Abstract:
The invention relates to a method for dyeing or lightening human keratinous fibres in which: (a) an anhydrous composition (A) comprising one or more fatty substances and one or more surfactants; (b) a composition (B) comprising one or more oxidizing agents and optionally one or more fatty substances; (c) a composition (C) comprising one or more alkaline agents and optionally one or more oxidation dyes and/or one or more direct dyes, are applied to the said fibres, the said fatty substance or substances being chosen from volatile linear alkanes, additional fatty substances and their mixtures, and it being understood that one or more volatile linear alkanes is or are present in at least one of the compositions (A), (B) or (C) and preferably in at least one of the compositions (A) and (B). The invention also relates to a device comprising the three compositions (A), (B) and (C) in three different compartments and to a ready-for-use composition resulting from the mixing of the compositions (A), (B) and (C).
Method for dyeing or lightening keratinous fibres in the presence of volatile linear alkane(s) and device

The present invention relates to a method for dyeing or lightening human keratinous fibres comprising the use of an anhydrous composition (A) which comprises one or more fatty substances and one or more surfactant(s), an oxidizing composition (B) and a composition (C) which comprises one or more alkaline agent(s) and optionally one or more dyes, one or more volatile linear alkanes being present in the composition (A), (B) and/or (C), and to a ready-for-use composition resulting from the mixing of the compositions (A), (B) and (C).

It also relates to a multicompartment device, a first compartment of which includes the said anhydrous composition, a second compartment of which includes an oxidizing composition and a third compartment of which includes a composition comprising at least one alkaline agent and optionally one or more dyes, one or more volatile linear alkanes being present in the first and/or the second compartment.

In the field of the dyeing of human keratinous fibres, such as the hair, mention may be made of oxidation or permanent dyeing. More particularly, this dyeing method employs one or more oxidation dye precursors, usually one or more oxidation bases, optionally in combination with one or more couplers.

In general, oxidation bases are chosen from ortho- or paraphenylenediamines, ortho- or paraaminophenols, and heterocyclic compounds. These oxidation bases are colourless or weakly coloured compounds which, in combination with oxidizing products, make it possible to access coloured entities by an oxidative condensation process.

Very often, the shades obtained with these oxidation bases are varied by combining them with one or more couplers, the latter being chosen in particular from aromatic meta-diamines, meta-aminophenols,
meta-diphenols and certain heterocyclic compounds, such as indole compounds.

The variety of the molecules involved as oxidation bases and couplers makes it possible to obtain a rich palette of colours.

Direct or semipermanent dyeing is also known. The method conventionally used in direct dyeing consists in applying, to the keratinous fibres, direct dyes, which are coloured and colouring molecules having affinity for the fibres, in leaving to stand, in order to allow the molecules to penetrate by diffusion inside the fibre, and in then rinsing them.

The direct dyes generally employed are chosen from nitrobenzene, anthraquinone, nitropyridine, azo, methine, azomethine, xanthene, acridine, azine or triarylmethane direct dyes.

This type of method does not require the use of an oxidizing agent to develop the colouring. However, the use of an oxidizing agent in order to obtain, with the colouring, a lightening effect is not ruled out. The reference is then to direct or semipermanent dyeing under lightening conditions.

Methods for permanent dyeing or also semipermanent dyeing under lightening conditions thus consist in employing, with the dyeing composition, an aqueous composition comprising at least one oxidizing agent, under alkaline pH conditions in the great majority of cases. The role of this oxidizing agent is to decompose the melanin of the hair, which, depending on the nature of the oxidizing agent present, results in more or less pronounced lightening of the fibres. Thus, for relatively weak lightening, the oxidizing agent is generally hydrogen peroxide. When greater lightening is desired, use is usually made of peroxynitrogenated salts, such as persulphates, for example, in the presence of hydrogen peroxide.

Methods for lightening human keratinous fibres consist in employing an aqueous composition comprising at least one oxidizing agent, under alkaline pH conditions in the great majority of cases. The role of this oxidizing agent is to decompose the melanin of the hair, which, depending on the nature of the oxidizing agent present, results
in more or less pronounced lightening of the fibres. Thus, for relatively weak lightening, the oxidizing agent is generally hydrogen peroxide. When greater lightening is desired, use is usually made of peroxynated salts, such as persulphates, for example, in the presence of hydrogen peroxide.

There exists a need to improve the dyeing or bleaching in terms of effectiveness (intensity of dyeing and/or level of lightening) and in terms of comfort of use, in particular for the purpose of limiting the problems of odour related to the alkaline agents used (amines and/or aqueous ammonia). For this, the proposal has been made to increase the content of insoluble fatty substances and in particular of mineral oils in dyeing or bleaching compositions.

There exists a desire to improve the environmental aspect of such compositions by attempting in particular to replace the mineral oils with fatty substances if possible of natural origin, while not detrimentally affecting the effectiveness of the said methods.

The term "natural compound" is understood to mean a product which is obtained from the earth or the soil or from plants or animals, optionally via one or more physical processes, such as, for example, milling, refining, distillation, purification or filtration.

The term "compound of natural origin" is understood to mean a natural compound which has been subjected to one or more chemical treatments not affecting the essential qualities of this compound and/or a compound predominantly comprising natural compounds.

One of the objects of the present invention is to provide lightening or dyeing methods employing specific fatty substances in the presence of an oxidizing agent which do not have the disadvantages of the existing methods while remaining at least as effective with regard to the lightening and the homogeneity of the latter or, when dyeing is concerned, with regard to the power of the colouring obtained, of the chromaticity and of the homogeneity of the colouring along the fibre. In particular, the method according to the invention results in powerful colourings.
These aims and others are achieved by the present invention, a subject-matter of which is thus a method for dyeing or lightening human keratinous fibres in which:

(a) an anhydrous composition (A) comprising one or more fatty substances and one or more surfactants;
(b) a composition (B) comprising one or more oxidizing agents and optionally one or more fatty substances;
(c) a composition (C) comprising one or more alkaline agents and optionally one or more oxidation dyes and/or one or more direct dyes,

are applied to the said fibres,

the said fatty substance or substances being chosen from volatile linear alkanes, additional fatty substances and their mixtures, and it being understood that one or more volatile linear alkanes is or are present in at least one of the compositions (A), (B) or (C) and preferably in at least one of the compositions (A) and (B).

It also relates to a multicompartiment device comprising:

- in a first compartment, an anhydrous composition (A) comprising one or more fatty substances and one or more surfactants,
- in a second compartment, a composition (B) comprising one or more oxidizing agents and optionally one or more fatty substances, and
- in a third compartment, a composition (C) comprising one or more alkaline agents and optionally one or more oxidation dyes and/or one or more direct dyes,

the said fatty substance or substances being chosen from volatile linear alkanes, additional fatty substances and their mixtures, and it being understood that one or more volatile linear alkanes is or are present in at least one of the compositions (A), (B) or (C), preferably in the composition (A) or (B) or in both compositions (A) and (B).

Another subject-matter of the invention is a ready-for-use composition resulting from the mixing of the compositions (A), (B) and (C), the total amount of fatty substances in the mixture of the compositions (A), (B) and (C) preferably representing at least 20% by
weight, with respect to the total weight of the mixture of these three compositions.

Other characteristics and advantages of the invention will become more clearly apparent on reading the description and examples which follow.

The human keratinous fibres treated by the method according to the invention are preferably the hair.

According to the invention, the dyeing or lightening method employs an anhydrous composition (A).

More particularly, the term "anhydrous composition" is understood to mean, within the meaning of the invention, a composition exhibiting a water content equal to 0% by weight or less than 5% by weight, preferably less than 2% by weight and more preferably still less than 1% by weight, with respect to the weight of the said composition. It should be noted that the water can also be in the form of bound water, such as the water crystallization of the salts, or of the traces of water absorbed by the starting materials used in the preparation of the compositions used in the invention.

This anhydrous composition (A) comprises one or more fatty substances.

The term "fatty substance" is understood to mean, within the meaning of the present invention, an organic compound which is insoluble in water at normal temperature (25°C) and at atmospheric pressure (101 325 Pa). These fatty substances generally exhibit a solubility of less than 5% and preferably less than 1%, more preferably still of less than 0.1%, at 25°C and at atmospheric pressure. They exhibit, in their structure, at least one sequence of at least two siloxane groups or at least one hydrocarbon chain comprising at least 6 carbon atoms. Preferably, the fatty substances used in the invention do not comprise any -COOH functional group.

In addition, the said fatty substances are generally soluble in organic solvents under the same temperature and pressure conditions, such as, for example, chloroform, ethanol, benzene, liquid petrolatum or decamethylcyclopentasiloxane.
The fatty substances used in the invention are chosen from volatile linear alkanes, additional fatty substances and their mixtures. The additional fatty substances can be chosen from C₆-i₆ alkanes other than volatile linear alkanes, non-silicone oils of animal, vegetable, mineral or synthetic origin, C₆-3₀ fatty alcohols, C₆-3₀ fatty acid and/or C₆-3₀ fatty alcohol esters, non-silicone waxes, silicones and their mixtures.

Within the meaning of the invention, fatty alcohols and fatty esters more particularly exhibit at least one saturated or unsaturated and linear or branched hydrocarbon group comprising from 6 to 30 carbon atoms which is optionally substituted, in particular by one or more hydroxyl groups (in particular from 1 to 4). If they are unsaturated, these compounds can comprise from 1 to 3 conjugated or nonconjugated carbon-carbon double bonds.

The term "one or more volatile linear alkane(s)" is understood to mean, without distinction, "one or more volatile linear alkane oil(s)".

A volatile linear alkane suitable for the invention is liquid at ambient temperature (approximately 25°C) and at atmospheric pressure (101 325 Pa or 760 mmHg).

The term "volatile linear alkane" suitable for the invention is understood to mean a linear alkane which is capable of evaporating on contact with the skin in less than one hour at ambient temperature (25°C) and at atmospheric pressure (101 325 Pa), which is liquid at ambient temperature and which has in particular a rate of evaporation ranging from 0.01 to 15 mg/cm²/min at ambient temperature (25°C) and at atmospheric pressure (101 325 Pa).

Preferably, the volatile linear alkanes suitable for the invention exhibit a rate of evaporation ranging from 0.01 to 3.5 mg/cm²/min, better still from 0.01 to 1.5 mg/cm²/min, at ambient temperature (25°C) and at atmospheric pressure (101 325 Pa).

More preferably, the volatile linear alkanes suitable for the invention exhibit a rate of evaporation ranging from 0.01 to 0.8 mg/cm²/min, preferably from 0.01 to 0.3 mg/cm²/min and more
preferably still from 0.01 to 0.12 mg/cm²/min, at ambient temperature (25°C) and at atmospheric pressure (101 325 Pa).

The rate of evaporation of a volatile alkane in accordance with the invention (and more generally of a volatile solvent) can be evaluated in particular by means of the protocol described in WO 06/013413 and more particularly by means of the protocol described below.

