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(54) Title: HAIR DYEING COMPOSITION USING (2,5- DIAMINOPHENYL) ETHANOL, A BETAINE AMPHOTERIC SURFACTANT OR A TERTIARY FATTY AMINE IN A MEDIUM RICH IN FATTY SUBSTANCES

(57) Abstract: The present invention relates to a composition for dyeing keratin fibres, comprising a) one or more fatty substances which are preferably non-silicone liquids, and b) one or more betaine amphoteric surfactants and/or a tertiary fatty amine, c) (2,5-diaminophenyl)ethanol; d) optionally, one or more couplers; e) optionally one or more basifying agents; f) one or more chemical oxidizing agents such as hydrogen peroxide, and the content of fatty substances in the composition representing in total at least 15% and preferably more than 25% by weight relative to the total weight of the composition. The present invention also relates to a process using this composition and to a multi¬ compartment device suitable for performing the said process.

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HAIR DYEING COMPOSITION USING (2,5- DIAMINOPHENYL) ETHANOL, A BETAINE AMPHOTERIC SURFACTANT OR A TERTIARY FATTY AMINE IN A MEDIUM RICH IN FATTY SUBSTANCES

The present invention relates to a composition for dyeing keratin fibres, comprising a) one or more fatty substances, which are preferably liquid and non-silicone; b) one or more betaine amphoteric surfactants and/or one or more tertiary fatty amines; c) (2,5-diaminophenyl)ethanol; d) optionally, one or more couplers; e) optionally one or more basifying agents; and f) one or more chemical oxidizing agents such as hydrogen peroxide, and the content of fatty substances in the composition representing in total at least 10%, in particular at least 15% by weight, more particularly at least 20% by weight and more preferentially at least 25% by weight relative to the weight of the composition.

The present invention also relates to a dyeing process using this composition, and to a multi-compartment device that is suitable for the use of this composition.

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

One of the dyeing methods is "permanent" or oxidation dyeing, which uses dyeing compositions containing oxidation dye precursors, generally known as oxidation bases. These oxidation bases are colourless or weakly coloured compounds which, in combination with oxidizing products, can give rise to coloured compounds by an oxidative condensation process.

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 the molecules used as oxidation bases and couplers allows a rich palette of colours to be obtained.

It is also possible to use direct dyes in order especially to provide glints to the coloration obtained. These direct dyes are coloured and colouring molecules that have an affinity for the fibres. Examples that may be mentioned include nitrobenzene, 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, under alkaline pH conditions in the vast majority of cases. The role of this oxidizing agent is, at least partially, to degrade the melanin of the hair, which, depending on the nature of the oxidizing agent present, leads to more or less pronounced lightening of the fibres. The oxidizing agent used is generally hydrogen peroxide.

One of the difficulties encountered during the implementation of the dyeing processes of the prior art arises from the fact that they are carried out under alkaline conditions and that the basifying agents most commonly used are aqueous ammonia and amines. Specifically, the basifying agent makes it possible to adjust the pH of the composition to an alkaline pH to enable activation of the oxidizing agent. In addition, this basifying agent causes swelling of the keratin fibre, with raising of the scales, which promotes the penetration of the oxidizing agent, and also of the dyes, if they are present, essentially oxidation dyes, into the fibre, and thus increases the efficacy of the dyeing or lightening reaction.

However, these basifying agents, and especially aqueous ammonia, cause the user discomfort due to their strong characteristic odour.

Moreover, not only may the user be inconvenienced by the odour, but he/she may also be confronted with greater risks of intolerance, for instance irritation of the scalp, which is especially reflected by stinging.

It is also important to obtain colorations that are light-fast. However, the use of certain couplers such as meta-phenylenediamines, for example, induces degradation caused by sunlight.

Moreover, it has been proposed in oxidation dyeing to use an oxidation base of (2,5-diaminophenyl)ethanol type (EP 0 858 796). Colorations that use this oxidation base are also known, especially combined with particular acids such as diethylenetriaminepenta(methylene)phosphonic acid (EP 2 103 299) or with chlorinated bases or chlorinated couplers such as 2-amino-6-chloro-4-nitrophenol, 2,6-dichloro-4-aminophenol, 2-chloro-6-ethylamino-4-nitrophenol 3-amino-5-chloroaniline, 2-chloro-4-aminophenol or 2-chloro-6-methyl-3-aminophenol (WO 98/17233, WO 98/19658, WO 98/19659, WO 98/19660, EP 0 985 406, EP 0 727 203, DE 19828204, DE 19724334 or WO 96/15765), or with couplers such as 3-(2,4-diaminophenoxy)-1-propanol (WO 2001/051019). However, these combinations of bases, couplers and acids produce colours that are not always satisfactory, whose dyeing power is limited or even insufficient to ensure in particular suitable coverage of grey hair and/or which show excessive selectivity of the coloration between the root and the end and/or insufficient fastness with respect to external attacking factors such as light, shampoos, inclement weather, etc. In addition, none of these documents describes a dye composition comprising a large amount of fatty substances, in particular of oil.

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

In particular, the composition according to the invention in the presence of a chemical oxidizing agent makes it possible to obtain colours that are satisfactory, especially in terms of power in general, but also with satisfactory coverage or build-up of the colour at the root of the hair, which makes it possible to avoid a "root" effect of the coloration. The colorations obtained are also sparingly selective. Finally, it is also possible to obtain colorations that are very light-fast.

Furthermore, the invention makes it possible to achieve substantial degrees of lightening while at the same time colouring, without using persalts or increasing the amount of chemical oxidizing agent or of basifying agent.

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

a) one or more fatty substances, which are preferably liquid and non-silicone;

b) one or more betaine amphoteric surfactants and/or one or more tertiary fatty amines comprising at least one C_8-C_{30} fatty chain; preferentially one or more betaine amphoteric surfactants or one or more tertiary fatty amines comprising at least one C_8-C_{30} fatty chain;

c) one or more oxidation base(s) chosen from (2,5-diaminophenyl)ethanol, acid salts thereof or solvates thereof such as hydrates;

d) optionally one or more coupler(s);

e) optionally one or more basifying agent(s);

f) one or more chemical oxidizing agent(s) such as hydrogen peroxide; and

the fatty substance content representing in total at least 10%, in particular at least 15% by weight, more particularly at least 20% by weight and more preferentially at least 25% by weight even more particularly at least 30% by weight, more preferentially at least 40% by weight and even more preferentially at least 50 % by weight relative to the total weight of the composition.

Another subject of the invention is dyeing processes using the composition of the invention containing at least one chemical oxidizing agent, and a multi-compartment device that enables the use of the composition of the invention.

Thus, the use of the dye composition according to the invention leads to powerful, intense, chromatic and/or sparingly selective colorations, i.e. colorations that are uniform along the fibre. The dyeing process of the invention also makes it possible to cover keratin fibres particularly well at their root, especially down to three centimetres from the base of the said fibres. Moreover, the colours obtained after treating the fibres remain stable, in particular towards light.

The invention also makes it possible to reduce the amounts of active agents of the invention such as the dyes and/or basifying agents and/or oxidizing agents.

Furthermore, the processes according to the invention use formulations that are less malodorous during their application to the hair or during their preparation.

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

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

The human keratin fibres 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".

a) Fatty substances

As has been mentioned, the composition of the invention comprises a) one or more fatty substances, which are preferably non-silicone and liquid at room temperature (25°C) and at atmospheric pressure.

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 less than 1% and even more preferentially less than 0.1%). They exhibit, in their structure, at least one hydrocarbon 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 (-C(O)OH or -C(O)O$^-$). In particular, the fatty substances of the invention are neither polyoxyalkylenated nor polyglycerolated.

Preferably, the fatty substances used in the composition according to the invention are non-silicone oils.

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

The term "*non-silicone oil*" means an oil not containing any silicon atoms (Si) and the term "*silicone oil*" means an oil containing at least one silicon atom.

In other words, the fatty substance(s) are preferably non-silicone liquid fatty substances.

More particularly, the fatty substances are chosen from C_6-C_{16} hydrocarbons, hydrocarbons containing more than 16 carbon atoms, non-silicone oils of animal origin, plant oils of triglyceride type, synthetic triglycerides, fluoro oils, fatty alcohols, fatty acid and/or fatty alcohol esters other than triglycerides and plant waxes, non-silicone waxes and silicones.

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

As regards the C_6-C_{16} hydrocarbons, they are linear, branched or optionally cyclic, and are preferably alkanes. Examples that may be mentioned include hexane, dodecane and isoparaffins such as isohexadecane and isodecane.

A hydrocarbon-based oil of animal origin that may be mentioned is perhydrosqualene.

The triglyceride oils of plant or synthetic origin are preferably chosen from 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, sunflower oil, castor oil, avocado oil, caprylic/capric acid triglycerides, for instance those sold by the company Stéarineries Dubois or those sold under the names Miglyol® 810, 812 and 818 by the company Dynamit Nobel, jojoba oil and shea butter oil.

The linear or branched hydrocarbons of mineral or synthetic origin containing more than 16 carbon atoms are preferably chosen from liquid paraffins, petroleum jelly, liquid petroleum jelly, polydecenes and hydrogenated polyisobutene such as Parleam®.

The fluoro oils may be chosen from 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 bromoperfluorooctyl sold under the name Foralkyl® by the company Atochem; nonafluoromethoxybutane and nonafluoroethoxyisobutane; perfluoromorpholine derivatives such as 4-trifluoromethyl perfluoromorpholine sold under the name PF 5052® by the company 3M.

The fatty alcohols that may be used in the composition according to the invention are saturated or unsaturated, and linear or branched, and comprise from 6 to 30 carbon atoms and more particularly from 8 to 30 carbon atoms. Examples that may be mentioned include cetyl alcohol, stearyl alcohol and the mixture thereof (cetylstearyl alcohol), octyldodecanol, 2-butyloctanol, 2-hexyldecanol, 2-undecylpentadecanol, oleyl alcohol and linoleyl alcohol.

The wax(es) that may be used in the composition according to the invention are chosen especially from carnauba wax, candelilla wax, esparto grass wax, paraffin wax, ozokerite, plant waxes, for instance olive wax, rice wax, hydrogenated jojoba wax or the absolute waxes of flowers such as the essential wax of blackcurrant blossom sold by the company Bertin (France), animal waxes, for instance beeswaxes, or modified beeswaxes (cerabellina); other waxes or waxy starting materials that may be used according to the invention are especially marine waxes such as the product sold by the company Sophim under the reference M82, and polyethylene waxes or polyolefin waxes in general.

As regards the esters of fatty acids and/or of fatty alcohols, which are advantageously different from the triglycerides mentioned above, mention may be made in particular of esters of saturated or unsaturated, linear or branched C_1-C_{26} aliphatic mono- or polyacids and of saturated or unsaturated, linear or branched C_1-C_{26} aliphatic mono- or polyalcohols, the total carbon number of the esters more particularly being 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-octyldecyl palmitate, alkyl myristates such as isopropyl, butyl, cetyl, 2-octyldodecyl, myristyl or stearyl myristate, hexyl stearate, butyl stearate, isobutyl stearate; dioctyl malate, hexyl laurate, 2-hexyldecyl 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 mono-, di- or tricarboxylic acids and of C_2-C_{26} di-, tri-, tetra- or pentahydroxy alcohols may also be used.

