heteroatoms such as O, or NR, or RS, or W, or which may be identical or different, represent a hydrogen atom or a Cl-C\(_6\) alkyl or \( \text{CrC}_6 \) hydroxyalkyl or \( \text{CrC}_6 \) aminoalkyl radical.

15. The composition according to the preceding claim, in which the basifying agent(s) are chosen from aqueous ammonia and alkanolamines, or mixtures thereof.

16. The composition according to any one of the preceding claims, characterized in that the composition comprises at least one surfactant other than the nonionic ether of a polyoxyalkylenated fatty alcohol of formula (i).

17. The composition according to any one of the preceding claims, characterized in that the chemical oxidizing agent is hydrogen peroxide.

18. A process for dyeing keratin fibers, in particular human keratin fibers, which consists in applying to said fibers a composition according to any one of claims 1 to 17.

19. The process according to claim 18, in which the composition applied in the process according to the invention is prepared extemporaneously before the application, by mixing at least two formulations, preferably two or three compositions and even more preferentially two formulations.

20. The process according to the preceding claim, characterized in that the composition is derived from the mixing of two formulations; preferably a formulation (A) free of chemical oxidizing agent and comprising at least one oxidation dye chosen from the pyrazolone oxidation bases as claimed in one of claims 1, 5 and 6, at least one
nonionic compound of formula (i) as claimed in one of claims 1 to 3, and a formulation (B) comprising at least one chemical oxidizing agent.

21. The process according to claim 19, characterized in that the composition is derived from the mixing of three formulations; preferably an anhydrous formulation (A') free of chemical oxidizing agent and comprising at least one fatty substance as claimed in one of claims 9 to 11; a formulation (B') containing at least one oxidation dye chosen from the pyrazolone oxidation bases as claimed in one of claims 1, 5 and 6, at least one nonionic compound of formula (i) as claimed in one of claims 1 to 3, and a formulation (C) comprising at least one chemical oxidizing agent.

22. The process according to either of claims 20 and 21, characterized in that at least one of the formulations (A) and (B), or (A') and optionally (B') or (C), comprises at least one fatty substance; the fatty substance content of the composition resulting from the mixing of formulations (A) and (B), or of formulations (A'), (B') and (C), being less than 25% by weight of fatty substance, relative to the total weight of the composition.

23. A multi-compartment device, comprising a first compartment containing formulation (A) according to either of claims 20 and 22, and a second compartment containing formulation (B) according to either of claims 20 and 22.

24. A multi-compartment device comprising a first compartment containing a formulation (A') according to either of claims 21 and 22; a second compartment containing a formulation (B') according to either of claims 21 and 22; and at least a third compartment comprising a formulation (C) containing at least one chemical oxidizing agent.