15 g of volatile hydrocarbon solvent are introduced into a crystallizing dish (diameter: 7 cm) placed on a balance located in a chamber with a capacity of approximately 0.3 m³ regulated with regard to temperature (25°C) and hygrometry (relative humidity 50%).

The volatile hydrocarbon solvent is allowed to freely evaporate, without being stirred, ventilation being provided by a fan (Papst-Motoren, reference 8550 N, rotating at 2700 revolutions/minute) arranged in the vertical position above the crystallizing dish containing the volatile hydrocarbon solvent, the blades being directed towards the crystallizing dish, at a distance of 20 cm with respect to the bottom of the crystallizing dish.

The weight of volatile hydrocarbon solvent remaining in the crystallizing dish is measured at regular time intervals.

The evaporation profile of the solvent is then obtained by plotting the curve of the amount of product evaporated (in mg/cm²) as a function of the time (in min).

The rate of evaporation, which corresponds to the tangent at the origin of the curve obtained, is then calculated. The rates of evaporation are expressed in mg of volatile solvent evaporated per unit of surface area (cm²) and per unit of time (minute).

According to a preferred embodiment, the volatile linear alkanes suitable for the invention have a nonzero vapour pressure (also known as saturated vapour pressure) at ambient temperature, in particular a vapour pressure ranging from 0.3 Pa to 6000 Pa.

Preferably, the volatile linear alkanes suitable for the invention have a vapour pressure ranging from 0.3 to 2000 Pa, better still from 0.3 to 1000 Pa, at ambient temperature (25°C).
More preferably, the volatile linear alkanes suitable for the invention have a vapour pressure ranging from 0.4 to 600 Pa, preferably from 1 to 200 Pa and more preferably still from 3 to 60 Pa, at ambient temperature (25°C).

According to one embodiment, a volatile linear alkane suitable for the invention can exhibit a flash point within the range varying from 30 to 120°C and more particularly from 40 to 100°C. The flash point is in particular measured according to Standard ISO 3679.

According to one embodiment, the volatile linear alkanes suitable in the invention can be linear alkanes comprising from 7 to 15 carbon atoms, preferably from 8 to 14 carbon atoms and better still from 9 to 14 carbon atoms.

More preferably, the volatile linear alkanes suitable in the invention can be linear alkanes comprising from 10 to 14 carbon atoms and more preferably still from 11 to 14 carbon atoms.

A volatile linear alkane suitable for the invention can advantageously be of vegetable origin.

Preferably, the volatile linear alkane or the mixture of volatile linear alkanes present in the composition according to the invention comprises at least a $^{14}$C isotope of carbon (carbon-14). In particular, the $^{14}$C isotope can be present in a ratio by number of isotopes $^{14}$C/$^{12}$C (or $^{14}$C/$^{12}$C ratio) of greater than or equal to $1 \times 10^{-16}$, preferably of greater than or equal to $1 \times 10^{-15}$, more preferably of greater than or equal to $7.5 \times 10^{-14}$ and better still of greater than or equal to $1.5 \times 10^{-13}$. Preferably, the $^{14}$C/$^{12}$C ratio ranges from $6 \times 10^{-13}$ to $1.2 \times 10^{-12}$.

The amount of $^{14}$C isotopes in the volatile linear alkane or the mixture of volatile linear alkanes can be determined by methods known to a person skilled in the art, such as the Libby counting method, liquid scintillation spectrometry or accelerator mass spectrometry.

Such an alkane can be obtained, directly or in several stages, from a vegetable starting material, such as an oil, a butter, a wax, and the like.
Mention may be made, as example of alkanes suitable for the invention, of the alkanes described in Patent Applications WO 2007/068371 and WO2008/1 55059. These alkanes are obtained from fatty alcohols, themselves obtained from coconut or palm oil.

Mention may be made, as examples of linear alkanes suitable for the invention, of n-heptane (C_{7}), n-octane (C_{8}), n-nonane (C_{9}), n-decane (C_{10}), n-undecane (C_{11}), n-dodecane (C_{12}), n-tridecane (C_{13}), n-tetradecane (C_{14}), n-pentadecane (C_{15}), and their mixtures. According to a specific embodiment, the volatile linear alkane is chosen from n-nonane, n-undecane, n-dodecane, n-tridecane, n-tetradecane and their mixtures.

According to a preferred embodiment, mention may be made of the mixtures of n-undecane (C_{11}) and of n-tridecane (C_{13}) obtained in Examples 1 and 2 of Application WO2008/1 55059.

Mention may also be made of the n-dodecane (C_{12}) and the n-tetradecane (C_{14}) sold by Sasol under the references Parafol 12-97 and Parafol 14-97 respectively, and their mixtures.

One embodiment consists in using just one volatile linear alkane.

Alternatively, use may be made of a mixture of at least two distinct volatile linear alkanes differing from one another by a carbon number n of at least 1, in particular differing from one another by a carbon number of 1 or 2.

According to one embodiment, use is made of a mixture of at least two distinct volatile linear alkanes comprising from 10 to 14 carbon atoms and differing from one another by a carbon number of at least 1. Mention may be made, as examples, in particular of the C_{10}/C_{11}, C_{11}/C_{12} or C_{12}/C_{13} mixtures of volatile linear alkanes.

According to another embodiment, use is made of a mixture of at least two distinct volatile linear alkanes comprising from 10 to 14 carbon atoms and differing from one another by a carbon number of at least 2. Mention may be made, as examples, in particular of the C_{10}/C_{12} or C_{12}/C_{14} mixtures of volatile linear alkanes, for an even
carbon number \( n \), and the \( \text{C}_{11}/\text{C}_{13} \) mixture, for an uneven carbon number \( n \).

According to a preferred embodiment, use is made of a mixture of at least two distinct volatile linear alkanes comprising from 10 to 14 carbon atoms which differ from one another by a carbon number of at least 2 and in particular of a \( \text{C}_{11}/\text{C}_{13} \) mixture of volatile linear alkanes or a \( \text{C}_{12}/\text{C}_{14} \) mixture of volatile linear alkanes.

Other mixtures combining more than two volatile linear alkanes according to the invention, such as, for example, a mixture of at least three distinct volatile linear alkanes comprising from 7 to 15 carbon atoms which differ from one another by a carbon number of at least 1, can be used in the invention.

In the case of the mixtures of two volatile linear alkanes, the said two volatile linear alkanes preferably represent more than 95\% by weight and better still more than 99\% by weight of the mixture.

According to a specific form of the invention, in a mixture of volatile linear alkanes, the volatile linear alkane having the smallest carbon number is predominant in the mixture.

According to another form of the invention, use is made of a mixture of volatile linear alkanes in which the volatile linear alkane having the greatest carbon number is predominant in the mixture.

Mention may in particular be made, as examples of mixtures suitable for the invention, of the following mixtures:

- from 50 to 90\%> by weight, preferably from 55 to 80\%> by weight, more preferably from 60 to 75\% by weight, of volatile linear \( \text{C}_n \) alkane with \( n \) ranging from 7 to 15,
- from 10 to 50\% by weight, preferably from 20 to 45\% by weight, preferably from 24 to 40\% by weight, of volatile linear \( \text{C}_{n+x} \) alkane with \( x \) greater than or equal to 1, preferably \( x = 1 \) or \( x = 2 \), with \( n + x \) between 8 and 14,

with respect to the total weight of the alkanes in the said mixture.

In particular, the said mixture of volatile linear alkanes can additionally comprise:
• less than 2% by weight, preferably less than 1% by weight, of branched hydrocarbons,
• and/or less than 2% by weight, preferably less than 1% by weight, of aromatic hydrocarbons,
• and/or less than 2% by weight, preferably less than 1% by weight and preferentially less than 0.1% by weight of unsaturated hydrocarbons, the said percentages being expressed with respect to the total weight of the mixture.

More particularly, the volatile linear alkanes suitable in the invention can be employed in the form of an n-undecane/n-tridecane mixture.

In particular, use will be made of a mixture of volatile linear alkanes comprising:

- from 55 to 80% by weight, preferably from 60 to 75% by weight, of volatile linear Cn alkane (n-undecane) and
- from 20 to 45% by weight, preferably from 24 to 40% by weight, of volatile linear C13 alkane (n-tridecane),

with respect to the total weight of the alkanes in the said mixture.

According to a specific embodiment, the mixture of alkanes is an n-undecane/n-tridecane mixture. In particular, such a mixture can be obtained according to Example 1 or Example 2 of Application WO 2008/1 55059.

According to another specific embodiment, use is made of the n-dodecane sold under the reference Parafol 12-97 by Sasol.

According to another specific embodiment, use is made of the n-tetradecane sold under the reference Parafol 14-97 by Sasol.

According to yet another embodiment, use is made of a mixture of n-dodecane and n-tetradecane.

The C6−16 alkanes other than volatile linear alkanes can be linear, branched or cyclic. Mention may in particular be made, as examples of C6−16 alkanes other than volatile linear alkanes, of hexane, isodecane and isohexadecane.
Mention may be made, as non-silicone oils of animal, vegetable, mineral or synthetic origin which can be used as fatty substances in the composition (A), for example, of:

- hydrocarbon oils of animal origin, such as perhydrosqualene,
- triglyceride oils of vegetable or synthetic origin, such as sunflower oil, maize oil, soybean oil, cucumber oil, grape seed oil, sesame oil, hazelnut oil, apricot kernel oil, macadamia oil, arara oil, castor oil, avocado oil, jojoba oil or shea butter oil; liquid triglycerides of fatty acids comprising from 6 to 30 carbon atoms, such as triglycerides of heptanoic or octanoic acids; or also, for example, triglycerides of caprylic/capric acids, such as those sold under the name Myritol® by Cognis or those sold under the names Miglyol® 810, 812 and 818 by Dynamit Nobel,
- linear or branched hydrocarbons of mineral or synthetic origin comprising more than 16 carbon atoms, such as liquid paraffins, which may or may not be volatile, and their derivatives, petrolatum, liquid petrolatum, polydecenes or hydrogenated polyisobutenes, such as those sold under the name Parleam® by Nof Corporation; preferably, the liquid paraffins, petrolatum, liquid petrolatum, polydecenes and hydrogenated polyisobutenes;
- fluorinated oils, such as perfluoromethylcyclopentane and perfluoro-1,3-dimethylcyclohexane, sold under the names of "Flutec® PCI" and "Flutec® PC3" by BNFL Fluorochemicals; perfluoro-1,2-dimethylcyclobutane; perfluoroalkanes, such as dodecafluoropentane and tetradecafluorohexane, sold under the names of "PF 5050®" and "PF 5060®" by 3M, or bromoperfluoroctyl, sold under the name "Foralkyl®" by Atochem; nonafluoromethoxybutane and nonafluoroethoxyisobutane; or perfluoromorpholine derivatives, such as 4-(trifluoromethyl)perfluoromorpholine, sold under the name "PF 5052®" by 3M.

The C_{6-30} fatty alcohols suitable for the implementation of the invention are more particularly chosen from saturated or unsaturated and linear or branched alcohols comprising from 6 to 30 carbon atoms and more particularly from 8 to 30 carbon atoms. Mention may be
made, for example, of cetyl alcohol, stearyl alcohol and their mixture (cetearyl alcohol), octyldecanol, 2-butyloctanol, 2-hexyldecanol, 2-undecylpentadecanol, oleyl alcohol or linoleyl alcohol.