Mention may in particular be made of: diethyl sebacate; diisopropyl sebacate; diisopropyl adipate; di(n-propyl) adipate; dioctyl adipate; diisostearyl adipate; dioctyl maleate; glyceryl undecylenate; octyldodecyl stearoyl stearate; pentaerythrityl monoricinoleate; pentaerythrityl tetraisononanoate; pentaerythrityl tetrapelargonate; pentaerythrityl tetraisostearate; pentaerythrityl tetraoctanoate; propylene glycol dicaprylate; propylene glycol dicaprate; tridecyl erucate; triisopropyl 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-octyldecyl palmitate, alkyl myristates such as isopropyl, butyl, cetyl or 2-octyldodecyl myristate, hexyl stearate, butyl stearate, isobutyl stearate; dioctyl malate, hexyl laurate, 2-hexyldecyl laurate, isononyl isononanoate or cetyl octanoate.

The composition may also comprise, as fatty ester, sugar esters and diesters of C_6-C_{30} and preferably $C_{12}C_{22}$ fatty acids. It is recalled that the term "sugar" is understood to mean oxygen-bearing hydrocarbon-based compounds that contain several alcohol functions, with or without aldehyde or ketone functions, and that comprise at least 4 carbon atoms. These sugars may be monosaccharides, oligosaccharides or polysaccharides.

Mention may be made, as suitable sugars, for example, of sucrose (or saccharose), glucose, galactose, ribose, fucose, maltose, fructose, mannose, arabinose, xylose, lactose and their derivatives, in particular alkyl derivatives, such as methyl derivatives, for example methylglucose.

The sugar esters of fatty acids may be chosen in particular from the group comprising the esters or mixtures of esters of sugars described previously and of linear or branched, saturated or unsaturated C_6-C_{30} and preferably C_{12}-C_{22} fatty acids. If they are unsaturated, these compounds may comprise one to three conjugated or unconjugated carbon-carbon double bonds.

The esters according to this variant may also be chosen from mono-, di-, tri- and tetraesters, polyesters, and mixtures thereof.

These esters can, for example, be oleates, laurates, palmitates, myristates, behenates, cocoates, stearates, linoleates, linolenates, caprates, arachidonates or their mixtures, such as, in particular, oleate/palmitate, oleate/stearate or palmitate/stearate mixed esters.

More particularly, use is made of monoesters and diesters and in particular mono- or di-oleate, -stearate, -behenate, -oleate/palmitate, -linoleate, -linolenate or -oleate/stearate of sucrose, of glucose or of methylglucose.

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% diester-triester-polyester;
- the sucrose monopalmitate/stearate-dipalmitate/stearate sold by Goldschmidt under the name Tegosoft® PSE.

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

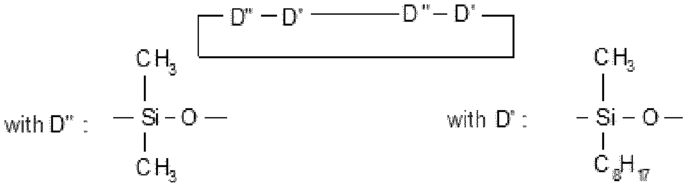
Preferably, the silicone is chosen from polydialkylsiloxanes, in particular polydimethylsiloxanes (PDMSs), and organomodified polysiloxanes comprising at least one functional group chosen from amino groups, aryl groups and alkoxy groups.

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 having a boiling point of between 60°C and 260°C, and more particularly still 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:



$$\boxed{-D''-D'-\!\!-\!\!-D''-D'-}$$

$$\text{with } D'': \; -\overset{CH_3}{\underset{CH_3}{Si}}-O- \qquad \text{with } D': \; -\overset{CH_3}{\underset{C_8H_{17}}{Si}}-O-$$

Mention may also be made of mixtures of cyclic polydialkylsiloxanes with organosilicon compounds, such as the mixture of octamethylcyclotetrasiloxane and tetra(trimethylsilyl)pentaerythritol (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 5×10^{-6} m^2/s at 25°C. An example is decamethyltetrasiloxane sold in particular under the name SH 200 by the company Toray Silicone. Silicones coming within this category are also described in the paper published in Cosmetics and Toiletries, Vol. 91, Jan. 76, pp. 27-32, Todd & Byers, *Volatile Silicone Fluids for Cosmetics*.

Use is preferably made of non-volatile polydialkylsiloxanes, polydialkylsiloxane gums and resins, polyorganosiloxanes modified with the organofunctional groups above, and mixtures thereof.

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

Mention may be made, among these polydialkylsiloxanes, without implied limitation, of the following commercial products:

- the Silbione® oils of the 47 and 70 047 series or the Mirasil® oils sold by Rhodia, such as, for example, the oil 70 047 V 500 000;

- the oils of the Mirasil® series sold by Rhodia;

- the oils of the 200 series from the company Dow Corning, such as DC200 with a viscosity of 60 000 mm^2/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 having dimethylsilanol end groups known under the name dimethiconol (CTFA), such as the oils of series 48 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 polydi(C_1-C_{20})alkylsiloxanes.

The silicone gums that may be used in accordance with the invention are in particular 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, polyisobutylenes, methylene chloride, pentane, dodecane, tridecane or their mixtures.

Products which can be used more particularly in accordance with the invention are mixtures such as:

- the 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 Dow Corning;

- the mixtures of a polydimethylsiloxane gum and of a cyclic silicone, such as the product SF 1214 Silicone Fluid from 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;

- the 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 General Electric. The product SF 1236 is a mixture of a gum SE 30 defined above, with a viscosity of 20 m^2/s, and of an oil SF 96 with a viscosity of 5×10^{-6} m^2/s. This product preferably comprises 15% of gum SE 30 and 85% of an oil SF 96.

The organopolysiloxane resins that may be used in accordance with the invention are crosslinked siloxane systems containing the following units:

$R_2SiO_{2/2}$, $R_3SiO_{1/2}$, $RSiO_{3/2}$ and $SiO_{4/2}$,

in which R represents an alkyl containing 1 to 16 carbon atoms. Among these products, those that are particularly preferred are those in which R denotes a C_1-C_4 lower alkyl group, more particularly methyl.

Mention may be made, among these resins, of the product sold under the name Dow Corning 593 or those sold under the names Silicone Fluid SS 4230 and SS 4267 by General Electric, which are silicones of dimethyl/trimethylsiloxane structure.

Mention may also be made of the resins of the trimethylsiloxysilicate type, sold especially under the names X22-4914, X21-5034 and X21-5037 by the company Shin-Etsu.

The organomodified silicones that may 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.

The organomodified silicones may be polydiarylsiloxanes, in particular polydiphenylsiloxanes, and polyalkylarylsiloxanes functionalized with the organofunctional groups mentioned previously.

The polyalkylarylsiloxanes are particularly chosen from linear and/or branched polydimethyl/methylphenylsiloxanes and polydimethyl/diphenylsiloxanes with a viscosity ranging from 1×10^{-5} to 5×10^{-2} m^2/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 Rhodorsil® 70 633 and 763 series 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.

Mention may also be made, among the organomodified silicones, of polyorganosiloxanes comprising:

- substituted or unsubstituted amine groups, such as the products sold under the names GP 4 Silicone Fluid and GP 7100 by 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, C_1-C_4 aminoalkyl groups;
- alkoxylated 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 substances according to the invention are non-silicone.

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 substances are advantageously chosen from C_{16}-C_{16} hydrocarbons, hydrocarbons containing more than 16 carbon atoms, triglycerides, fatty alcohols, esters of a fatty acid and/or of a fatty alcohol other than triglycerides, or mixtures thereof.

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

Even more preferentially, the fatty substances are chosen from liquid petroleum jelly and octyldodecanol.

The composition according to the invention comprises at least 15% by weight of fatty substances, which are preferably non-silicone, in particular of oils, preferably non-silicone oils, relative to the total weight of the composition of the invention. More particularly, the composition according to the invention comprises at least 20% and preferably at least 25%, at least 25% even more particularly at least 30%, more preferably at least 40% and even more preferably at least 50 % by weight of fatty substances, which are preferably non-silicone, in particular of oils, preferably non-silicone oils, relative to the total weight of the composition.

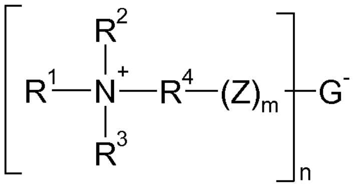
The composition according to the invention more particularly has a content of fatty substances, which are preferably non-silicone, in particular of oils, preferably non-silicone oils, ranging from 10% to 80%, more preferentially from 15% to 80% by weight, preferably from 25% to 75% by weight, better still from 30% to 70% by weight and even more advantageously from 30% to 60% by weight relative to the weight of the composition.

b) Betaine amphoteric surfactants and/or tertiary fatty amines comprising at least one C_8-C_{30} fatty chain

The composition of the invention also comprises one or more betaine surfactants and/or one or more tertiary fatty amines comprising at least one C_8-C_{30} fatty chain.

According to a particular embodiment of the invention, the ingredient b) represents one or more betaine surfactants.

More particularly, the betaine surfactant(s) are chosen from the compounds of formula **(I)**, and also the optional organic or mineral acid or base salts thereof, and solvates thereof such as hydrates:



$$\left[R^1-\overset{\displaystyle R^2}{\underset{\displaystyle R^3}{\overset{|}{\underset{|}{N^+}}}}-R^4-(Z)_m \right]_n G^- \qquad \textbf{(I)}$$

in which formula **(I)**:

- **R^1** denotes a saturated or unsaturated, linear or branched hydrocarbon-based chain comprising from 6 to 100 carbon atoms and in particular from 6 to 50 carbon atoms, which may be interrupted with one or more heteroatoms, divalent groups, or combinations thereof chosen from –O-, -C(O)- and -N(R)-; with R denoting a hydrogen atom or a C_1-C_4 alkyl radical, and R^1 also possibly being interrupted with an arylene group or terminated with an aryl group;
- **R^2** and **R^3**, which may be identical or different, in particular R^2 and R^3 are identical, denote a (C_1-C_6)alkyl group; preferably, R^2 and R^3 represent a methyl group;
- **R^4** denotes a linear or branched, preferably linear, divalent hydrocarbon-based radical comprising from 1 to 10 and preferably from 1 to 5 carbon atoms, optionally substituted in particular with one or more hydroxyl groups;
- **Z** denotes a heteroatom or a divalent group chosen from –O- and -N(R)- with R as defined previously,
- **n** denotes a number equal to 1 or 2;
- **m** denotes an integer equal to 0 or 1;
- **G^-** denotes an anionic radical chosen from carboxylates, sulfates, sulfonates, phosphates and phosphonates (*–C(O)-O$^-$, *–S(O)$_2$-O$^-$, *–O-S(O)$_2$-O$^-$, *–P(O)$_2$-O$^-$, *–P(O)-O$_2^-$, *–P(OH)-O$^-$, **=P(O)-O$^-$ and **=P-O$^-$; with "*-" denoting the point of attachment of the anionic radical to the rest of the molecule via Z or R^4 when n is

1, and "**=" representing the two points of attachment of the anionic radical via Z or R^4 when n is 2);

it being understood that:

- when n is 2, the radicals $R^1R^2R^3N^+$-R'-$(Z)_m$- are identical or different, preferably identical; and
- the surfactant of formula (I) being electrically neutral, it may comprise anionic and/or cationic counterions to produce the electrical neutrality of the molecule.

The term "*unsaturated*" hydrocarbon-based chain means a hydrocarbon-based chain which comprises one or more double bonds and/or one or more triple bonds, said bonds possibly being conjugated or unconjugated.

The term "*alkyl radical*" means a saturated, linear or branched, preferably of C_1-C_8, hydrocarbon-based radical.

The term "*alkenyl radical*" means a linear or branched, preferably C_2-C_8, hydrocarbon-based radical; which is unsaturated, comprising one or more conjugated or unconjugated double bonds.