Preferably, the fatty alcohols are liquid.

As regards the C_{6-30} fatty acid and/or C_{6-30} fatty alcohol esters, which are advantageously different from the triglycerides mentioned above, mention may in particular be made of esters of saturated or unsaturated and linear or branched C_{1-2}6 aliphatic mono- or polyacids and of saturated or unsaturated and linear or branched C_{1-2}6 aliphatic mono- or polyalcohols, the total carbon number of the esters being greater than or equal to 10.

Mention may be made, among the monoesters, of dihydroabietyl behenate; octyldodecyl behenate; isocetyl behenate; cetyl lactate; C_{12-15} 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; isonyl isononanoate; isostearyl palmitate; methyl acetyl ricinoleate; myristyl stearate; octyl isononanoate; 2-ethylhexyl isononanoate; octyl palmitate; octyl pelargonate; octyl stearate; octyldodecyl erucate; oleyl erucate; ethyl and isopropyl palmitate; 2-ethylhexyl palmitate; 2-ocytldodecyl palmitate; alkyl myristates, such as isopropyl, butyl, cetyl, 2-octyldodecyl, myristyl or stearyl myristate, hexyl stearate, butyl stearate, isobutyl stearate; dioctyl malate, hexyl laurate or 2-hexyldecyl laurate.

Still as examples of esters, mention may also be made of esters of C_{4-22} di- or tricarboxylic acids and of C_{1-2}2 alcohol and esters of mono-, di- or tricarboxylic acids and of di-, tri-, tetra- or pentahydroxy C_{2-2}6 alcohols.

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 stearyl stearate; pentaerythrityl monoricinoleate; pentaerythrityl tetraisononanoate; pentaerythrityl tetrapelargonate;
pentraerythritol tetraisostearate; pentaerythritol tetraoctanoate; propylene glycol dicaprylate; propylene glycol dicaprate; tridecyl erucate; triisopropyl citrate; triisostearyl citrate; glyceryl trilactate; glyceryl trioctanoate; trioctyldodecyl citrate; trioctylexyl citrate; propylene glycol dioctanoate; neopentyl glycol diheptanoate; diethylene glycol diisononate; and polyethylene glycol distearates.

Preference is given, among the abovementioned esters, to the use of ethyl, isopropyl, myristyl, cetyl or stearyl palmitate, 2-ethylhexyl palmitate, 2-octyldecyl palmitate, alkyl myristates, such as isopropyl, butyl, cetyl or 2-octyldecyl myristate, hexyl stearate, butyl stearate, isobutyl stearate; dioctyl malate, hexyl laurate, 2-hexyldecyl laurate, isononyl isononanoate or cetyl octanoate.

The composition (A) can also comprise, as fatty ester, esters and diesters of sugars and of C₆-C₃₀, preferably C₁₂-C₂₂, fatty acids. It should be remembered that "sugar" is understood to mean oxygen-comprising hydrocarbon compounds which have several alcohol functional groups, with or without an aldehyde or ketone functional group, and which comprises at least 4 carbon atoms. These sugars can 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 esters of sugars and of fatty acids can be chosen in particular from the group consisting of the esters or mixtures of esters of sugars described above and of saturated or unsaturated and linear or branched C₆-C₃₀, preferably C₁₂-C₂₂, fatty acids. If they are unsaturated, these compounds can comprise from one to three conjugated or non-conjugated carbon-carbon double bonds.

These esters can also be chosen from mono-, di-, tri- and tetraesters, polyesters and their mixtures.

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

More particularly, use is made of mono- and diesters and in particular of sucrose, glucose or methylglucose mono- or diolates, -stearates, -behenates, -oleate/palmitates, -linoleates, -linolenates or -oleate/stearates.

Mention may be made, by way of example, of the product sold under the name Glucate® DO by Amerchol, which is a methylglucose dioleate.

Mention may also be made, as examples of esters or of mixtures of esters of sugars and of fatty acids, of:

- the products sold under the names F160, F140, F110, F90, F70 and SL40 by Crodesta, respectively denoting sucrose palmitate/stearates formed of 73% monoester and 27% di- and triester, of 61%, monoester and 39% di-, tri- and tetraester, of 52% monoester and 48% di-, tri- and tetraester, of 45% monoester and 55% di-, tri- and tetraester, of 39% monoester and 61% di-, tri- and tetraester, and sucrose monolaurate;

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

- the sucrose mono- and dipalmitate/stearate sold by Goldschmidt under the name Tegosoft® PSE.

The non-silicone wax or waxes are chosen in particular from carnauba wax, candelilla wax, esparto wax, paraffin wax, ozokerite; vegetable waxes, such as olive tree wax, rice wax, hydrogenated jojoba wax or absolute flower waxes, such as the blackcurrant flower essential wax sold by Bertin (France); and animal waxes, such as beeswaxes or modified beeswaxes (cerabellina). Other waxes or waxy raw materials which can be used according to the invention are in particular marine waxes, such as that sold by Sophim under the reference M82, polyethylene waxes or polyolefin waxes in general.

The silicones which can be used in the compositions (A) of the present invention are volatile or non-volatile and cyclic, linear or
branched silicones which may or may not be modified by organic groups and which have a viscosity of \(5 \times 10^{-6}\) to \(2.5 \text{ m}^2/\text{s}\) at 25°C and preferably of \(1 \times 10^{-5}\) to \(1 \text{ m}^2/\text{s}\).

The silicones which can be used in accordance with the invention can be provided in the form of oils, waxes, resins or gums.

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

Organopolysiloxanes are defined in more detail in the work by Walter Noll, "Chemistry and Technology of Silicones", (1968), Academic Press. They can be volatile or non-volatile.

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

(i) cyclic polydialkylsiloxanes comprising from 3 to 7, preferably from 4 to 5, silicon atoms. They are, for example, octamethyldicyclosiloxane, sold in particular under the name of Volatile Silicone® 7207 by Union Carbide or Silbione® 70045 V2 by Rhodia, decamethyldicyclopentasiloxane, sold under the name of Volatile Silicone® 7158 by Union Carbide and Silbione® 70045 V5 by Rhodia, and their mixtures.

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

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\begin{array}{c}
\text{CH}_3 \quad \cdots \quad \text{CH}_3 \\
\text{with } \text{D}^- : \quad \text{Si}^- \cdot \text{O} \quad \text{with } \text{D}^- : \quad \text{Si}^- \cdot \text{O} \\
\text{I} \quad \text{I} \quad \text{C}_9\text{H}_{17}
\end{array}
\]

Mention may also be made of mixtures of cyclic polydialkylsiloxanes with silicon-derived organic compounds, such as the mixture of octamethyldicyclosiloxane and of tetratrimethylsilylpentaerythritol (50/50) and the mixture of
octamethylcyclotetrasiloxane and of 1,1'-oxy(2,2,2',2',3,3'-hexatrimethylsilyloxy)bisneopentane;

(ii) the linear volatile polydialkylsiloxanes having from 2 to 9 silicon atoms and exhibiting a viscosity of less than or equal to 5 x 10⁻⁶ m²/s at 25°C. They are, for example, decamethyltetrasiloxane, sold in particular under the name "SH 200" by Toray Silicone. Silicones coming within this category are also described in the article published in Cosmetics and Toiletries, Vol. 91, Jan. 76, pp. 27-32, Todd & Byers, "Volatile Silicone Fluids for Cosmetics".

Use is preferably made of non-volatile polydialkylsiloxanes, polydialkylsiloxane gums and resins, polyorganosiloxanes modified by the organo functional groups above, and their mixtures.

These silicones are chosen more particularly from polydialkylsiloxanes, among which may be mainly mentioned polydimethylsiloxanes comprising 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:

- Silbione® oils of the 47 and 70 047 series or Mirasil® oils sold by Rhodia, such as, for example, the 70 047 V 500 000 oil;
  - oils of the Mirasil® series sold by Rhodia;
  - oils of the 200 series from Dow Corning, such as DC200 with a viscosity of 60 000 mm²/s;
- Viscasil® oils from General Electric and some oils of the SF series (SF 96, SF 18) from General Electric.

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

In this category of polydialkylsiloxanes, mention may also be made of the products sold under the names "Abil Wax® 9800 and 980 1" by Goldschmidt, which are polydi(Ci- C2o)alkylsiloxanes.

The silicone gums which can be used in accordance with the invention are in particular polydialkylsiloxanes, preferably
polydimethylsiloxanes, having 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, polyisobutylene, methylene chloride, pentane, dodecane, tridecane or their mixtures.

Products which can more particularly be used 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 140 1 sold by Dow Corning;

- the mixtures of a polydimethylsiloxane gum and of a cyclic silicone, such as the product SF 12 14 Silicone Fluid from General Electric; this product is a gum SF 30, corresponding to a dimethicone, having a number-average molecular weight of 500 000, dissolved in the oil SF 1202 Silicone Fluid, corresponding to decamethy Icyclopentasiloxane;

- the mixtures of two PDMSs with different viscosities and more particularly of a PDMS gum and of a PDMS oil, such as the product SF 1236 from General Electric. The product SF 1236 is a mixture of an SE 30 gum defined above, having a viscosity of 20 m²/s, and of an SF 96 oil, with a viscosity of 5 x 10⁶ m²/s. This product preferably comprises 15% of SE 30 gum and 85% of an SF 96 oil.

The organopolysiloxane resins which can be used in accordance with the invention are crosslinked siloxane systems including the units:

\[ R_2\text{SiO}_{1/2}, \text{RSiO}_{2/3}, \text{SiO}_{3/2} \], and \[ \text{SiO}_{4/2} \],

in which R represents an alkyl having from 1 to 16 carbon atoms. Those which are particularly preferred among these products are those in which R denotes a lower \( \text{Ci-C}_4 \) 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 and which are silicones with a dimethyl/trimethylsiloxane structure.
Mention may also be made of resins of the trimethylsiloxysilicate type, sold in particular under the names X22-4914, X21-5034 and X21-5037 by Shin-Etsu.

The organomodified silicones which can be used in accordance with the invention are silicones as defined above which comprise, in their structure, one or more organofunctional groups attached via a hydrocarbon group.

In addition to the silicones described above, the organomodified silicones can be polydiarylsiloxanes, in particular polydiphenylsiloxanes, and polyalkylarylsiloxanes functionalized by the abovementioned organofunctional groups.

The polyalkylarylsiloxanes are chosen in particular from polydimethyl/methylphenylsiloxanes or polydimethyl/diphenylsiloxanes, linear and/or branched, with a viscosity ranging from $1 \times 10^{-5}$ to $5 \times 10^{-2}$ m²/s at 25°C.

Mention may be made, among these polyalkylarylsiloxanes, by way of examples, of the products sold under the following names:

- Silbione® oils of the 70 641 series from Rhodia;
- oils of the Rhodorsil® 70 633 and 763 series from Rhodia;
- the oil Dow Corning 556 Cosmetic Grade Fluid from Dow Corning;
- silicones of the PK series from Bayer, such as the product PK20;
- silicones of the PN and PH series from Bayer, such as the products PN1 000 and PH1 000;
- some oils of the SF series from General Electric, such as SF 1023, SF 1154, SF 1250 and SF 1265.

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

- substituted or unsubstituted aminated 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
The substituted aminated groups are in particular amino(Ci-C4 alkyl) groups;
- alkoxylated groups, such as the products sold under the names "Silicone Copolymer F-755" by SWS Silicones and Abil Wax® 2428, 2434 and 2440 by Goldschmidt.

Preferably, the fatty substances do not comprise a C2-C3 oxyalkylene unit or a glycerol unit.
More particularly, the fatty substances are chosen from compounds which are liquid or pasty at ambient temperature and at atmospheric pressure.

Preferably, the fatty substances are liquid at a temperature of 25°C and at atmospheric pressure.

The said fatty substance or substances present in the composition (A) is or are preferably chosen from volatile linear alkanes, C6-C16 alkanes other than volatile linear alkanes, non-silicone oils of mineral origin comprising more than 16 carbon atoms or of vegetable or synthetic origin, C6-3o fatty alcohols, C6-3o fatty acid and/or C6-3o fatty alcohol esters, silicones or their mixtures.

Preferably, the fatty substance or substances of the composition (A) according to the invention are non-silicone fatty substances and are chosen from volatile linear alkanes, liquid C6-3o fatty alcohols, liquid petrolatum, polydecenes, liquid C6-3o fatty acid and/or C6-3o fatty alcohol esters, and their mixtures.

A preferred embodiment is that the composition (A) comprises one or more volatile linear alkanes as defined above, alone or in combination with one or more additional fatty substances as defined in the invention.

The anhydrous composition (A) exhibits a total content of fatty substances (volatile linear alkane(s) + the optional additional fatty substance(s)) advantageously ranging from 50 to 90% by weight, preferably from 55 to 90% by weight and more particularly still from 60 to 85%o by weight, with respect to the weight of the anhydrous composition (A).
The anhydrous composition (A) also comprises one or more surfactants. The surfactant or surfactants can be anionic, cationic, amphoteric or nonionic.

More particularly, the surfactant or surfactants are chosen from anionic surfactants, nonionic surfactants and their mixtures.

The anionic surfactants are more especially chosen from the salts (in particular salts of alkali metals, especially of sodium, ammonium salts, amine salts, aminoalcohol salts or salts of alkaline earth metals, such as magnesium) of the following compounds:

- alkyl sulphates, alkyl ether sulphates, alkylamido ether sulphates, alkylaryl polyether sulphates or monoglyceride sulphates;
- alkylsulphonates, alkylamidesulphonates, alkylaryl sulphonates, α-olefinsulphonates or paraffinsulphonates;
- alkyl phosphates or alkyl ether phosphates;
- alkyl sulphosuccinates, alkyl ether sulphosuccinates or alkylamide sulphosuccinates;
- alkyl sulphinylsuccinamates;
- acylsarcosinates, acylisethionates and N-acyltaurates;
- salts of fatty acids, such as oleic acid, ricinoleic acid, palmitic acid, stearic acid, coconut oil acid or hydrogenated coconut oil acid;
- salts of alkyl-D-galactosideuronic acids;
- acyl lactylate;
- salts of polyoxyalkylated alkyl ether carboxylic acids, polyoxyalkylated alkylaryl ether carboxylic acids or polyoxyalkylated alkylamido ether carboxylic acids, in particular those comprising from 2 to 50 ethylene oxide groups;
- and their mixtures.

It should be noted that the alkyl or acyl radical of these different compounds advantageously comprises from 6 to 24 carbon atoms, preferably from 8 to 24 carbon atoms, and the aryl group preferably denotes a phenyl or benzyl group.

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

Mention may be made, as examples of oxyalkylenated nonionic surfactants, of:

- oxyalkylenated \((C_8-C_{24} \text{ alkyl})\) phenols,
- oxyalkylenated, saturated or unsaturated, linear or branched, \(C_8-C_{30}\) alcohols,
- oxyalkylenated, saturated or unsaturated, linear or branched, \(C_8-C_{30}\) amides,
- esters of saturated or unsaturated and linear or branched \(C_8-C_{30}\) acids and of polyethylene glycols,
- esters of saturated or unsaturated and linear or branched \(C_8-C_{30}\) acids and of sorbitol which are oxyethylenated,
- oxyethylenated, saturated or unsaturated, vegetable oils,
- condensates of ethylene oxide and/or of propylene oxide, inter alia,

alone or as mixtures.

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

In accordance with a preferred embodiment of the invention, the oxyalkylenated nonionic surfactants are chosen from oxyethylenated \(C_8-C_{30}\) alcohols, such as oxyethylenated lauryl, myristyl, cetyl, cetearyl and behenyl alcohols; or esters of saturated or unsaturated and linear or branched \(C_8-C_{30}\) acids and of sorbitol which are polyoxyethylenated.

Use is preferably made, as examples of mono- or polyglycerolated nonionic surfactants, of mono- or polyglycerolated \(C_8-C_{40}\) alcohols.

In particular, the mono- or polyglycerolated \(C_8-C_{40}\) alcohols correspond to the following formula:

\[
RO-[\text{CH}_2-\text{CH(CH}_2\text{OH)}-0]_m-H
\]
in which R represents a linear or branched C₈-C₄₀, preferably C₈-C₃₀, alkyl or alkenyl group and m represents a number ranging from 1 to 30 and preferably from 1 to 10.

Mention may be made, as examples of compounds suitable in the context of the invention, of lauryl alcohol comprising 4 mol of glycerol (INCI name: Polyglyceryl-4 Lauryl Ether), lauryl alcohol comprising 1.5 mol of glycerol, oleyl alcohol comprising 4 mol of glycerol (INCI name: Polyglyceryl-4 Oleyl Ether), oleyl alcohol comprising 2 mol of glycerol (INCI name: Polyglyceryl-2 Oleyl Ether), cetearyl alcohol comprising 2 mol of glycerol, cetearyl alcohol comprising 6 mol of glycerol, oleyl/cetyl alcohol comprising 6 mol of glycerol and octadecanol comprising 6 mol of glycerol.

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

Preference is more particularly given, among mono- or polyglycerolated alcohols, to the use of C₈/C₁₀ alcohol comprising one mol of glycerol, C₁₀/C₁₂ alcohol comprising 1 mol of glycerol and C₁₂ alcohol comprising 1.5 mol of glycerol.

Preferably, the surfactant present in the anhydrous composition is a nonionic surfactant.

The content of surfactants in the anhydrous composition (A) more particularly represents from 0.1 to 50% by weight, preferably from 0.5 to 30% by weight, with respect to the weight of the anhydrous composition.

The cosmetic composition (A) can also include various additives conventionally used in compositions for dyeing or lightening the hair, such as anionic, cationic, nonionic, amphoteric or zwitterionic polymers or their mixtures; inorganic thickening agents, in particular fillers, such as clays or talc; organic thickening agents, with in particular anionic, cationic, nonionic and amphoteric polymeric associative thickeners; antioxidants; penetration agents; sequestering agents; fragrances;
dispersing agents; film-forming agents; conditioning agents; ceramides; preservatives; or opacifying agents.

The above additives are generally present in an amount of, for each of them, between 0.01 and 20% by weight, with respect to the weight of the composition (A), when they are present.

The composition can comprise one or more inorganic thickening agents chosen from organophilic clays, pyrogenic silicas or their mixtures.

The organophilic clay can be chosen from montmorillonite, bentonite, hectorite, attapulgite, sepiolite, and their mixtures. The clay is preferably a bentonite or a hectorite.

These clays can be modified with a chemical compound chosen from quaternary ammoniums, tertiary amines, amine acetates, imidazolines, amine soaps, fatty sulphates, alkylaryl sulphonates, amine oxides, and their mixtures.

Mention may be made, as organophilic clays, of quaternium-18 bentonites, such as those sold under the names Bentone 3, Bentone 38 or Bentone 38V by Rheox, Tixogel VP by United Catalyst or Claytone 34, Claytone 40 or Claytone XL by Southern Clay; stearalkonium bentonites, such as those sold under the names Bentone 27 by Rheox, Tixogel LG by United Catalyst or Claytone AF or Claytone APA by Southern Clay; quaternium-18/benzalkonium bentonites, such as those sold under the names Claytone HT or Claytone PS by Southern Clay; or quaternium-18 hectorites, such as those sold under the names Bentone Gel DOA, Bentone Gel EC05, Bentone Gel EUG, Bentone Gel IPP, Bentone Gel ISD, Bentone Gel SS7 1, Bentone Gel VS8 or Bentone Gel VS3 8 by Rheox and Simagel M or Simagel SI 345 by Biophil.

Pyrogenic 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 exhibit a large number of silanol groups at their surfaces. Such hydrophilic silicas are sold, for example, under the names "Aerosil 130®", "Aerosil 200®", "Aerosil 255®", "Aerosil 300®" or "Aerosil 380®" by Degussa or "Cab-O-Sil HS-5®", "Cab-O-Sil VS-5®", "Cab-O-Sil M-5®".
"Cab-O-Sil EH-5 ¾", "Cab-O-Sil LM-130 ¾", "Cab-O-Sil MS-55 ¾" or "Cab-O-Sil M-5®" by Cabot.

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

The hydrophobic groups can be:
- trimethylsiloxyl groups, which are obtained in particular by treatment of pyrogenic silica in the presence of hexamethyldisilazane. Silicas thus treated are named "Silica silylate" according to the CTFA (6th edition, 1995). They are sold, for example, under the references "Aerosil R812®" by Degussa or "Cab-O-Sil TS-530®" by Cabot.
- dimethylsilyloxy or polydimethylsiloxane groups, which are obtained in particular by treatment of pyrogenic silica in the presence of polydimethylsiloxane or of dimethyldichlorosilane. Silicas thus treated are named "Silica dimethyl silylate" according to the CTFA (6th edition, 1995). They are sold, for example, under the references "Aerosil R972®" or "Aerosil R974®" by Degussa or "Cab-O-Sil TS-610®" or "Cab-O-Sil TS-720®" by Cabot.

The pyrogenic silica preferably exhibits a particle size which can be nanometric to micrometric, for example ranging from approximately 5 to 200 nm.

Preferably, the composition comprises a hectorite, an organomodified bentonite or an optionally modified pyrogenic silica.

When it is present, the inorganic thickening agent represents from 1 to 30% by weight, with respect to the weight of the composition.

Advantageously, the composition is provided in the form of a gel or of a cream.

The method according to the invention also employs a composition (B) comprising one or more oxidizing agents.

More particularly, the oxidizing agent or agents are chosen from hydrogen peroxide, urea hydrogen peroxide, alkali metal bromates or ferricyanides, peroxycyclated salts, such as, for example, alkali metal or alkaline earth metal persulphates, perborates and percarbonates, and also
peracids and their precursors. Use may also be made, as oxidizing agent, of one or more oxidation/reduction enzymes, such as laccases, peroxidases and 2-electron oxidoreductases (such as uricase), optionally in the presence of their respective donor or cofactor.