The term "*alkoxy radical*" means an alkyl-oxy radical for which the alkyl radical is a linear or branched C_1-C_{16} and preferentially C_1-C_8 hydrocarbon-based radical.

The term "*aryl*" radical means a fused or non-fused monocyclic or polycyclic carbon-based group comprising from 6 to 22 carbon atoms, and in which at least one ring is aromatic; preferentially, the aryl radical is a phenyl, biphenyl, naphthyl, indenyl, anthracenyl or tetrahydronaphthyl.

The term "*arylene*" radical means a fused or non-fused monocyclic or polycyclic, divalent aromatic carbon-based radical comprising from 6 to 22 carbon atoms, and in which at least one ring is aromatic, preferably phenylene and more preferentially 1,3-phenylene or 1,4-phenylene.

The term "*optionally substituted*" attributed to the radical in question means that said radical may be substituted with one or more radicals chosen from the following radicals: i) hydroxyl, ii) C_1-C_4 alkoxy, iii) acylamino, iv) amino optionally substituted with one or two identical or different C_1-C_4 alkyl radicals, said alkyl radicals possibly forming, with the nitrogen atom that bears them, a 5- to 7-membered heterocycle, optionally comprising another nitrogen or non-nitrogen heteroatom.

The term "*organic or mineral acid salt*" more particularly means salts chosen from a salt derived from i) hydrochloric acid HCl, ii) hydrobromic acid HBr, iii) sulfuric acid

H_2SO_4, iv) alkylsulfonic acids: Alk-$S(O)_2OH$ such as methanesulfonic acid and ethanesulfonic acid; v) arylsulfonic acids: Ar-$S(O)_2OH$ such as benzenesulfonic acid and toluenesulfonic acid; vi) citric acid; vii) succinic acid; viii) tartaric acid; ix) lactic acid; x) alkoxysulfinic acids: Alk-O-S(O)OH such as methoxysulfinic acid and ethoxysulfinic acid; xi) aryloxysulfinic acids such as tolueneoxysulfinic acid and phenoxysulfinic acid; xii) phosphoric acid H_3PO_4; xiii) acetic acid $CH_3C(O)OH$; xiv) triflic acid CF_3SO_3H; and xv) tetrafluoroboric acid HBF_4;

The term "*organic or mineral base salt*" more particularly means salts chosen from a salt derived from basifying agents as defined in "e) Additional basifying agents" hereinbelow.

The term "*anionic counterion*" means an anion or an anionic group derived from an organic or mineral acid salt which counterbalances the cationic charge of the dye; more particularly, the anionic counterion is chosen from: i) halides such as chloride or bromide; ii) nitrates; iii) sulfonates, including C_1-C_6 alkylsulfonates: Alk-$S(O)_2O^-$ such as methanesulfonate or mesylate and ethanesulfonate; iv) arylsulfonates: Ar-$S(O)_2O^-$ such as benzenesulfonate and toluenesulfonate or tosylate; v) citrate; vi) succinate; vii) tartrate; viii) lactate; ix) alkyl sulfates: Alk-O-$S(O)O^-$ such as methyl sulfate and ethyl sulfate; x) aryl sulfates: Ar-O-$S(O)O^-$ such as benzene sulfate and toluene sulfate; xi) alkoxy sulfates: Alk-O-$S(O)_2O^-$ such as methoxy sulfate and ethoxy sulfate; xii) aryloxy sulfates: Ar-O-$S(O)_2O^-$, xiii) phosphates $O=P(OH)_2-O^-$, $O=P(O^-)_2-OH$, $O=P(O^-)_3$, $HO-[P(O)(O^-)]_w-P(O)(O^-)_2$ with w being an integer; xiv) acetate; xv) triflate; and xvi) borates such as tetrafluoroborate, xvii) disulfate $(O=)_2S(O^-)_2$ or SO_4^{2-} and monosulfate HSO_4^-; the anionic counterion, derived from an organic or mineral acid salt, ensures the electrical neutrality of the molecule; thus, it is understood that when the anion comprises several anionic charges, then the same anion can serve for the electrical neutrality of several cationic groups in the same molecule or else may serve for the electrical neutrality of several molecules; for example, a betaine surfactant which contains two positive charges either may contain two "*singly charged*" anionic counterions or contains a "*doubly charged*" anionic counterion such as $(O=)_2S(O)_2$ or $O=P(O^-)_2-OH$.

In particular, the cationic counterion(s) are chosen from alkali metals such as Na or K or alkaline-earth metals such as Mg or Ca, or organic cations such as ammonium or mono/di/tri(C_1-C_6)alkylammonium, and/or the anionic counterion(s) are chosen from halides such as chloride or alkylsulfonates such as mesylates.

More preferentially, the optional cationic counterion(s) are chosen from alkali metals such as Na or K or alkaline-earth metals such as Mg or Ca, and/or the anionic counterion(s) are chosen from halides such as chloride or alkylsulfonates such as mesylates.

According to a preferred embodiment of the invention, the betaine surfactant(s) are chosen from the surfactants of formula **(I)** in which **n** is equal to 1 and **G$^-$** denotes an anionic radical chosen from *-C(O)O- and *–S(O)$_2$-O$^-$.

According to an advantageous embodiment of the invention, the betaine surfactant(s) are chosen from the surfactants of formula **(I)** in which **R^4** denotes a linear C_1-C_5 divalent alkylene radical optionally substituted with a hydroxyl group, such as -CH$_2$.CH$_2$-CH$_2$-, -CH$_2$-CH(OH)-CH$_2$- or –CH$_2$-CH$_2$-.

According to a preferred embodiment of the invention, the betaine surfactant(s) are chosen from the surfactants of formula **(I)** in which **m** is **1** and **Z** represents an oxygen atom or a group –N(R)- with R as defined previously. More preferentially, when m is 1, then Z represents an oxygen atom.

According to another preferred embodiment of the invention, the betaine surfactant(s) are chosen from the surfactants of formula **(I)** in which **m** is **0**.

According to another preferred embodiment of the invention, the betaine surfactant(s) are chosen from the surfactants of formula **(I)** in which **R^1** denotes a group chosen from i) C_6-C_{30} alkyl; ii) C_6-C_{30} alkenyl; -(C_6-C_{30})alkylamido(C_1-C_4)alkyl or -(C_6-C_{30})alkenylamido(C_1-C_4)alkyl, with amido representing a group –C(O)-N(R)- and R being as defined previously. Particularly, R denotes a hydrogen atom.

More particularly, R^1 denotes a linear or branched, preferably linear, C_6-C_{30} alkyl radical.

More particularly, the betaine surfactant(s) that may be used in the present invention are chosen from (C_8-C_{20})alkylbetaines, sulfobetaines, (C_8-C_{20})alkylamido(C_3-C_8)alkylbetaines and (C_8-C_{20})alkylamido(C_6-C_8)alkylsulfobetaines, better still from (C_8-C_{20})alkylbetaines and (C_8-C_{20})alkylamido(C_3-C_8)alkylbetaines and even better still from (C_8-C_{20})alkylbetaines.

Even more preferentially, the betaine surfactant according to the invention is cocoylbetaine.

In the composition of the invention, the amount of ingredient b) 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, more particularly from 0.5% to 10%

by weight and more preferentially from 1% to 5% by weight relative to the total weight of the composition.

According to another particular embodiment of the invention, the ingredient b) represents one or more tertiary fatty amines comprising at least one C_8-C_{30} fatty chain.

The tertiary amine(s) used in the dye composition according to the invention comprise at least one saturated or unsaturated C_8-C_{30} hydrocarbon-based chain.

In other words, the tertiary amine(s) used in the dye composition according to the invention comprise at least one C_8-C_{30} alkyl or alkenyl chain.

Preferably, the tertiary amine(s) comprise at least one saturated or unsaturated C_{12}-C_{30}, especially C_{15}-C_{20} and in particular C_{18} hydrocarbon-based chain.

Even more preferentially, the tertiary amine(s) comprise at least one unsaturated C_8-C_{30} and in particular C_{18} hydrocarbon-based chain.

The tertiary amine(s) used in the dye composition according to the invention may be chosen especially from alkylamidoamines, such as (C_8-C_{30})alkylamidodi(C_1-C_6)alkylamines and (C_8-C_{30})alkenylamidodi(C_1-C_6)alkylamines.

Preferably, the tertiary amine(s) are chosen from (C_{12}-C_{30})alkylamidodi(C_1-C_6)alkylamines and (C_{12}-C_{30})alkenylamidodi(C_1-C_6)alkylamines, especially (C_{15}-C_{20})alkenylamidodi(C_1-C_4)alkylamines.

In particular, the tertiary amines according to the invention are chosen from the oleylamidopropyldimethylamine sold under the name Mackine 501V by the company MacIntyre and the stearamidopropyldimethylamine sold under the name Mackine 301 by the company MacIntyre, or mixtures thereof.

More preferentially, the tertiary amines comprising at least one C_8-C_{30} fatty chain are chosen from oleylamidopropyldimethylamine.

The composition according to the invention advantageously comprises a total amount ranging from 0.1% to 20% by weight, preferably ranging from 0.5% to 10% by weight and more preferentially ranging from 1% to 5% by weight relative to the total weight of the composition.

Preferably, the dye composition comprises one or more non-silicone liquid fatty substances and one or more tertiary amines comprising at least one C_8-C_{30} fatty chain, chosen from (C_8-C_{30})alkylamidodi(C_1-C_6)alkylamines and (C_8-C_{30})alkenylamidodi(C_1-C_6)alkylamines.

According to yet another particular embodiment of the invention, the ingredient b) represents a mixture of one or more betaine amphoteric surfactants as defined previously and of one or more tertiary fatty amines comprising at least one C_8-C_{30} fatty chain as defined previously.

The composition according to the invention then advantageously comprises a total amount of the mixture of one or more betaine amphoteric surfactants as defined previously and of one or more tertiary fatty amines comprising at least one C_8-C_{30} fatty chain as defined previously ranging from 0.1% to 20% by weight, preferably ranging from 0.5% to 10% by weight and more preferentially ranging from 1% to 5% by weight relative to the total weight of the composition.

Additional surfactants other than the betaine amphoteric surfactants and/or the tertiary fatty amines

The composition for dyeing keratin fibres according to the invention may also contain one or more additional or supplementary surfactants, i.e. other than the betaine amphoteric surfactants and/or the tertiary fatty amines as defined previously. According to a particular embodiment of the invention, the supplementary surfactant(s) are chosen from anionic, 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 $-C(O)OH$, $-C(O)O^-$, $-SO_3H$, $-S(O)_2O^-$, $-OS(O)_2OH$, $-OS(O)_2O^-$, $-P(O)OH_2$, $-P(O)_2O^-$, $-P(O)O_2^-$, $-P(OH)_2$, $=P(O)OH$, $-P(OH)O^-$, $=P(O)O^-$, $=POH$ and $=PO^-$, the anionic parts comprising a cationic counterion such as an alkali metal, an alkaline-earth metal or an ammonium.

Mention may be made, as examples of anionic surfactants which can be used in the composition according to the invention, of alkyl sulfates, alkyl ether sulfates, alkylamido ether sulfates, alkylaryl polyether sulfates, monoglyceride sulfates, alkylsulfonates, alkylamidesulfonates, alkylarylsulfonates, α-olefinsulfonates, paraffinsulfonates, alkyl sulfosuccinates, alkyl ether sulfosuccinates, alkylamide sulfosuccinates, alkyl sulfoacetates, acyl sarcosinates, acyl glutamates, alkyl sulfosuccinamates, acyl isethionates and N-acyl taurates, salts of alkyl monoesters of polyglycoside-polycarboxylic acids, acyl lactylates, salts of D-galactosideuronic acids, salts of alkyl ether carboxylic acids, salts of alkylaryl ether carboxylic acids, salts of alkylamido ether carboxylic acids, 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 can 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 chosen from C_6-C_{24} alkyl polyglycoside-citrates, 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, ammonium salts, amine salts and in particular amino alcohol salts or 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.