This oxidizing agent is advantageously composed of hydrogen peroxide, in particular in aqueous solution (aqueous hydrogen peroxide solution), the concentration of which can vary more particularly from 0.1 to 50% by weight, more preferably still from 0.5 to 20% by weight and better still from 1 to 15% by weight, with respect to the total weight of the oxidizing composition (B).

Depending on the degree of lightening desired, the oxidizing agent can also comprise an oxidizing agent preferably chosen from peroxygenated salts.

Preferably, the oxidizing agent is not chosen from peroxygenated salts and peracids and precursors.

The oxidizing composition (B) can comprise one or more fatty substances as described above.

In a first alternative form of the invention, only the composition (A) comprises one or more volatile linear alkanes as defined above.

In a second alternative form of the invention, the oxidizing composition (B) comprises one or more volatile linear alkanes as defined above, alone or in combination with at least one additional fatty substance as described above.

When the oxidizing composition (B) comprises one or more fatty substances, it/they is/are preferably present in a total amount (volatile linear alkane(s) + optional additional fatty substance(s)) ranging from 5 to 70% by weight, better still from 10 to 65% by weight, with respect to the total weight of the composition (B).

According to a third alternative form of the invention, the compositions (A) and (B) comprise one more volatile linear alkanes as defined above, alone or in combination with at least one additional fatty substance as described above.

The oxidizing composition (B) may or may not be aqueous. The term "aqueous composition" is understood to mean a composition
comprising more than 5% by weight of water, preferably more than 10% by weight of water and more advantageously still more than 20% by weight of water, with respect to the total weight of the composition (B).

Preferably, the composition (B) is an aqueous composition.

It can also comprise one or more organic solvents.

Mention may be made, as organic solvent, for example, of linear or branched \( \text{C}_2-\text{C}_4 \) alkanols, such as ethanol and isopropanol; glycerol; polyols and polyolethers, such as 2-butoxyethanol, propylene glycol, dipropylene glycol, propylene glycol monomethyl ether, diethylene glycol monoethyl ether and diethylene glycol monomethyl ether; aromatic alcohols, such as benzyl alcohol or phenoxyethanol, and their mixtures.

The solvent or solvents, if they are present, represent a content usually ranging from 1 to 40% by weight, with respect to the weight of the oxidizing composition (B), preferably from 5 to 30% by weight.

The oxidizing composition (B) can comprise one or more acidifying agents.

Mention may be made, among acidifying agents, by way of example, of inorganic or organic acids, such as hydrochloric acid, orthophosphoric acid, sulphuric acid, carboxylic acids, such as acetic acid, tartaric acid, citric acid or lactic acid, or sulphonylic acids.

Usually, the pH of the oxidizing composition (B), when it is aqueous, is less than 7.

The oxidizing composition (B) can also include other additives conventionally employed in the field, such as, in particular, those mentioned above in the context of the anhydrous composition (A).

Finally, the oxidizing composition (B) is provided in various forms, such as, for example, a solution, an emulsion or a gel.

The method according to the invention also employs a composition (C) comprising one or more alkaline agents.

The alkaline agent is preferably chosen from:

- aqueous ammonia,
- organic amines exhibiting a pK\(_a\) at 25°C of less than 12, and their organic and inorganic salts,
- inorganic bases,
- ammonium salts, and
- their mixtures.

Use may be made, as alkaline agent, of one or more organic amines exhibiting a $pK_b$ at 25°C of less than 12, preferably of less than 10 and more preferably still of less than 6.

It should be noted that this is the $pK_b$ corresponding to the functional group of highest basicity.

The said organic amine can be:

(i) an organic amine comprising one or two primary, secondary or tertiary amine functional groups and one or more linear or branched $C_1$-$C_8$ alkyl groups carrying one or more hydroxyl groups,

(ii) an amino acid,

(iii) an organic amine of heterocyclic type,

(iv) an amino acid dipeptide,

(v) guanidine or a compound comprising a guanidine functional group,

(vi) or one of their mixtures.

Mention may particularly made, as examples of amines (i), of alkanolamines, such as mono-, di- or trialkanolamines, comprising from 1 to 3 identical or different $C_1$-$C_4$ hydroxyalkyl groups.

Mention may be made, among compounds of this type, of monoethanolamine, 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, or tris(hydroxymethyl)aminomethane.

The organic amines of following formula:

\[
\begin{align*}
R_x - N \cdot W \cdot N & \cdot R_z \\
R_y - W & \cdot R_t
\end{align*}
\]

in which $W$ is a $C_1$-$C_6$ alkylene residue optionally substituted by a hydroxyl group or a $C_1$-$C_6$ alkyl group and $R_x$, $R_y$, $R_z$ and $R_t$, which are identical or different, represent a hydrogen atom or a $C_1$-$C_6$ alkyl, $C_1$-$C_6$ hydroxyalkyl or amino($C_1$-$C_6$ alkyl) group, are also suitable.
Mention may be made, as examples of such amines, of 1,3-diaminopropylone, 1,3-diamino-2-propanol, spermine or spermidine.

The amino acids which can be used as alkaline agents (ii) are more particularly of natural or synthetic origin, in their L, D or racemic form, and comprise at least one acid functional group chosen more particularly from carboxylic acid, sulphonic acid, phosphonic acid or phosphoric acid functional groups. The amino acids can occur in the neutral or ionic form.

Mention may be 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 functional group, optionally included in a ring or in a ureido functional group.

Such basic amino acids are preferably chosen from those corresponding to the following formula (Γ):

\[
R - \text{CH}_2 - \text{CH} / \text{NH}_2 \\
\text{CO}_2\text{H}
\]

where R denotes a group chosen from:

\[
\begin{align*}
\text{-(CH}_2\text{)}_3\text{NH}_2 & ; \\
\text{-(CH}_2\text{)}_2\text{NH}_2 & ; \\
\text{-(CH}_2\text{)}_2\text{NHCONH}_2 & ; \\
\text{-(CH}_2\text{)}_2\text{NH} - \text{C} - \text{NH}_2 & \\
\end{align*}
\]

The compounds corresponding to the formula (Γ) are histidine, lysine, arginine, ornithine or citrulline. Preferably, the basic amino acids are arginine, lysine, histidine or their mixtures.
Mention may in particular be made, as examples of organic amine (iii) of heterocyclic type, in addition to the histidine already mentioned in the amino acids, of pyridine, piperidine, imidazole, triazole, tetrazole and benzimidazole.

Mention may in particular be made, as amino acid dipeptides (organic amines (iv)) which can be used in the present invention, of carnosine, anserine and baleine.

Mention may be made, as examples of organic amine (v), of guanidine, arginine, already mentioned as amino acid (organic amine (ii)), 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-sulphonic acid.

In an advantageous embodiment, the composition (C) comprises the combination of monoethanolamine and of an amino acid (ii). In this case, the monoethanolamine is present in a content ranging from 0.1 to 40% by weight, preferably from 0.5 to 20% by weight, with respect to the weight of the said composition (C). With regard to the content of basic amino acid(s), the latter will more particularly vary from 0.1 to 40% by weight, preferably from 0.5 to 20% by weight, with respect to the weight of the said composition (C).

In this specific embodiment, the monoethanolamine/amino acid (ii) ratio by weight preferably ranges from 0.1 to 10, more preferably still from 0.3 to 10 and better still from 1 to 5.

The organic amine salts which can be used in the composition (C) are the organic or inorganic salts of an organic amine as described above.

Preferably, the organic salts are chosen from the salts of organic acids, such as citrates, lactates, glycolates, gluconates, acetates, propionates, fumarates, oxalates and tartrates.

Preferably, the inorganic salts are chosen from hydrohalides (for example hydrochlorides), carbonates, hydrogencarbonates, sulphates, hydrogenphosphates and phosphates.

Preferably, the salts of organic amines present in the cosmetic composition (C) are chosen from inorganic salts of organic amines, in particular carbonates of organic amines. More preferably, the salts of
organic amines are chosen from inorganic salts of alkanolamines, such as monoethanolamine hydrochloride, inorganic salts of amino acids, and guanidine carbonate. More preferably still, the organic amine salt is guanidine carbonate.

The inorganic bases which can be used in the composition (C) are compounds having, in their structures, one or more elements from Groups 1 to 13 of the Periodic Table, the elements being other than hydrogen, and not simultaneously comprising carbon and hydrogen atom(s).

According to a specific embodiment of the invention, the inorganic base comprises one or more elements from Groups 1 and 2 of the Periodic Table other than hydrogen.

In a preferred alternative form, the inorganic base exhibits the following structure:

\[(Z_1^{x-})_m(Z_2^{y+})_n\]

in which:

- \(Z_2\) denotes a metal from Groups 1 to 13 of the Periodic Table of the Elements, preferably 1 or 2, such as sodium or potassium;
- \(Z_i^{x-}\) denotes an anion chosen from the \(\text{CO}_3^{2-}\), \(\text{OH}^-\), \(\text{HC0}_3^{2-}\), \(\text{SiO}_3^{2-}\), \(\text{HPO}_4^{2-}\), \(\text{PO}_4^{3-}\) or \(\text{B}_4\text{O}_7^{2-}\) ions, preferably from the \(\text{CO}_3^{2-}\), \(\text{OH}^-\) or \(\text{SiO}_3^{2-}\) ions;
- \(x\) denotes 1, 2 or 3;
- \(y\) denotes 1, 2, 3 or 4;
- \(m\) and \(n\) denote, independently of one another, 1, 2, 3 or 4;
- with \(n \times y = m \times x\).

Preferably, the inorganic base corresponds to the following formula: \((\text{Zi}^{x-})_m(\text{Z}_2^{y+})_n\) in which \(Z_2\) denotes a metal from Groups 1 and 2 of the Periodic Table of the Elements; \(\text{Zi}^{x-}\) denotes an anion chosen from the \(\text{CO}_3^{2-}\), \(\text{OH}^-\) or \(\text{SiO}_3^{2-}\) ions, \(x\) has a value of 1, \(y\) denotes 1 or 2, \(m\) and \(n\) denote, independently of one another, 1 or 2 and \(n \times y = m \times x\).

Mention may be made, as examples of inorganic base which can be used according to the invention, of sodium carbonate, potassium carbonate, sodium hydroxide, potassium hydroxide, sodium metasilicate or potassium metasilicate. Preferably, the inorganic base is an alkali metal carbonate or sodium hydroxide.
The ammonium salts which can be used in the composition (C) according to the present invention are salts of ammonium (NH$_4^+$).

The ammonium salts which can be used in the composition (C) according to the present invention are preferably chosen from the following acid salts: acetate, carbonate, bicarbonate, chloride, citrate, nitrate, nitrite, phosphate or sulphate.

Use will particularly preferably be made of ammonium carbonate.

Preferably, the composition (C) does not comprise persalts.

The ammonium salt or salts can be employed as a mixture with one or more solid or pasty and preferably pulverulent adjuvants. The adjuvants can be chosen from clays, salts other than ammonium salts, anionic, nonionic, cationic or zwitterionic surfactants, natural or synthetic thickeners, optionally modified starch, glass beads, silica, nylon, alumina, titanium dioxide, zeolites, poly(methyl methacrylate) (PMMA), chitosan, maltodextrin, cyclodextrin, mono- or disaccharides, such as glucose, saccharose, sorbitol or fructose, zinc oxide, zirconium oxide, silica beads, talc, borosilicates, in particular calcium borosilicate, polyethylene, polytetrafluoroethylene (PTFE), cellulose and its derivatives, superabsorbent compounds, magnesium carbonate, calcium carbonate, polyacrylamide, porous hydroxyapatite, sawdust, fucus powder, crosslinked polyvinylpyrrolidone, calcium alginate, active charcoal, poly(vinylidene chloride/acrylonitrile) particles, in particular those sold under the general name "Expancel®" by Akzo Nobel and under the specific references "Expancel® WE" or "DE" Expancels, and their mixtures.

Preferably, the alkaline agent is chosen from:
• organic amines exhibiting a $pK_a$ at 25°C of less than 12, such as ethanolamine, alone or as a mixture with an amino acid,
• inorganic salts of alkanolamines, inorganic salts of amino acids, and guanidine carbonate,
• alkali metal carbonates and sodium hydroxide,
• ammonium carbonate, and
• their mixtures.
More preferably still, the alkaline agent is an organic amine exhibiting a $pK_a$ at 25°C of less than 12 and more preferably still monoethanolamine.

Advantageously, the composition (C) exhibits a content of alkaline agent(s) ranging from 0.01 to 30% by weight, preferably from 0.1 to 20% by weight, with respect to the total weight of the said composition (C).

The composition (C) can comprise one or more fatty substances as defined above and in particular one or more volatile linear alkanes of the invention.

Preferably, the composition (C) does not comprise volatile linear alkanes of the invention.

In an alternative form of the invention, the composition (C) does not comprise fatty substances.

The composition (C) can additionally comprise one or more oxidation dyes and/or one or more direct dyes when a dyeing process is concerned.

The oxidation dyes are generally chosen from oxidation bases, optionally in combination with one or more couplers.

By way of example, the oxidation bases are chosen from paraphenylenediamines, bisphenylalkylenediamines, para-aminophenols, ortho-aminophenols, heterocyclic bases and their addition salts.

Mention may be made, among para-phenylenediamines, by way of example, of para-phenylenediamine, para-toluylenediamine, 2-chloro-para-phenylenediamine, 2,3-dimethyl-para-phenylenediamine, 2,6-dimethyl-para-phenylene diamine, 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 ($β$-hydroxy ethyl)-para-phenylenediamine, 4-$N,N$-bis ($P$-hydroxyethyl)amino-2-methylaniline, 4-$N,N$-bis ($β$-hydroxy ethyl) amino-2-chloro anilne, 2-($P$-hydroxyethyl)-para-phenylenediamine, 2-fluoro-para-phenylenediamine, 2-isopropyl-para-phenylenediamine, $N$-($β$-hydroxypropyl)-para-phenylenediamine, 2-hydroxymethyl-para-

Among the para-phenylenediamines mentioned above, para-phenylene diamine, para-toluenediamine, 2-isopropyl-para-phenylenediamine, 2-(P-hydroxyethyl)-para-phenylenediamine, 2-(P-hydroxyethyloxy)-para-phenylene diamine, 2,6-dimethyl-para-phenylenediamine, 2,3-dimethyl-para-phenylenediamine, N,N-bis(P-hydroxyethyl)-para-phenylenediamine, 2-chloro-para-phenylenediamine, 2-(P-acetylaminoethyloxy)-para-phenylenediamine and their addition salts with an acid are particularly preferred.

Mention may be made, among bisphenylalkylenediamines, by way of example, of N,N'-bis(P-hydroxyethyl)-N,N'-bis(4'-aminophenyl)-1,3-diaminopropanol, N,N'-bis(P-hydroxyethyl)-N,N'-bis(4'-aminophenyl)ethylenediamine, N,N'-bis(4-aminophenyl)tetramethylene diamine, N,N'-bis(β-hydroxy ethyl) -N,N'-bis(4- amino-phenyl)tetramethylene diamine, N,N'-bis(4-methylaminophenyl)tetramethylene diamine, N,N'-bis(ethyl)-N,N'-bis(4'-amino-3'-methyl-phenyl)ethylenediamine, 1,8-bis(2,5-diaminophenoxy)-3,6-dioxaoctane and their addition salts.

Mention may be made, among para-aminophenols, by way of example, of para-aminophenol, 4-amino-3-methylphenol, 4-amino-3-fluorophenol, 4-amino-3-chlorophenol, 4-amino-3-(hydroxy-methyl)phenol, 4-amino-2-methylphenol, 4-amino-2-(hydroxy-methyl)phenol, 4-amino-2-(methoxymethyl)phenol, 4-amino -2-(aminomethyl)phenol, 4-amino -2- [(P-hydroxyethyl)aminomethyl] phenol, 4-amino-2-fluorophenol and their addition salts with an acid.
Mention may be made, among ortho-aminophenols, by way of example, of 2-aminophenol, 2-amino-5-methylphenol, 2-amino-6-methylphenol, 5-acetamido-2-aminophenol and their addition salts.

Mention may be made, among heterocyclic bases, by way of example, of pyridine derivatives, pyrimidine derivatives and pyrazole derivatives.

Mention may be made, among pyridine derivatives, of the compounds described, for example, in Patents GB 1 026 978 and GB 1 153 196, such as 2,5-diaminopyridine, 2-[(4-methoxyphenyl)amino]-3-aminopyridine, 3,4-diaminopyridine and their addition salts.

Other pyridine oxidation bases of use in the present invention are the 3-aminopyrazolo[1,5-a]pyridine oxidation bases or their addition salts described, for example, in Patent Application FR 2 801 308.

Mention may be made, by way of example, of pyrazolo[1,5-a]pyridin-3-ylamine; 2-(acetylamino)pyrazolo[1,5-a]pyridin-3-ylamine; 2-(morpholin-4-yl)pyrazolo[1,5-a]pyridin-3-ylamine; 3-aminopyrazolo[1,5-a]pyridine-2-carboxylic acid; 2-methoxyropyrazolo[1,5-a]pyridin-3-ylamine; (3-aminopyrazolo[1,5-a]pyridin-7-yl)methanol; 2-(3-aminopyrazolo[1,5-a]pyridin-5-yl)ethanol; 2-(3-aminopyrazolo[1,5-a]pyridin-7-yl)ethanol; (3-aminopyrazolo[1,5-a]pyridin-2-yl)methanol; 3,6-diaminopyrazolo[1,5-a]pyridine; 3,4-diaminopyrazolo[1,5-ajpyridine; pyrazolo[1,5-a]pyridine-3,7-diamine; 7-(morpholin-4-yl)pyrazolo[1,5-a]pyridin-3-ylamine; pyrazolo[1,5-a]pyridine-3,5-diamine; 5-(morpholin-4-yl)pyrazolo[1,5-a]pyridin-3-ylamine; 2-[(3-aminopyrazolo[1,5-a]pyridin-5-yl)(2-hydroxyethyl)amino]ethanol; 2-[(3-aminopyrazolo[1,5-a]pyridin-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; 3-aminopyrazolo[1,5-a]pyridin-7-ol; and their addition salts.

Mention may be made, among pyrimidine derivatives, of the compounds described, for example, in Patents DE 2 359 399; JP 88-169571; JP 05-63 124; EP 0 770 375 or Patent Application WO 96/1 5765, such as 2,4,5,6-tetraaminopyrimidine, 4-hydroxy-2,5,6-triamino-
pyrimidine, 2-hydroxy-4,5,6-triaminopyrimidine, 2,4-dihydroxy-5,6-diaminopyrimidine, 2,5,6-triaminopyrimidine and their addition salts and their tautomeric forms, when a tautomeric equilibrium exists.

Mention may be made, among pyrazole derivatives, of the compounds described in Patents DE 3 843 892 and DE 4 133 957 and Patent Applications WO 94/08969, WO 94/08970, FR-A-2 733 749 and DE 195 43 988, such as 4,5-diamino-1-methylpyrazole, 4,5-diamino-1-(P-hydroxyethyl)pyrazole, 3,4-diaminopyrazole, 4,5-diamino-1-(4'-chlorobenzyl)pyrazole, 4,5-diamino-1,3-dimethylpyrazole, 4,5-diamino-3-methyl-1-phenylpyrazole, 4,5-diamino-1-methyl-3-phenylpyrazole, 4-amino-1,3-dimethyl-5-hydrazinopyrazole, 1-benzyl-4,5-diamino-3-methylpyrazole, 4,5-diamino-3-(tert-butyl)-1-methylpyrazole, 4,5-diamino-1-(3-methyl)pyrazole, 4,5-diamino-1-ethyl-3-methylpyrazole, 4,5-diamino-1-ethyl-3-(′-methoxyphenyl)pyrazole, 4,5-diamino-1-ethyl-3-(4′-methoxyphenyl)pyrazole, 4,5-diamino-1-ethyl-3-methylpyrazole, 4,5-diamino-3-hydroxymethyl-1-isopropylpyrazole, 4,5-diamino-3-methyl-1-isopropylpyrazole, 4-amino-5-(2′-aminoethyl)-amino-1,3-dimethylpyrazole, 3,4,5-triaminopyrazole, 1-methyl-3,4,5-triaminopyrazole, 3,5-diamino-1-methyl-4-(methylaminopyrazole, 3,5-diamino-4-(P-hydroxyethyl)amino-1-methylpyrazole and their addition salts. 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-(P-hydroxyethyl)pyrazole and/or one of its salts.

Mention may also be made, as pyrazole derivatives, of diamino-N,N'-dihydropyrazolopyrazolones, in particular those described in Application FR-A-2 886 136, such as the following compounds and their addition salts: 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-hydroxy ethyl)-1,2-dihydropyrazol-3-one, 2-amino-3-(2-hydroxyethyl)amino-6,7-dihydro-1H,5H-pyrazolo[1,2-ajpyrazol-1-one, 2-amino-3-dimethylamino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one, 2,3-diamino-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, 4-amino-1,2-diethyl-5-(pyrrolidin-1-yl)-1,2-dihydropyrazol-13-one, 4-amino-5-[3-(dimethylamino)pyrrolidin-1-yl]-1,2-diethyl-1,2-dihydropyrazol-13-one or 2,3-diamino-6-hydroxy-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one.

It will be preferable to use 2,3-diamino-6,7-dihydro-1H,5H-pyrazolo[1,2-a]pyrazol-1-one and/or one of its salts.

Use will preferably be made, as heterocyclic bases, of 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 one of their salts.

The composition according to the invention can optionally comprise one or more couplers advantageously chosen from those conventionally used for dyeing keratinous fibres.