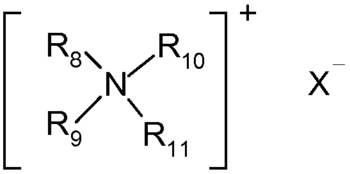
Use is preferably made, among the anionic surfactants mentioned, of (C_6-C_{24})alkyl sulfates, (C_6-C_{24})alkyl ether sulfates comprising from 2 to 50 ethylene oxide units, in particular in the form of alkali metal, ammonium, amino alcohol and alkaline-earth metal salts, or a mixture of these compounds.

In particular, it is preferable to use (C_{12}-C_{20})alkyl sulfates, (C_{12}-C_{20})alkyl ether sulfates comprising from 2 to 20 ethylene oxide units, in particular in the form of alkali metal, ammonium, amino alcohol and alkaline-earth metal salts, or a mixture of these compounds. Better still, it is preferred to use sodium lauryl ether sulfate containing 2.2 mol of ethylene oxide.

The cationic surfactant(s) which can be used in the composition according to the invention comprise, for example, salts of optionally polyoxyalkylenated 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 **(A4)** below**:**



(A4)

in which formula **(A4)**:

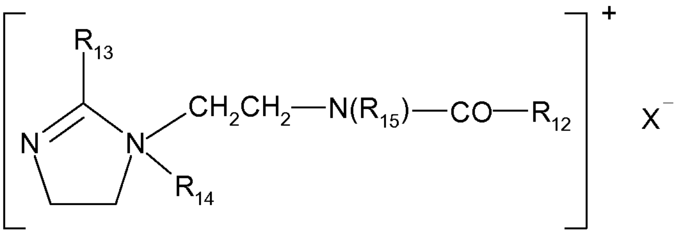
- R_8 to R_{11}, which may be identical or different, represent a linear or branched aliphatic group comprising from 1 to 30 carbon atoms, or an aromatic group such as aryl or alkylaryl, it being understood that at least one of the groups R_8 to R_{11} comprises from 8 to 30 carbon atoms and preferably from 12 to 24 carbon atoms; and
- X^- represents an organic or inorganic anionic counterion, such as that chosen from halides, acetates, phosphates, nitrates, $(C_1\text{-}C_4)$alkyl sulfates, $(C_1\text{-}C_4)$alkyl or $(C_1\text{-}C_4)$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 $C_1\text{-}C_{30}$ alkyl, $C_1\text{-}C_{30}$ alkoxy, polyoxy$(C_2\text{-}C_6)$alkylene, $C_1\text{-}C_{30}$ alkylamide, $(C_{12}\text{-}C_{22})$alkylamido$(C_2\text{-}C_6)$alkyl, $(C_{12}\text{-}C_{22})$alkyl acetate and $C_1\text{-}C_{30}$ hydroxyalkyl groups, X^- is an anionic counterion chosen from the group of halides, phosphates, acetates, lactates, $(C_1\text{-}C_4)$alkyl sulfates and $(C_1\text{-}C_4)$alkyl- or $(C_1\text{-}C_4)$alkylarylsulfonates.

Among the quaternary ammonium salts of formula **(A4)**, preference is given firstly to tetraalkylammonium chlorides, for instance dialkyldimethylammonium or alkyltrimethylammonium chlorides in which the alkyl group contains approximately from 12 to 22 carbon atoms, in particular behenyltrimethylammonium chloride, distearyldimethylammonium chloride, cetyltrimethylammonium chloride, benzyldimethylstearylammonium chloride, or else, secondly, distearoylethylhydroxyethylmethylammonium methosulfate, dipalmitoylethylhydroxyethylammonium methosulfate or distearoylethylhydroxyethylammonium methosulfate, or else, lastly, palmitylamidopropyltrimethylammonium 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 **(A5)** below:



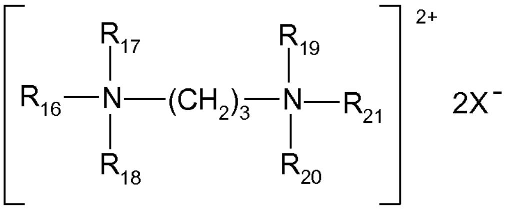
(A5)

in which formula **(A5)**:

- R_{12} represents an alkenyl or alkyl group comprising from 8 to 30 carbon atoms, for example fatty acid derivatives of tallow;
- 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;
- R_{14} represents a C_1-C_4 alkyl group;
- 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, phosphates, acetates, lactates, (C_1-C_4)alkyl sulfates, (C_1-C_4)alkyl or (C_1-C_4)alkylaryl sulfonates.

R_{12} and R_{13} preferably denote a mixture of alkyl or alkenyl groups containing from 12 to 21 carbon atoms, for example tallow fatty acid derivatives, R_{14} denotes a methyl group, and R_{15} 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, particularly of formula **(A6)** below:



$$\left[R_{16}-\overset{\overset{R_{17}}{|}}{\underset{\underset{R_{18}}{|}}{N}}-(CH_2)_3-\overset{\overset{R_{19}}{|}}{\underset{\underset{R_{20}}{|}}{N}}-R_{21} \right]^{2+} 2X^-$$

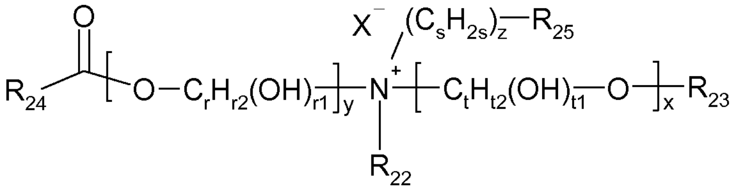
(A6)

in which formula (**A6**):

- R_{16} denotes an alkyl group comprising approximately from 16 to 30 carbon atoms, which is optionally hydroxylated and/or interrupted with one or more oxygen atoms;
- R_{17} is chosen from hydrogen, an alkyl group comprising from 1 to 4 carbon atoms or a group $-(CH_2)_3-N^+(R_{16a})(R_{17a})(R_{18a}), X^-$;
- R_{16a}, R_{17a}, R_{18a}, R_{18}, R_{19}, R_{20} and R_{21}, 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, represent an organic or inorganic anionic counterion, such as that chosen from halides, acetates, phosphates, nitrates, (C_1-C_4)alkyl sulfates, (C_1-C_4)alkyl or (C_1-C_4)alkylaryl sulfonates, 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);

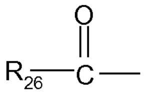
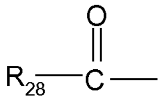
- - quaternary ammonium salts containing one or more ester functions, such as those of formula **(A7)** below:



$$R_{24}-\overset{O}{\overset{\|}{C}}-\left[O-C_rH_{r2}(OH)_{r1}\right]_y-\underset{R_{22}}{\overset{X^-\ (C_sH_{2s})_z-R_{25}}{N^+}}-\left[C_tH_{t2}(OH)_{t1}-O\right]_x-R_{23}$$

(A7)

in which formula **(A7)**:

- R_{22} is chosen from C_1-C_6 alkyl groups and C_1-C_6 hydroxyalkyl or C_1-C_6 dihydroxyalkyl groups,
- R_{23} is chosen from:
  - the group  $R_{26}-\overset{O}{\overset{\|}{C}}-$,
  - linear or branched, saturated or unsaturated C_1-C_{22} hydrocarbon-based groups R_{27},
  - a hydrogen atom,
- R_{25} is chosen from:
  - the group  $R_{28}-\overset{O}{\overset{\|}{C}}-$,
  - linear or branched, saturated or unsaturated C_1-C_6 hydrocarbon-based groups R_{29},
  - a hydrogen atom,
- R_{24}, R_{26} and R_{28}, which may be identical or different, are selected from linear or branched, saturated or unsaturated C_7-C_{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 equals 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 has a value from 1 to 10.

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

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

Advantageously, R_{24}, R_{26} and R_{28}, which are identical or different, are selected from linear or branched, saturated or unsaturated C_{11}-C_{21} hydrocarbon-based groups, and more particularly from linear or branched, saturated or unsaturated C_{11}-C_{21} alkyl and alkenyl groups.

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

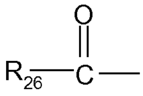
Advantageously, y is equal to 1.

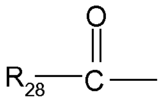
Preferably, r, s and t, which may be identical or different, are equal to 2 or 3, and even more particularly are equal to 2.

The anionic counterion X^- is preferably a halide, such as chloride, bromide or iodide; a $(C_1$-$C_4)$alkyl sulfate or a $(C_1$-$C_4)$alkyl- or $(C_1$-$C_4)$alkylarylsulfonate. However, it is possible to use 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 comprising an ester function.

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 **(A7)** 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  $R_{26}-C(=O)-$
    - methyl, ethyl or C_{14}-C_{22} hydrocarbon-based groups
    - a hydrogen atom,
- R_{25} is chosen from:

  - the group  $R_{28}-\overset{O}{\overset{\|}{C}}-$
  - a hydrogen atom,

- R_{24}, R_{26} and R_{28}, which may be identical or different, are chosen from linear or branched, saturated or unsaturated C_{13}-C_{17} hydrocarbon-based groups, and preferably 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 **(A7)**, examples that may be mentioned include salts, especially the chloride or methyl sulfate, of diacyloxyethyldimethylammonium, diacyloxyethylhydroxyethylmethylammonium, monoacyloxyethyldihydroxyethylmethylammonium, triacyloxyethylmethylammonium or monoacyloxyethylhydroxyethyldimethylammonium, 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 comprises several acyl groups, these groups may be identical or different.

These products are obtained, for example, by direct esterification of triethanolamine, triisopropanolamine, an alkyldiethanolamine or an alkyldiisopropanolamine, which are optionally oxyalkylenated, with fatty acids or with fatty acid mixtures of vegetable 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 dialkyl 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 monoesters, diesters 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 US-A-4 874 554 and US-A-4 137 180.

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 can 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, α-diols and (C_1-C_{20})alkylphenols, these compounds being polyethoxylated, polypropoxylated or polyglycerolated, and containing at least one fatty chain comprising, for example, from 8 to 18 carbon atoms, it being possible for the number of ethylene oxide and/or propylene oxide groups to especially range from 2 to 50, and for the number of glycerol groups to especially range from 2 to 30.

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

The nonionic surfactants are chosen more particularly from mono- or polyoxyalkylenated or mono- or polyglycerolated nonionic surfactants. The oxyalkylene units are more particularly oxyethylene or oxypropylene units, or a combination thereof, preferably oxyethylene units.

Examples of oxyalkylenated nonionic surfactants that may be mentioned include:

- oxyalkylenated (C_8-C_{24})alkylphenols;
- saturated or unsaturated, linear or branched, oxyalkylenated C_8-C_{30} alcohols;
- saturated or unsaturated, linear or branched, oxyalkylenated C_8-C_{30} amides;
- esters of saturated or unsaturated, linear or branched, C_8-C_{30} acids and of polyethylene glycols;
- polyoxyethylenated esters of saturated or unsaturated, linear or branched, C_8-C_{30} acids and of sorbitol;

- saturated or unsaturated oxyethylenated vegetable 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 oxypropylene units.

In accordance with one preferred embodiment of the invention, the oxyalkylenated nonionic surfactants are chosen from oxyethylenated C_8-C_{30} alcohols comprising from 1 to 100 mol of ethylene oxide; polyoxyethylenated esters of saturated or unsaturated, linear or branched C_8-C_{30} acids and of sorbitol comprising from 1 to 100 mol of ethylene oxide.

As examples of monoglycerolated or polyglycerolated nonionic surfactants, monoglycerolated or polyglycerolated C_8-C_{40} alcohols are preferably used.

In particular, the monoglycerolated or polyglycerolated C_8-C_{40} alcohols correspond to formula **(A8)** below:

$$R_{29}O\text{-}[CH_2\text{-}CH(CH_2OH)\text{-}O]_m\text{-}H \qquad \textbf{(A8)}$$

in which formula **(A8)**:

- R_{29} represents a linear or branched C_8-C_{40} and preferably C_8-C_{30} 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 **(A8)** that are suitable within 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 (A8) 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 C_8/C_{10} alcohol containing 1 mol of glycerol, the C_{10}/C_{12} alcohol containing 1 mol of glycerol and the C_{12} alcohol containing 1.5 mol of glycerol.

Preferably, the surfactant used in the process of the invention in the composition is a monooxyalkylenated or polyoxyalkylenated, particularly monooxyethylenated or polyoxyethylenated, or monooxypropylenated or polyoxypropylenated, nonionic surfactant, or a combination thereof, more particularly monooxyethylenated or polyoxyethylenated.

Preferably, the surfactant(s) are chosen from nonionic surfactants or from anionic surfactants. More particularly, the surfactant(s) present in the composition are chosen from nonionic surfactants.

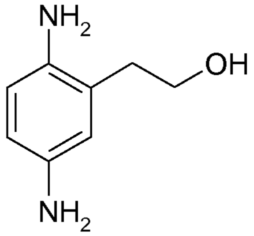
According to one variant of the invention, the composition and the process for treating (dyeing) keratin fibres use one or more surfactants chosen from nonionic surfactants, in particular mono- or polyoxyalkylenated nonionic surfactants; and/or one or more anionic surfactants, in particular of alkyl sulfate type.

Even more preferentially, the nonionic surfactants are chosen from polyoxyethylenated sorbitol esters and polyoxyethylenated fatty alcohols, and mixtures thereof.

In the composition of the invention, the amount of the additional 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.

c) (2,5-Diaminophenyl)ethanol oxidation bases:

The composition of the invention comprises c) one or more oxidation bases chosen from (2,5-diaminophenyl)ethanol (or 2-β-hydroxyethyl-para-phenylenediamine) of the following formula, and also acid salts thereof or solvates thereof such as hydrates:



The oxidation base(s) chosen from (2,5-diaminophenyl)ethanol, acid salts thereof or solvates thereof such as hydrates, according to the invention, are advantageously in an amount ranging from 0.0001% to 20% by weight relative to the total weight of the composition, preferably from 0.005% to 10% by weight and more particularly from 0.01% to 10% by weight relative to the total weight of the composition.

The composition according to the invention may comprise one or more additional oxidation bases, i.e. oxidation bases other than (2,5-diaminophenyl)ethanol, acid salts thereof or solvates thereof such as hydrates. According to one particular embodiment of the invention, the additional base(s) are chosen from heterocyclic bases and benzene bases, and the addition salts thereof.

The benzene oxidation bases according to the invention are particularly chosen from para-phenylenediamines, bis(phenyl)alkylenediamines, para-aminophenols and ortho-aminophenols, and the addition salts thereof.

Among the para-phenylenediamines that may be mentioned, for example, are para-phenylenediamine, para-tolylenediamine, 2-chloro-para-phenylenediamine, 2,3-dimethyl-para-phenylenediamine, 2,6-dimethyl-para-phenylenediamine, 2,6-diethyl-para-phenylenediamine, 2,5-dimethyl-para-phenylenediamine, N,N-dimethyl-para-phenylenediamine, N,N-diethyl-para-phenylenediamine, N,N-dipropyl-para-phenylenediamine, 4-amino-N,N-diethyl-3-methylaniline, N,N-bis(β-hydroxyethyl)-para-phenylenediamine, 4-N,N-bis(β-hydroxyethyl)amino-2-methylaniline, 4-N,N–bis(β-hydroxyethyl)amino-2-chloroaniline, 2-fluoro-para-phenylenediamine, 2-isopropyl-para-phenylenediamine, N-(β-hydroxypropyl)-para-phenylenediamine, 2-hydroxymethyl-para-phenylenediamine, N,N-dimethyl-3-methyl-para-phenylenediamine, N-ethyl-N-(β-hydroxyethyl)-para-phenylenediamine, N-(β,γ-dihydroxypropyl)-para-phenylenediamine, N-(4'-aminophenyl)-para-phenylenediamine, N-phenyl-para-phenylenediamine, 2-β-hydroxyethyloxy-para-phenylenediamine, 2-β-acetylaminoethyloxy-para-phenylenediamine, N-(β-methoxyethyl)-para-phenylenediamine, 4-aminophenylpyrrolidine, 2-thienyl-para-phenylenediamine, 2-β-hydroxyethylamino-5-aminotoluene and 3-hydroxy-1-(4'-aminophenyl)pyrrolidine, and the addition salts thereof with an acid.

Among the para-phenylenediamines mentioned above, para-phenylenediamine or PPD, para-tolylenediamine or PTD, 2-isopropyl-para-phenylenediamine, 2-β-hydroxyethyloxy-para-phenylenediamine, 2,6-dimethyl-para-phenylenediamine, 2,6-diethyl-para-phenylenediamine, 2,3-dimethyl-para-phenylenediamine, N,N-bis(β-hydroxyethyl)-para-phenylenediamine, 2-chloro-para-phenylenediamine and 2-β-acetylaminoethyloxy-para-phenylenediamine, and the addition salts thereof with an acid, are particularly preferred.

Among the bis(phenyl)alkylenediamines that may be mentioned, for example, are N,N'-bis(β-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(β-hydroxyethyl)-N,N'-bis(4-aminophenyl)tetramethylenediamine, N,N'-bis(4-methylaminophenyl)tetramethylenediamine, N,N'-bis(ethyl)-N,N'-bis(4'-amino-3'-methylphenyl)ethylenediamine and 1,8-bis(2,5-diaminophenoxy)-3,6-dioxaoctane, and the 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-hydroxymethylphenol, 4-amino-2-methylphenol, 4-amino-2-hydroxymethylphenol, 4-amino-2-methoxymethylphenol, 4-amino-2-aminomethylphenol, 4-amino-2-(β-hydroxyethylaminomethyl)phenol and 4-amino-2-fluorophenol, and the addition salts thereof with an acid.

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 the addition salts thereof.

The heterocyclic bases according to the invention are more particularly chosen from pyridine derivatives, pyrimidine derivatives and pyrazole derivatives, and the addition salts thereof.

Among the pyridine derivatives 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-diaminopyridine, 2-(4-methoxyphenyl)amino-3-aminopyridine and 3,4-diaminopyridine, and the addition salts thereof.

Other pyridine oxidation bases that are useful in the dyeing process according to the invention are the 3-aminopyrazolo[1,5-a]pyridine oxidation bases or the 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-acetylaminopyrazolo[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-a]pyrid-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-a]pyridine-3,7-diamine, 7-morpholin-4-ylpyrazolo[1,5-a]pyrid-3-ylamine, pyrazolo[1,5-a]pyridine-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-a]pyrid-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 the addition salts thereof.

Among the pyrimidine derivatives that may be mentioned are the compounds described, for example, in patents DE 2359399, JP 88-169571, JP 05-63124 and EP 0 770 375 or patent application WO 96/15765, such as 2,4,5,6-tetraaminopyrimidine, 4-hydroxy-2,5,6-triaminopyrimidine, 2-hydroxy-4,5,6-triaminopyrimidine, 2,4-dihydroxy-5,6-diaminopyrimidine, 2,5,6-triaminopyrimidine and addition salts thereof, and tautomeric forms thereof, when a tautomeric equilibrium exists.

Among the pyrazole derivatives that may be mentioned are the compounds described in patents DE 3843892, DE 4133957 and patent applications WO 94/08969, WO 94/08970, FR-A-2 733 749 and DE 195 43 988, such as 4,5-diamino-1-methylpyrazole, 4,5-diamino-1-(β-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-triamino-pyrazole, 1-methyl-3,4,5-triaminopyrazole, 3,5-diamino-1-methyl-4-methylaminopyrazole, 3,5-diamino-4-(β-hydroxyethyl)amino-1-methylpyrazole, and addition salts thereof. Use may also be made of 4,5-diamino-1-(β-methoxyethyl)pyrazole.

Use will preferably be made of a 4,5-diaminopyrazole and more preferably still of 4,5-diamino-1-(β-hydroxyethyl)pyrazole and/or a salt thereof.

Pyrazole derivatives that may also be mentioned include diamino-N,N-dihydropyrazolopyrazolones and especially those described in patent application FR-A-2 886 136, such as the following compounds and the addition salts thereof: 2,3-diamino-

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-(pyrrolidin-1-yl)-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one, 4,5-diamino-1,2-dimethyl-1,2-dihydropyrazol-3-one, 4,5-diamino-1,2-diethyl-1,2-dihydropyrazol-3-one, 4,5-diamino-1,2-di(2-hydroxyethyl)-1,2-dihydropyrazol-3-one, 2-amino-3-(2-hydroxyethyl)amino-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, 2,3-diamino-5,6,7,8-tetrahydro-1H,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 or 2,3-diamino-6-hydroxy-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one.

Use will preferably be made of 2,3-diamino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one and/or a salt thereof.

Heterocyclic bases that will preferentially be used include 4,5-diamino-1-(β-hydroxyethyl)pyrazole and/or 2,3-diamino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one and/or a salt thereof.

The additional oxidation base(s) according to the invention 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.

d) Additional couplers

The composition of the invention may comprise one or more couplers. According to one preferred embodiment, the composition and the process use one or more couplers. Among these couplers, mention may be made especially of meta-phenylenediamines, meta-aminophenols, meta-diphenols, naphthalene-based couplers and heterocyclic couplers, and also the 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-(β-hydroxyethyloxy)benzene, 2-amino-4-(β-hydroxyethylamino)-1-methoxybenzene, 1,3-diaminobenzene, 1,3-bis(2,4-diaminophenoxy)propane, 3-ureidoaniline, 3-ureido-1-dimethylaminobenzene, sesamol, 1-β-hydroxyethylamino-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, 1-H-3-methylpyrazol-5-one, 1-phenyl-3-methylpyrazol-5-one, 2,6-dimethylpyrazolo[1,5-b]-1,2,4-triazole, 2,6-dimethyl[3,2-c]-1,2,4-triazole and 6-methylpyrazolo[1,5-a]benzimidazole, the addition salts thereof with an acid, and mixtures thereof.

The coupler(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 of the invention.

In general, the addition salts of the oxidation bases and couplers which can be used in the context of the invention are selected in particular from the addition salts with an acid, such as the hydrochlorides, hydrobromides, sulfates, citrates, succinates, tartrates, lactates, tosylates, benzenesulfonates, phosphates and acetates.

In one variant of the invention, the composition does not contain any para-phenylenediamine (PPD) and/or the process for treating keratin fibres does not use PPD. According to another advantageous embodiment, the composition and/or the process for treating keratin fibres do not use chlorinated bases or halogenated couplers, in particular chlorinated bases or couplers such as those chosen from 2-amino-6-chloro-4-nitrophenol, 2,6-dichloro-4-aminophenol, 2-chloro-6-ethylamino-4-nitrophenol, 3-amino-5-chloroaniline, 2-chloro-4-aminophenol and 2-chloro-6-methyl-3-aminophenol. According to another particular embodiment, the composition and/or the process for treating keratin fibres do not use 3-(2,4-diaminophenoxy)-1-propanol couplers.