Mention may in particular be made, among these couplers, of meta-phenylenediamines, meta-aminophenols, meta-diphenols, naphthalene couplers or heterocyclic couplers and their addition salts.

Mention may be made, by way of example, of 1,3-dihydroxybenzene, 1,3-dihydroxy-2-methylbenzene, 4-chloro-1,3-dihydroxybenzene, 2,4-diamino-1-(P-hydroxyethyloxy)benzene, 2-amino-4-(P-hydroxyethylamino)-1-methoxybenzene, 1,3-diaminobenzene, 1,3-bis(2,4-diaminophenoxy)propane, 3-ureidoaniline, 3-ureido-1-dimethylamino benzene, sesamol, 1-β-hydroxy ethylamino-3,4-methylenedioxybenzene, cc-naphthol, 2-methyl-1-naphthol, 6-hydroxyindole, 4-hydroxyindole, 4-hydroxy-N-methylindole, 2-amino-3-hydroxy pyridine, 6-hydroxybenzomorpholine, 3,5-diamino-2,6-dim ethoxypyridine, 1-N-(P-hydroxyethy)amino-3,4-methylene dioxybenzene, 2,6-bis (P-hydroxyethylamino)toluene, 6-hydroxyindoline, 2,6-dihydroxy-4-methylpyridine, 1H-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, 6-methylpyrazolo[1,5-a]benzimidazole, their addition salts with an acid and their mixtures.

Generally, the addition salts of the oxidation bases and couplers which can be used in the context of the invention are chosen in particular from the addition salts with an acid, such as hydrochlorides, hydrobromides, sulphates, citrates, succinates, tartrates, lactates, tosylates, benzenesulphonates, phosphates and acetates.

The oxidation base or bases each advantageously represent from 0.000 1 to 10% by weight, with respect to the total weight of the composition, and preferably from 0.005 to 5% by weight, with respect to the total weight of the composition.

The content of coupler(s), if it(they) is(are) present, each advantageously represent from 0.000 1 to 10% by weight, with respect to the total weight of the composition, and preferably from 0.005 to 5% by weight, with respect to the total weight of the composition.

As regards the direct dyes, the latter are more particularly chosen from ionic or nonionic entities, preferably cationic or nonionic entities.

Mention may be made, as examples of suitable direct dyes, of azo, methine, carbonyl, azine, nitro(hetero)aryl or tri(hetero)arylmethane direct dyes, porphyrins, phthalocyanines and natural direct dyes, alone or as mixtures.

More particularly, azo dyes comprise an \(-N=N-\) functional group, the two nitrogen atoms of which are not simultaneously participants in a ring. However, it is not out of the question for one of the two nitrogen atoms of the \(-N=N-\) sequence to be a participant in a ring.

Dyes of the family of the methines are more particularly compounds comprising at least one sequence chosen from \(>C=C<\) and \(-N=C<-\), the two atoms of which are not simultaneously participants in a ring. However, it is specified that one of the nitrogen or carbon atoms of the sequences can be a participant in a ring. More particularly, the dyes of this family result from compounds of the following types: methine, azomethine, mono- and diarylmethane, indoamines (or diphenylamines),
indophenols, indoanilines, carbocyanines, azacarbocyanines and their isomers, diazacarbocyanines and their isomers, tetraazacarbocyanines or hemicyanines.

As regards dyes of the family of the carbonyls, mention may be made, for example, of dyes chosen from acridone, benzoquinone, anthraquinone, naphthoquinone, benzantrone, anthranthrone, pyranthrone, pyrazolanthrone, pyrimidinoanthrone, flavanthrone, indanthrone, flavone, (iso)violanthrone, isoindolinone, benzimidazolone, isoquinolinone, anthrapyridone, pyrazoloquinazolone, perinone, quinacridone, quinophthalone, indigoid, thioindigo, naphthalimide, anthrapyrimidine, diketopyrrolopyrrole or coumarin dyes.

As regards dyes of the family of the cyclic azines, mention may in particular be made of azine, xanthene, thioxanthene, fluorindine, acridine, (di)oxazine, (di)thiazine or pyronine dyes.

The nitro(hetero)aromatic dyes are more particularly nitrobenzene or nitropyridine direct dyes.

As regards the dyes of porphyrin or phthalocyanine type, use may be made of cationic or noncaticion compounds optionally comprising one or more metals or metal ions, such as, for example, alkali and alkaline earth metals, zinc and silicon.

Mention may be made, as examples of direct dyes which are particularly suitable, of nitrobenzene dyes, azo, azomethine or methine direct dyes, azacarbocyanines, such as tetraazacarbocyanines (tetraazapentamethines), quinone and in particular anthraquinone, naphthoquinone or benzoquinone direct dyes, azine, xanthene, triarylmethane, indoamine or indigoid direct dyes, phthalocyanines, porphyrins and natural direct dyes, alone or as mixtures.

These dyes can be monochromophoric dyes (that is to say, comprising only a single chromophore) or polychromophoric dyes, preferably di- or trichromophoric dyes, it being possible for the chromophores to be identical or different and from the same or a different chemical family. It should be noted that a polychromophoric dye comprises several radicals, each resulting from a molecule which absorbs in the visible region between 400 and 800 nm. Furthermore, this
absorbance of the dye requires neither preoxidation of the latter nor combination with other chemical entity(ies).

In the case of polychromophoric dyes, the chromophores are connected to one another by means of at least one connecting arm, which may or may not be cationic.

Preferably, the connecting arm is a linear, branched or cyclic C$_1$-C$_2$0 alkyl chain which is optionally interrupted by at least one heteroatom (such as nitrogen or oxygen) and/or by at least one group comprising it (CO, SO$_2$), which is optionally interrupted by at least one heterocycle which may or may not be fused with a phenyl nucleus and which comprises at least one quaternized nitrogen atom participating in the said cycle and optionally at least one other heteroatom (such as oxygen, nitrogen or sulphur), which is optionally interrupted by at least one substituted or unsubstituted phenyl or naphthyl group and which is optionally interrupted by at least one quaternary ammonium group substituted by two optionally substituted C1-C15 alkyl groups, the connecting arm not comprising a nitro, nitroso or peroxy group.

If the heterocycles or aromatic nuclei are substituted, they are substituted, for example, by one or more Ci-Cs alkyl groups optionally substituted by a hydroxyl group, a C1-C2 alkoxy group, a C2-C4 hydroxyalkoxy group, an acetylamino group, an amino group substituted by one or two C1-C4 alkyl groups which optionally carry at least one hydroxyl group or it being possible for the two groups to form, with the nitrogen atom to which they are attached, a 5- or 6-membered heterocycle optionally comprising another heteroatom identical to or different from nitrogen; a halogen atom; a hydroxyl group; a C1-C2 alkoxy group; a C2-C4 hydroxyalkoxy group; an amino group; or an amino group substituted by one or two identical or different C1-C4 alkyl groups which optionally carry at least one hydroxyl group.

Mention may be made, among the benzene direct dyes which can be used according to the invention, without implied limitation, of the following compounds:
- 1,4-diamino-2-nitrobenzene
- 1-amino-2-nitro-4 -(P-hydroxyethylamino)benzene
- 1-amino-2-nitro-4-[bis(P-hydroxy ethyl) amino] benzene
- 1,4-bis(P-hydroxyethylamino)-2-nitrobenzene
- 1-(β-hydroxyethylamino)-2-nitro-4-[bis(P-hydroxy ethyl) amino] benzene

5
- 1-(P-hydroxyethylamino)-2-nitro-4-aminobenzene
- 1-(β-hydroxyethylamino)-2-nitro-4-[(ethyl)(P-hydroxy-ethyl)amino] benzene
- 1-amino-3-methyl-1,4-[(β-hydroxy ethylamino)-6-nitrobenzene
- 1-amino-2-nitro-4-(P-hydroxyethylamino)-5-chlorobenzene
- 1,2-diamino-4-nitrobenzene
- 1-amino-2-(β-hydroxyethylamino)-5-nitrobenzene
- 1,2-bis(P-hydroxyethylamino)-4-nitrobenzene
- 1-amino-2-[tris(hydroxymethyl)methylamino]-5-nitrobenzene
- 1-hydroxy-2-amino-5-nitrobenzene

10
- 1-hydroxy-2-amino-4-nitrobenzene
- 1-hydroxy-3-nitro-4-amino benzene
- 1-hydroxy-2-amino-4,6-dinitrobenzene
- 1-(β-hydroxyethyloxy)-2-(P-hydroxyethylamino)-5-nitrobenzene

15
- 1-methoxy-2-(P-hydroxyethylamino)-5-nitrobenzene
- 1-(P-hydroxyethylxylo)-3-methy lamino-4-nitrobenzene
- 1-(P,y-dihydroxypropyloxy)-3-methy lamino-4-nitrobenzene
- 1-(P-hydroxyethylamino)-4-(P,y-dihydroxypropyloxy)-2-nitrobenzene

20
- 1-(P,y-dihydroxypropylamino)-4-trifluoromethyl-2-nitrobenzene
- 1-(P-hydroxyethylamino)-4-trifluoromethyl-2-nitrobenzene
- 1-(β-hydroxyethylamino)-3-methyl-1,2-nitrobenzene
- 1-(β-amino ethylamino)-5-methoxy-2-nitrobenzene

25
- 1-hydroxy-2-chloro-6-ethylamino-4-nitrobenzene
- 1-hydroxy-2-chloro-6-amin o-4-nitrobenzene
- 1-hydroxy-6-[bis(P-hydroxy ethyl) amino]-3-nitrobenzene
- 1-(P-hydroxyethylamino)-2-nitrobenzene
- 1-hydroxy-4-(P-hydroxyethylamino)-3-nitrobenzene.
Mention may be made, among the azo, azomethine, methine or tetraazapentamethine direct dyes which can be used according to the invention, of the cationic dyes described in Patent Applications WO 95/1 5144, WO 95/0 1772 and EP 7 14 954; FR 2 189 006, FR 2 285 851, FR 2 140 205, EP 1 378 544 and EP 1 674 073.