Additional dyes

The composition of the invention may also comprise one or more direct dyes. The latter 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 the following direct dyes: azo dyes; methine dyes; carbonyl dyes; azine dyes; nitro(hetero)aryl dyes; tri(hetero)arylmethane dyes; porphyrin dyes; phthalocyanin dyes, and natural direct dyes, alone or as mixtures.

More particularly, the azo dyes comprise an –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 –N=N- to be engaged in a ring.

The dyes of the methine family are more particularly compounds comprising at least one sequence chosen from >C=C< and –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, monoarylmethanes 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, thioindigo, 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 phthalocyanin 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; indoamine direct dyes; indigoid direct dyes; phthalocyanin direct dyes, porphyrin direct dyes and natural direct dyes, alone or as mixtures.

Among the natural dyes that may be used according to the invention, mention may be made of lawsone, juglone, alizarin, purpurin, carminic acid, kermesic acid, purpurogallin, protocatechaldehyde, indigo, isatin, curcumin, spinulosin, apigenidin, haematin, haematoxylin, brasilein, brasilin, and orceins. Use may also be made of extracts or decoctions comprising these natural dyes and in particular henna-based poultices or extracts.

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.

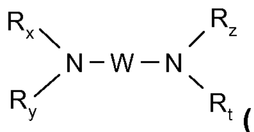
e) Additional basifying agents:

The composition of the invention may also comprise e) one or more basifying agents. According to one embodiment of the invention, the composition and the process for treating keratin fibres use one or more basifying agents. The basifying agent(s) may be inorganic or organic or hybrid.

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

The organic basifying agent(s) are preferably chosen from organic amines with a pK_b 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 pK_b corresponding to the function of highest basicity. In addition, the organic amines do not comprise an alkyl or alkenyl fatty chain 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 having formula **(II)** below:



$$(R_x)(R_y)N-W-N(R_z)(R_t)$$

(II)

in which formula **(II)** W is a divalent C_1-C_6 alkylene radical optionally substituted with one or more hydroxyl groups or a C_1-C_6 alkyl radical, and/or optionally interrupted with one or more heteroatoms such as O, or NR_u; R_x, R_y, R_z, R_t and R_u, which may be identical or different, represent a hydrogen atom or a C_1-C_6 alkyl, C_1-C_6 hydroxyalkyl or C_1-C_6 aminoalkyl radical.

Examples of amines of formula (**II**) that may be mentioned include 1,3-diaminopropane, 1,3-diamino-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 C_1-C_8 alkyl groups bearing one or more hydroxyl radicals.

The organic amines chosen from alkanolamines such as monoalkanolamines, dialkanolamines or trialkanolamines comprising one to three identical or different C_1-C_4 hydroxyalkyl radicals are in particular suitable for performing the invention.

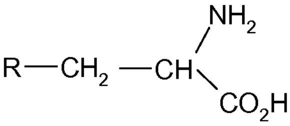
Among the compounds of this type, mention may be made of monoethanolamine (MEA), diethanolamine, triethanolamine, monoisopropanolamine, diisopropanolamine, N-dimethylaminoethanolamine, 2-amino-2-methyl-1-propanol, triisopropanolamine, 2-amino-2-methyl-1,3-propanediol, 3-amino-1,2-propanediol, 3-dimethylamino-1,2-propanediol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

More particularly, the amino acids that may be used are of natural or synthetic origin, in their L, 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 can be in the neutral or ionic form.

Mention may in particular be made, as amino acids which can be used in the present invention, 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.

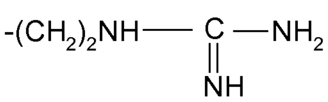
Such basic amino acids are preferably chosen from those corresponding to formula **(III)** below:



$$R-CH_2-CH(NH_2)-CO_2H$$

(III)

in which formula **(III)** R represents a group chosen from: imidazolyl, preferably 4-imidazolyl; $-(CH_2)_3NH_2$; $-(CH_2)_2NH_2$; $-(CH_2)_2-NH-C(O)-NH_2$; and



$$-(CH_2)_2NH-C(=NH)-NH_2$$

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

The organic amine can also be chosen from organic amines of heterocyclic type. Mention may in particular be made, in addition to histidine already mentioned in the amino acids, of pyridine, piperidine, imidazole, triazole, tetrazole or benzimidazole.

The organic amine can 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 balenine.

The organic amine may also be chosen from compounds comprising a guanidine function. As amines of this type that can 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, glycocyamine, 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 alkanolamines, amino acids in neutral or ionic form, in particular basic amino acids, and preferably corresponding to those having the formula **(III)**. Even more preferentially, the basifying agent(s) are chosen from monoethanolamine (MEA) and basic amino acids in neutral or ionic form.

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.

According to a first particular embodiment, the composition according to the invention does not contain, or else the process according to the invention does not use any aqueous ammonia, or a salt thereof, as basifying agent.

If, however, according to another particular embodiment, the composition or the process did use any, its content would advantageously not exceed 0.03% by weight (expressed as NH_3) and would preferably not exceed 0.01% by weight relative to the weight of the composition of the invention. Preferably, if the composition comprises aqueous ammonia, or a salt thereof, then the amount of basifying agent(s) other than the aqueous ammonia is greater than that of the aqueous ammonia (expressed as NH_3).

f) Chemical oxidizing agent

The composition of the invention comprises f) one or more chemical oxidizing agents. The term "chemical oxidizing agent" means an oxidizing agent other than atmospheric oxygen. The composition of the invention preferably contains one or more chemical oxidizing agents.

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

This oxidizing agent advantageously consists of hydrogen peroxide.

The concentration of chemical oxidizing agents 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 can also comprise one or more organic solvents.

Examples of organic solvents that may be mentioned include linear or branched C_2-C_4 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 clays or 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 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, alkylaryl sulfonates and amine oxides, and mixtures thereof.

Mention may be made, as organophilic clays, of quaternium-18 bentonites, such as those sold under the names Bentone 3, Bentone 38 and Bentone 38V by Rheox, Tixogel VP by United Catalyst and Claytone 34, Claytone 40 and Claytone XL by Southern Clay; stearalkonium bentonites, such as those sold under the names Bentone 27 by Rheox, Tixogel LG by United Catalyst and Claytone AF and Claytone APA by Southern Clay; and quaternium-18/benzalkonium bentonite, such as those sold under the names Claytone HT and Claytone PS by Southern Clay.

The fumed silicas can be obtained by high-temperature hydrolysis of a volatile silicon compound in an oxyhydrogen flame, producing a finely divided silica. This process makes it possible in particular to obtain hydrophilic silicas which contain 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 HS-5®, Cab-O-Sil EH-5®, Cab-O-Sil LM-130®, Cab-O-Sil MS-55® and Cab-O-Sil M-5® by the company Cabot.

It is possible to chemically modify the surface of the silica by chemical reaction for the purpose of reducing the number of silanol groups. It is possible in particular to replace silanol groups with hydrophobic groups: a hydrophobic silica is then obtained.

The hydrophobic groups can be:

- trimethylsiloxyl groups, which are obtained in particular 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.

- dimethylsilyloxyl or polydimethylsiloxane groups, which are obtained in particular by treating fumed silica in the presence of polydimethylsiloxane or dimethyldichlorosilane. 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 acid diethanolamide or monoethanolamide, oxyethylenated alkyl ether carboxylic acid monoethanolamide), polymeric thickeners, such as cellulose-based thickeners (hydroxyethylcellulose, hydroxypropylcellulose, carboxymethylcellulose), guar gum and derivatives thereof (hydroxypropyl guar), gums of microbial origin (xanthan gum, scleroglucan gum), crosslinked homopolymers of acrylic acid or of acrylamidopropanesulfonic acid and associative polymers (polymers comprising hydrophilic regions and hydrophobic regions having a fatty chain (alkyl or alkenyl chain comprising at least 10 carbon atoms) which are capable, in an aqueous medium, of reversibly associating with one another or with other molecules).

According to a specific 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, scleroglucan gum) and crosslinked homopolymers of acrylic acid or of acrylamidopropanesulfonic acid, and preferably from cellulose-based thickeners with in particular hydroxyethylcellulose.

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, preferably in the form of an emulsion and particularly of a direct emulsion.

Processes of the invention

The composition according to the invention comprising the ingredients a) to f) as defined previously is applied to dry or wet keratin fibres. It is left in place on the fibres 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°C and 25°C) and 80°C and preferably between room temperature and 60°C.

After the treatment, the human keratin fibres are optionally rinsed with water, optionally washed with a shampoo and then rinsed with water, before being dried or left to dry.

The composition according to the invention is generally prepared by mixing at least two compositions.

In a first variant of the invention, the composition according to the invention comprising the ingredients a) to f) as defined previously results from the mixing of two compositions:

- a composition (A) comprising c) at least one oxidation base chosen from (2,5-diaminophenyl)ethanol, addition salts thereof or solvates thereof such as hydrates; d) optionally at least one coupler as defined previously; e) at least one basifying agent as defined previously; and
- a composition (B) comprising f) at least one chemical oxidizing agent as defined previously,

it being understood that:

- at least one of the compositions (A) or (B) comprises a) at least one fatty substance that is preferably a non-silicone liquid as defined previously, and b) at least one betaine amphoteric surfactant and/or at least one tertiary fatty amine as defined previously, such that the content of fatty substances in the composition according to the invention resulting from the mixing of compositions (A) + (B) comprises at least 10%, in particular at least 15% by weight, more particularly at least 20% by weight and more preferentially at least 25% by weight relative to the weight of the composition derived form the mixture of (A)+(B).

Preferentially, at least one of the compositions (A) or (B) is aqueous.

Even more preferentially, both the compositions (A) and (B) are aqueous.

The term "aqueous composition" means a composition comprising at least 5% water. Preferably, an aqueous composition comprises more than 10% by weight of water and more advantageously still more than 20% by weight of water.

Preferably, composition (A) is aqueous.

In this variant, composition (A) comprises at least 50% of fatty substances and even more preferentially at least 50% of non-silicone fatty substances that are liquid at room temperature (25°C).

Preferably, composition (A) is a direct or inverse emulsion and preferably a direct (O/W) emulsion.

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

In a second variant of the invention, the composition according to the invention comprising ingredients a) to f) as defined previously results from the mixing of three compositions, the three compositions being aqueous or at least one of them being anhydrous.

More particularly, for the purposes of the invention, the expression "anhydrous cosmetic composition" means a cosmetic composition with a water content of less than 5% by weight, preferably less than 2% by weight and more preferably still 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 the water of crystallization of the salts or traces of water absorbed by the raw materials used in the preparation of the compositions according to the invention.

In this second variant, use will preferably be made of two aqueous compositions (B') and (C') and an anhydrous composition (A'). The anhydrous composition (A') then preferably comprises a) at least one fatty substance as defined previously and more preferentially at least one liquid fatty substance. Composition (B') then preferably comprises c) at least the oxidation base chosen from (2,5-diaminophenyl)ethanol, acid salts thereof or solvates thereof such as hydrates and d) optionally at least one coupler as defined previously. Composition (C') then preferably comprises f) at least one chemical oxidizing agent as defined previously. The basifying agent(s) e) as defined previously are included in the compositions (A') and/or (B') and preferably solely in composition (B'). The betaine amphoteric surfactant(s) and/or the tertiary fatty amine(s)

b) as defined previously are included in at least one of the compositions (A'), (B') or (C'), these three compositions being such that the fatty substance content of the composition according to the invention resulting from the mixing of the three compositions (A')+(B')+(C') comprises at least 10%, in particular at least 15% by weight, more particularly at least 20% by weight and more preferentially at least 25% by weight relative to the weight of the composition derived from the mixture (A')+(B')+(C').

In this variant, the compositions (A‘), (B’) and (C’) are preferably mixed in a weight ratio (A’)+(B’)/(C’) ranging from 0.2 to 10 and better still from 0.5 to 2 and in a weight ratio (A’)/(B’) ranging from 0.5 to 10 and better still from 1 to 5.

Finally, the invention relates to a first multi-compartment device comprising a first compartment containing composition (A) as described above and at least a second compartment containing composition (B) as described above, the compositions of the compartments being intended to be mixed before application to give the formulation after mixing according to the invention, provided that the amount of fatty substance in this formulation represents at least 10%, in particular at least 15% by weight, more particularly at least 20% by weight and more preferentially at least 25% by weight relative to the weight of the composition resulting from the mixing of (A)+(B).

The invention also relates to a second multi-compartment device comprising a first compartment containing composition (A’) as described above and a second compartment containing a cosmetic composition (B’) as described above and at least a third compartment comprising composition (C’) as described above, the compositions of the compartments being intended to be mixed before application to give the formulation after mixing according to the invention, provided that the amount of fatty substance in this formulation represents at least 10%, in particular at least 15% by weight, more particularly at least 20% by weight and more preferentially at least 25% by weight relative to the weight of the composition resulting from the mixing of (A’)+(B’)+(C’).

The evaluation of the coloration can be done visually or read on a spectrocolorimeter (such as Minolta CM3600d, illuminant D65, angle 10°, SCI values) for the L*, a*, b* colorimetric measurements. In this L*, a*, b* system, L* represents the intensity of the color, a* indicates the green/red color axis and b* indicates the blue/yellow color axis. The lower the value of L, the darker or more intense the color. The higher the value of a*, the redder the shade; the higher the value of b*, the yellower the shade. The variation in coloring between the colored locks of natural white hair (NW) which is untreated (control) and after treatment or coloration are defined by ΔE*, corresponding to the colour uptake on keratin fibers, according to the following equation:

$$\Delta E^* = \sqrt{(L^* - L_o^*)^2 + (a^* - a_o^*)^2 + (b^* - b_o^*)^2}$$

In this equation, L*, a* and b* represent the values measured after dyeing the natural hair comprising 90% of white hairs and L_0*, a_0* and b_0* represent the values measured for the untreated natural hair comprising 90% of white hairs.

The greater the value of ΔE, the greater the difference in color between the control locks and the dyed locks and the greater colour uptake is.

On the other hand for evaluating the selectivity of the color between the root and tip of the keratin fiber, measurement can be done on permed or sensibilised white hair (PW) and natural white hair, wherein the variation in coloring between the colored locks PW and the colored natural white hair are defined by ΔE*, corresponding to the selectivity of the colour, is calculated according to the following equation:

$$\Delta E^* = \sqrt{(L^* - L_o^*)^2 + (a^* - a_o^*)^2 + (b^* - b_o^*)^2}$$

In this equation, L*, a* and b* represent the values measured after dyeing the natural hair comprising 90% of white hairs and L_0*, a_0* and b_0* represent the values measured after dyeing the permed or sensibilised hair. The lowest ΔE*, the best homogeneity of the hair color.

If the light fastness is investigated, ΔE* is also calculated for the L_0*, a_0*, b_0* and L*, a*, b* measured of the locks before and after exposure to the light, respectively.

Chromaticity in the CIE L*, a*, b* colorimetric system is calculated according to the following equation :

$$C^* = \sqrt{a^{*2} + b^{*2}}$$

The greater the value of C*, the greater the chromaticity is.

The examples that follow serve to illustrate the invention without, however, being limiting in nature.

EXAMPLES

The following compositions are prepared in which the amounts are expressed in grams of active materials.

EXAMPLE 1: Dye composition A1:

Ingredients	A1
Liquid petroleum jelly (fatty substance a)	60
Oxyethylenated (40 OE) hydrogenated castor oil (fatty substance a)	1
Cocoylbetaine as an aqueous solution (betaine surfactant b)	10
2-(2,5-Diaminophenyl)ethanol sulfate (oxidation base c)	1.58
6-Hydroxybenzomorpholine (coupler d)	0.033
1-β-Hydroxyethyloxy-2,4-diaminobenzene dihydrochloride (coupler d)	0.02
1,3-Dihydroxybenzene (resorcinol) (coupler d)	0.67
1-Hydroxy-3-aminobenzene (coupler d)	0.12
Pure monoethanolamine (basifying agent e)	5.16
Hydroxyethylcellulose (MW: 1.300.000)	2.5
Oxyethylenated stearyl alcohol (2 OE)	0.1
Oxyethylenated stearyl alcohol (20 OE)	0.1
Sodium lauryl ether sulfate (2.2 OE) as an aqueous solution	2.5
Sequestrant	2
Reducing agent	0.5
Antioxidant	0.5
Deionized water	qs 100

Oxidizing composition B1:

Ingredients	B1
50% hydrogen peroxide solution (200-volumes hydrogen peroxide solution) (chemical oxidizing agent f)	6
Etidronic acid, tetrasodium salt, as a 30% aqueous solution	0.2
Tetrasodium pyrophosphate decahydrate	0.04
Sodium salicylate	0.035
Dimethyldiallylammonium chloride/acrylic acid copolymer (80/20) as a protected aqueous solution	0.74
Glycerol	4
(50/50 C_8/C_{10})Alkyl polyglucoside (2) as a buffered aqueous 60% solution	3
Deionized water	qs 100

The dye composition A1 is mixed with the oxidizing formula B1 in a ratio of 3 parts of A1 per 4 parts of B1.

The mixture A1+B1 obtained is then applied to 90% grey hair. The "mixture/lock" bath ratio is 10/1 (g/g). The leave-on time is 35 minutes at 27°C.

After the leave-on time, the hair is rinsed with clear water and a shampoo is applied.

After drying, a light chestnut-brown shade of good strength and coverage is obtained on the hair.

EXAMPLE 2:

The following compositions are prepared, in which the amounts are expressed in grams of product in their given state.

Dye composition **A2**:

Composition	**A2**
Liquid petroleum jelly (fatty substance a)	4
2-(2,5-Diaminophenyl)ethanol sulfate (oxidation base c)	1.58
6-Hydroxybenzomorpholine (coupler d)	0.033
1-β-Hydroxyethyloxy-2,4-diaminobenzene dihydrochloride (coupler d)	0.02
1,3-Dihydroxybenzene (resorcinol) (coupler d)	0.67
1-Hydroxy-3-aminobenzene (coupler d)	0.12
Oleylamidopropyldimethylamine (compound b)	2.5
Monoethanolamine (basifying agent e)	4
Oxyethylenated (20 OE) and oxypropylenated (5 OP) cetyl alcohol	20
Oxyethylenated (10 OE) oleyl alcohol hydrogen phosphate	0.5
Sequestrant	0.2
Reducing agent	0.5
Antioxidant	0.3
Deionized water	qs 100

Oxidizing composition:

Composition	**B2**
Hydrogen peroxide as an aqueous 50% solution (200-volumes aqueous hydrogen peroxide solution) (chemical oxidizing agent f)	15
Disodium tin hexahydroxide	0.04
Tetrasodium pyrophosphate decahydrate	0.03
Liquid petroleum jelly	35
Poly[(dimethylimino)-1,3-propanediyl(dimethylimino)-1,6-hexanediyl dichloride] as an aqueous 60% solution	0.25
Polydimethyldiallylammonium chloride at 40% in water	0.5
Glycerol	0.5
Cetylstearyl alcohol (30/70 C_{16}/C_{18})	6
Oxyethylenated (20 OE) stearyl alcohol	5
Oxyethylenated (4 OE) rapeseed acid amide	1.3
Vitamin E: DL-α-Tocopherol	0.1
Sequestrant	0.15
Deionized water	qs 100

3. Procedure

The dye composition A2 is mixed with the oxidizing composition B2, at a rate of one part of dye composition per one part of oxidizing composition.

The mixtures A2+B2 are then applied to locks of hair comprising 90% white hairs, at a rate of 10 grams of mixture per one gram of lock.

After a leave-on time of 35 minutes at 27°C, the hair is rinsed with clear water and a conditioning shampoo is then applied to the hair.

After drying, a light chestnut-brown shade of good strength and coverage is obtained on the hair.

CLAIMS

1. Cosmetic composition comprising:

a) one or more fatty substances;

b) one or more betaine amphoteric surfactants and/or one or more tertiary amines comprising at least one C_8-C_{30} fatty chain;

c) one or more oxidation base(s) chosen from (2,5-diaminophenyl)ethanol, and also acid salts thereof or solvates thereof such as hydrates;

d) optionally one or more coupler(s);

e) optionally one or more basifying agent(s);

f) one or more chemical oxidizing agent(s), preferably hydrogen peroxide; and

the fatty substance content representing in total at least 15% by weight relative to the total weight of the composition and more particularly at least 25% even more particularly at least 30% by weight, more preferentially at least 40% by weight and even more preferentially at least 50 % by weight relative to the total weight of the composition.

2. Composition according to the preceding claim, characterized in that a) the fatty substance(s) are chosen from C_6-C_{16} hydrocarbons, hydrocarbons containing more than 16 carbon atoms, non-silicone oils of animal origin, plant oils of triglyceride type, synthetic triglycerides, fluoro oils, fatty alcohols, esters of fatty acids and/or of fatty alcohols other than triglycerides, and plant waxes, non-silicone waxes and silicones.

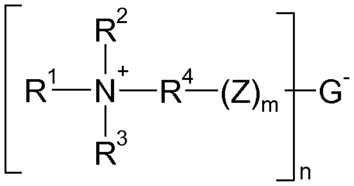
3. Composition according to either of the preceding claims, characterized in that a) the fatty substance(s) are liquid at room temperature and at atmospheric pressure and are preferably non-silicone.

4. Composition according to any one of the preceding claims, characterized in that the fatty substances are chosen from C_6-C_{16} hydrocarbons, hydrocarbons containing more than 16 carbon atoms, triglycerides, fatty alcohols, esters of fatty acids and/or of fatty alcohols other than triglycerides, or mixtures thereof, and preferably from liquid petroleum jelly, polydecenes, liquid fatty alcohols, liquid esters of fatty acids and/or of fatty alcohols, or mixtures thereof, and preferably from liquid petroleum jelly, polydecenes, liquid fatty alcohols and liquid esters of fatty acids and/or of fatty alcohols,

or mixtures thereof, and even more preferentially from liquid petroleum jelly and octyldodecanol.

5. Composition according to any one of the preceding claims, characterized in that a) the concentration of fatty substances ranges from 15% to 80% by weight, preferably from 25% to 75% by weight, in particular from 30% to 70% by weight and advantageously from 30% to 60% by weight relative to the total weight of the composition.

6. Composition according to any one of the preceding claims, characterized in that b) is chosen from one or more betaine surfactants; in particular from the compounds of formula **(I)** and also the optional acid or base salts thereof, or solvates thereof such as hydrates:



$$\left[R^1-\overset{\overset{\displaystyle R^2}{|}}{\underset{\underset{\displaystyle R^3}{|}}{N^+}}-R^4-(Z)_m \right]_n G^-$$

(I)

in which formula **(I)**:

- **R**^{1} denotes a saturated or unsaturated, linear or branched hydrocarbon-based chain, comprising from 6 to 100 and in particular from 6 to 50 carbon atoms, which may be interrupted with one or more heteroatoms, divalent groups, or combinations thereof chosen from –O-, -C(O)- and -N(R)-; with R denoting a hydrogen atom or a C_1-C_4 alkyl radical, and R^1 also possibly being interrupted with an arylene group and/or terminated with an aryl group;
- **R**^{2} and **R**^{3}, which may be identical or different, and are preferably identical, denote a (C_1-C_6)alkyl group, preferably methyl;
- **R**^{4} denotes a linear or branched, preferably linear, divalent hydrocarbon-based radical, comprising from 1 to 10 and preferably from 1 to 5 carbon atoms, optionally substituted in particular with one or more hydroxyl groups;
- **Z** denotes a heteroatom or a divalent group chosen from –O- and -N(R)- with R as defined previously,
- **n** denotes a number equal to 1 or 2;
- **m** denotes an integer equal to 0 or 1;

- **G^-** denotes an anionic radical chosen from carboxylates, sulfates, sulfonates, phosphates and phosphonates (*–C(O)-O$^-$, *–S(O)$_2$-O$^-$, *–O-S(O)$_2$-O$^-$, *–P(O)$_2$-O$^-$, *–P(O)-O$_2^-$, *–P(OH)-O$^-$, **=P(O)-O$^-$ and **=P-O$^-$; with "*-" denoting the point of attachment of the anionic radical to the rest of the molecule via Z or R^4 when n is 1, and "**=" representing the two points of attachment of the anionic radical via Z or R^4 when n is 2);

it being understood that:

- when n is 2, the radicals $R^1R^2R^3N^+$-R'-(Z)$_m$- are identical or different, preferably identical; and
- the surfactant of formula (I) being electrically neutral, it may comprise anionic and/or cationic counterions to produce the electrical neutrality of the molecule.

7. Composition according to the preceding claim, in which compound (I) is such that **R^4** denotes a linear C_1-C_5 divalent alkylene radical, optionally substituted with a hydroxyl group, such as –CH$_2$-CH$_2$-CH$_2$- or -CH$_2$-CH(OH)-CH$_2$-, or –CH$_2$-CH$_2$-.

8. Composition according to either of Claims 6 and 7, in which compound (I) is such that **m** is **1** and **Z** represents an oxygen atom or a group -N(R)- with R denoting a hydrogen atom or a C_1-C_4 alkyl radical, and preferentially, when m is 1, then Z represents an oxygen atom.

9. Composition according to either of Claims 6 and 7, in which compound (I) is such that **m** is **0**.

10. Composition according to Claims 6 to 9, in which compound (I) is such that **n** is equal to 1 and **G^-** denotes an anionic radical chosen from *-C(O)O$^-$ and *–S(O)$_2$-O$^-$.

11. Composition according to any one of Claims 6 to 10, in which compound (I) is such that **R^1** denotes a group chosen from i) C_6-C_{30} alkyl; ii) C_6-C_{30} alkenyl, -(C_6-C_{30})alkylamido(C_1-C_4)alkyl or -(C_6-C_{30})alkenylamido(C_1-C_4)alkyl, with amido representing a group -C(O)-N(R)- and R denoting a hydrogen atom or a C_1-C_4 alkyl radical; more particularly, R denoting a hydrogen atom and even more particularly R^1 denoting a linear or branched, preferably linear, C_6-C_{30} alkyl radical.

12. Composition according to any one of the preceding claims, characterized in that b) is chosen from $(C_8\text{-}C_{20})$alkylbetaines, sulfobetaines, $(C_8\text{-}C_{20})$alkylamido$(C_3\text{-}C_8)$alkylbetaines and $(C_8\text{-}C_{20})$alkylamido$(C_6\text{-}C_8)$alkylsulfobetaines; particularly chosen from $(C_8\text{-}C_{20})$alkylbetaines and $(C_8\text{-}C_{20})$alkylamido$(C_3\text{-}C_8)$alkylbetaines and preferentially from $(C_8\text{-}C_{20})$alkylbetaines such as cocoylbetaine.

13. Composition according to any one of the preceding claims, characterized in that b) is chosen from one or more tertiary amines which comprise at least one saturated or unsaturated $C_{12}\text{-}C_{30}$, especially $C_{15}\text{-}C_{20}$ and in particular C_{18} hydrocarbon-based chain.

14. Composition according to the preceding claim, characterized in that the tertiary amine(s) are chosen from alkylamidoamines, especially $(C_8\text{-}C_{30})$alkylamidodi$(C_1\text{-}C_6)$alkylamines and $(C_8\text{-}C_{30})$alkenylamidodi$(C_1\text{-}C_6)$alkylamines, particularly chosen from oleylamidopropyldimethylamine and stearamidopropyldimethylamine, or mixtures thereof.

15. Composition according to any one of the preceding claims, characterized in that the amount of ingredient b) 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, more particularly from 0.5% to 10% by weight and more preferentially from 1% to 5% by weight, relative to the total weight of the composition.

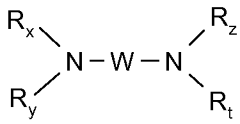
16. Composition according to any one of the preceding claims, characterized in that it comprises one or more surfactants chosen from nonionic surfactants, in particular mono- or polyoxyalkylenated nonionic surfactants; and/or one or more anionic surfactants, in particular of alkyl sulfate type.

17. Composition according to any one of the preceding claims, characterized in that the oxidation base(s) chosen from (2,5-diaminophenyl)ethanol, acid salts thereof or solvates thereof such as hydrates, are in an amount ranging from 0.0001% to 20% by weight relative to the total weight of the composition, preferably from 0.005% to 10% by weight and in particular from 0.01% to 10% by weight relative to the total weight of the composition.

18. Composition according to any one of the preceding claims, characterized in

that it comprises one or more coupler(s) d) preferably chosen from meta-phenylenediamines, meta-aminophenols, meta-diphenols, naphthalene-based couplers and heterocyclic couplers, and the addition salts thereof.

19. Composition according to any one of the preceding claims, characterized in that it comprises e) one or more basifying agents, which are preferably mineral, organic or hybrid and are chosen particularly from aqueous ammonia, alkali metal carbonates or bicarbonates such as sodium carbonate, potassium carbonate, sodium bicarbonate or potassium 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:



(II)

in which formula **(II)** W is a divalent C_1-C_6 alkylene radical optionally substituted with one or more hydroxyl groups or a C_1-C_6 alkyl radical, and/or optionally interrupted with one or more heteroatoms such as O, or NR_u; R_x, R_y, R_z, R_t and R_u, which may be identical or different, represent a hydrogen atom or a C_1-C_6 alkyl, C_1-C_6 hydroxyalkyl or C_1-C_6 aminoalkyl radical; particularly e) the basifying agent(s) are chosen from alkanolamines and more particularly monoethanolamine, and amino acids in neutral or ionic form.

20. Process for dyeing keratin fibres, in particular human keratin fibres such as the hair, which consists in applying to the said fibres the composition according to any one of the preceding claims.

21. Process according to the preceding claim, in which the composition as described according to any one of Claims 1 to 18 is obtained by mixing at least two compositions, preferably two or three compositions.

22. Process according to the preceding claim, in which the composition is derived from the mixing of two compositions:

a composition (A) comprising:

- at least one oxidation base c) as defined in Claim 1;
- at least one coupler d) as defined in Claim 18;

- optionally at least one basifying agent e) as defined in Claim 19; and

a composition (B) comprising:

- at least one chemical oxidizing agent f) as defined in Claim 1;
- at least one of the compositions (A) and (B) comprising:
  - o at least one fatty substance a) as defined in any one of Claims 1 to 5; and
  - o at least b) one surfactant as defined in Claims 1 and 6 to 12 and/or at least one tertiary fatty amine as defined in Claims 1, 13 and 14,

such that the fatty substance content of the composition according to the invention resulting from the mixing of compositions (A)+(B) comprises at least 10%, in particular at least 15% by weight, more particularly at least 20% by weight and more preferentially at least 25% by weight of fatty substance relative to the weight of the composition resulting from the said mixture.

23. Process according to Claim 20, in which the composition is derived from the mixing of three compositions, the three compositions being aqueous or at least one of them being anhydrous.

24. Process according to Claim 20, in which use is made of two aqueous compositions (B') and (C') and an anhydrous composition (A'),

- the anhydrous composition (A') comprising at least one fatty substance a) as defined in any one of Claims 1 to 5 and preferentially the fatty substance(s) are liquid;
- composition (B') comprising:
  - o at least one oxidation base c) as defined in Claim 1; and
  - o at least one coupler d) as defined in Claim 18;
- composition (C') comprising:
  - o at least one chemical oxidizing agent f) as defined in Claim 1;

it being understood that:

- optionally at least one basifying agent as defined in Claim 19; which is included in compositions (A') and/or (B') and preferably solely in composition (B');
- at least b) one surfactant as defined in Claims 1 and 6 to 12 and/or at least one tertiary fatty amine as defined in Claims 1, 13 and 14, which is included in at least one of the compositions (A’), (B’) or (C’).

these three compositions being such that the fatty substance content of the composition resulting from the mixing of the three compositions (A’)+(B’)+(C’) comprises at least 10%, in particular at least 15% by weight, more particularly at least 20% by weight and more preferentially at least 25% by weight of fatty substance relative to the weight of the composition resulting from the said mixture.

25. Multi-compartment device comprising:

- Either: i) a first compartment containing composition (A) as defined in Claim 22 and ii) at least a second compartment containing composition (B) as defined in Claim 22, the compositions of the compartments being intended to be mixed before application to give a composition after mixing of (A)+(B) in which the amount of fatty substance represents 10%, in particular at least 15% by weight, more particularly at least 20% by weight and more preferentially at least 25% by weight of fatty substance relative to the weight of the composition resulting from the said mixing of (A)+(B);
- Or: i) a first compartment containing composition (A') as defined in Claim 24; and ii) a second compartment containing a cosmetic composition (B') as described in Claim 24 and iii) at least a third compartment containing composition (C') as described in Claim 24; the compositions of the compartments being intended to be mixed before application to give a composition after mixing of (A')+(B')+(C') in which the amount of fatty substance represents at least 10%, in particular at least 15% by weight, more particularly at least 20% by weight and more preferentially at least 25% by weight relative to the weight of the composition resulting from the said mixing of (A')+(B')+(C').

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/056592

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61K8/22 A61K8/31 A61K8/41 A61K8/44 A61K8/92
A61Q5/10 A61K8/34
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61K A61Q

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 940 083 A1 (OREAL [FR]) 25 June 2010 (2010-06-25) page 4, line 17 - page 5, line 17 page 17, line 12 - line 20 page 24, line 8 - page 25, line 12; claims 1-5,8-10,14; example 1 -----	1,20,25
A	FR 2 940 058 A1 (OREAL [FR]) 25 June 2010 (2010-06-25) page 2, line 31 - page 3, line 17 page 3, line 24 - page 4, line 6 page 14, line 16 - line 24; claim 1; example 1 ----- -/--	1

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search 29 July 2013	Date of mailing of the international search report 06/08/2013
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Yon, Jean-Michel

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2012/032671 A1 (OREAL [FR]; MISU DAISUKE [JP]; YAMADA HIDETOSHI [JP]) 15 March 2012 (2012-03-15) page 1, line 24 - line 27 page 2, line 13 - line 16 page 2, line 31 - line 35 page 3, line 15 - line 33 page 4, line 6 - line 17 page 8, line 19 - line 22 page 13, line 37 - page 15, line 35 page 19, line 32 - page 20, line 14; claim 1; table 1 -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2013/056592

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
FR 2940083	A1	25-06-2010	NONE	
FR 2940058	A1	25-06-2010	NONE	
WO 2012032671	A1	15-03-2012	NONE	