Thus, mention may very particularly be made of the following dyes of formulae (I) to (IV) and preferably of the compounds of formulae (I) and (III):

\[
A\begin{array}{c}
D=D\\ X^-
\end{array}N \begin{array}{c}R_1 \end{array} \begin{array}{c}R_2 \end{array} \begin{array}{c}R_3 \end{array} \begin{array}{c}R_4 \end{array}
\]  

(1)

in which:

D represents a nitrogen atom or the \(-\text{CH}\) group,

\(R_i\) and \(R_2\), which are identical or different, represent a hydrogen atom; a \(\text{C}_1-\text{C}_4\) alkyl group which can be substituted by a \(-\text{CN}, -\text{OH}\) or \(-\text{NH}_2\) group or can form, with a carbon atom of the benzene ring, an optionally oxygen-comprising or nitrogen-comprising heterocycle which can be substituted by one or more \(\text{C}_1-\text{C}_4\) alkyl groups; or a 4'-aminophenyl group,

\(R_3\) and \(R_3'\), which are identical or different, represent a hydrogen atom, a halogen atom chosen from chlorine, bromine, iodine and fluorine, a cyano group, a \(\text{C}_1-\text{C}_4\) alkyl group, a \(\text{C}_1-\text{C}_4\) alkoxy group or an acetyloxy group,

\(X\) represents an anion, preferably chosen from chloride, methyl sulphate and acetate,

A represents a group chosen from the following structures \(A_i\) to \(A_{18}\), more advantageously \(A_1, A_4, A_7, A_{13}\) and \(A_{18}\):

\[
\begin{array}{c}
A_1 \\
A_2 \\
A_3
\end{array}
\]
in which \( R_4 \) represents a \( \text{C}_4 \) alkyl group which can be substituted by a hydroxyl group and \( R_5 \) represents a \( \text{C}_4 \) alkoxy group;

5

in which:

R\(_6\) represents a hydrogen atom or a \( \text{C}_4 \) alkyl group,

R\(_7\) represents a hydrogen atom, an alkyl group which can be substituted by a -CN group or by an amino group, or a 4'-aminophenyl group, or
forms, with $R_6$, an optionally oxygen-comprising and/or nitrogen-comprising heterocycle which can be substituted by a $C_1$-$C_4$ alkyl group, $R_8$ and $R_9$, which are identical or different, represent a hydrogen atom, a halogen atom, such as bromine, chlorine, iodine or fluorine, a $C_1$-$C_4$ alkyl group, a $C_1$-$C_4$ alkoxy group or a -CN group,

$X^-$ represents an anion, preferably chosen from chloride, methyl sulphate and acetate,

$B$ represents a group chosen from the following structures $B_1$ to $B_6$:

$B_1$ $B_2$ $B_3$ $B_4$ $B_5$ $B_6$

in which:

$R_{10}$ represents a $C_1$-$C_4$ alkyl group,

$R_{11}$ and $R_{12}$, which are identical or different, represent a hydrogen atom or a $C_1$-$C_4$ alkyl group;

$E=\text{D}_1=\text{D}_2-(\text{N})_m=\text{R}_{13}$

in which:

$R_{13}$ represents a hydrogen atom, a $C_1$-$C_4$ alkoxy group or a halogen atom, such as bromine, chlorine, iodine or fluorine,

$R_{14}$ represents a hydrogen atom or a $C_1$-$C_4$ alkyl group or forms, with a carbon atom of the benzene ring, a heterocycle which may comprise oxygen and/or may be substituted by one or more $C_1$-$C_4$ alkyl groups,
$R_i$ represents a hydrogen atom or a halogen atom, such as bromine, chlorine, iodine or fluorine,
$R_{i6}$ and $R_{i7}$, which are identical or different, represent a hydrogen atom or a C$_1$-C$_4$ alkyl group,
$D_i$ and $D_2$, which are identical or different, represent a nitrogen atom or the -CH group,
$m = 0$ or $1$, preferably $1$,
it being understood that, when $R_{i3}$ represents an unsubstituted amino group, then $D_i$ and $D_2$ simultaneously represent a -CH group and $m = 0$,
$X^-$ represents an anion, preferably chosen from chloride, methyl sulphate and acetate,
$E$ represents a group chosen from the following structures E1 to E8, more particularly E1, E2 and E7:

\[
\begin{align*}
\text{E1} & : \quad \begin{array}{c}
\text{E2} \\
\end{array} \\
\text{E3} & : \quad \begin{array}{c}
\text{E4} \\
\end{array} \\
\text{E5} & : \quad \begin{array}{c}
\text{E6} \\
\end{array} \\
\text{E7} & : \quad \begin{array}{c}
\text{E8} \\
\end{array}
\end{align*}
\]

in which $R'$ represents a C$_1$-C$_4$ alkyl group;
when $m = 0$ and when $D_i$ represents a nitrogen atom, then $E$ can also denote a group with the following structure E9:
in which \( R' \) represents a \( C_1-C_4 \) alkyl group;

\[
\text{G} - \text{N} - \text{N} - \text{J} \quad \text{(IV)}
\]
in which:

the symbol \( G \) represents a group chosen from the following structures \( G_i \) to \( G_3 \):

\[
\begin{align*}
G_1 & \quad \begin{pmatrix} \text{E9} \\ \text{in which \( R' \) represents a \( C_1-C_4 \) alkyl group;} \end{pmatrix} \\
G_2 & \quad \begin{pmatrix} \text{in which:} \\
\text{the symbol \( G \) represents a group chosen from the following structures \( G_i \) to \( G_3 \);} \\
\text{structures \( G_i \) to \( G_3 \);} \\
\text{R}_{18} \text{ denotes a } C_1-C_4 \text{ alkyl group or a phenyl group which can be substituted by a } C_1-C_4 \text{ alkyl group or a halogen atom chosen from chlorine, bromine, iodine and fluorine;} \\
\text{R}_{19} \text{ denotes a } C_1-C_4 \text{ alkyl group or a phenyl group;} \\
\text{R}_{20} \text{ and } R_{21} \text{, which are identical or different, represent a } C_1-C_4 \text{ alkyl group or a phenyl group or together form, in } G_1, \text{ a benzene ring substituted by one or more } C_1-C_4 \text{ alkyl, } C_1-C_4 \text{ alkoxy or } N_0^2 \text{ groups or together form, in } G_2, \text{ a benzene ring optionally substituted by one or more } C_1-C_4 \text{ alkyl, } C_1-C_4 \text{ alkoxy or } N_0^2 \text{ groups;} \\
\text{R}_{20} \text{ can additionally denote a hydrogen atom;} \\
\text{Z denotes an oxygen or sulphur atom or an } -NR_2^2 (X')_r \text{ group;} \\
\text{M represents a } -CH \text{ group, a } -CR \text{ group, } R \text{ denoting a } C_1-C_4 \text{ alkyl group, or an } -NR_2^2 (X')_r \text{ group;} \\
\text{K represents a } -CH \text{ group, a } -CR \text{ group, } R \text{ denoting a } C_1-C_4 \text{ alkyl group, or an } -NR_2^2 (X')_r \text{ group;} \\
\text{P represents a } -CH \text{ group, a } -CR \text{ group, } R \text{ denoting a } C_1-C_4 \text{ alkyl group, or an } -NR_2^2 (X')_r \text{ group; } r \text{ denotes zero or 1;} \\
\end{align*}
\]
R22 represents an O atom, a C1-C4 alkoxy group or a C1-C4 alkyl group; R23 and R24, which are identical or different, represent a hydrogen atom, a halogen atom chosen from chlorine, bromine, iodine and fluorine, a C1-C4 alkyl group, a C1-C4 alkoxy group or an -NO2 group; X\(^-\) represents an anion, preferably chosen from chloride, iodide, methyl sulphate, ethyl sulphate, acetate and perchlorate; with the proviso that, if R22 denotes O, then r denotes zero; if K or P or M denote -N-(C1-C4 alkyl) X\(^-\), then R23 or R24 is preferably other than a hydrogen atom; if K denotes -NR22(X)\(^r\), then M = P = -CH or -CR; if M denotes -NR22(X)\(^r\), then K = P = -CH or -CR; if P denotes -NR22(X)\(^r\), then K = M and denote -CH or -CR; if Z denotes a sulphur atom with R21 denoting C1-C4 alkyl, then R20 is other than a hydrogen atom; if Z denotes -NR22 with R19 denoting C1-C4 alkyl, then at least one of the R18, R20 or R21 groups of the group with the structure G2 is other than a C1-C4 alkyl group; the symbol J represents:

-(a) a group with the following structure J1:

```
\[ \begin{array}{c}
\text{J1} \\
\text{R26} \\
\text{R28} \\
\text{R27}
\end{array} \]
```

in which structure J1:

- R25 represents a hydrogen atom, a halogen atom chosen from chlorine, bromine, iodine and fluorine or a C1-C4 alkyl, C1-C4 alkoxy, -OH, -NO2, -NHR2 8, -NR29R3 0 or -NHCOC1-C4 alkyl) group or forms, with R26, a 5- or 6-membered ring which may or may not comprise one or more heteroatoms chosen from nitrogen, oxygen or sulphur;
- R26 represents a hydrogen atom, a halogen atom chosen from chlorine, bromine, iodine and fluorine, a C1-C4 alkyl group or a C1-C4 alkoxy group.
or forms, with R27 or R28, a 5- or 6-membered ring which may or may not comprise one or more heteroatoms chosen from nitrogen, oxygen or sulphur;

R27 represents a hydrogen atom, an -OH group, an -NHR29 group or an -NR29R30 group;

R28 represents a hydrogen atom, a C1-C4 alkyl group, a C1-C4 monohydroxyalkyl group, a C2-C4 polyhydroxyalkyl group or a phenyl group;

R29 and R30, which are identical or different, represent a C1-C4 alkyl group, a C1-C4 monohydroxyalkyl group or a C2-C4 polyhydroxyalkyl group;

-(b) a 5- or 6-membered nitrogenous heterocyclic group which is capable of including other heteroatoms and/or carbonyl groups and which can be substituted by one or more C1-C4 alkyl, amino or phenyl groups, and in particular a group with the following structure J2:

\[
\begin{array}{c}
\text{Y} \quad \text{N} \\
\text{O} \quad \text{U} \\
\text{R31} \quad \text{R32}
\end{array}
\]

in which structure J2:

R31 and R32, which are identical or different, represent a hydrogen atom, a C1-C4 alkyl group or a phenyl group;

Y denotes the -CO- group or the \( \text{=C}^{\equiv} \text{gr}0 \) up;

n = 0 or 1, with, when n denotes 1, U denoting the -CO- group.

In the structures (I) to (IV) defined above, the C1-C4 alkyl or alkoxy group preferably denotes methyl, ethyl, butyl, methoxy or ethoxy.

Preference is given, among the compounds of formulae (I) and (III), to the following compounds:
Mention may also be made, among azo direct dyes, of the following dyes described in the Colour Index International, 3rd edition:
- Disperse Red 17
- Basic Red 22
- Basic Red 76
- Basic Yellow 57
- Basic Brown 16
- Basic Brown 17
- Disperse Black 9.

Mention may also be made of 1-(4'-aminodiphenylazo)-2-methyl-4-[bis(P-hydroxy ethyl) amino] benzene.

Mention may be made, among quinone direct dyes, of the following dyes:
- Disperse Red 15
- Solvent Violet 13
- Disperse Violet 1
- Disperse Violet 4
- Disperse Blue 1
- Disperse Violet 8
- Disperse Blue 3
- Disperse Red 11
- Disperse Blue 7
- Basic Blue 22
- Disperse Violet 15
- Basic Blue 99

and the following compounds:
- 1-(N-methylmorpholinopropylamino)-4-hydroxyanthraquinone
- 1-aminopropylamino-4-(methylamino)anthraquinone
- 1-(aminopropylamino)anthraquinone
- 5-(P-hydroxyethyl)-1,4-diaminoanthraquinone
- 2-(aminoethylamino)anthraquinone
- 1,4-bis (P,y-dihydroxypropylamino)anthraquinone.

Mention may be made, among azine dyes, of the following compounds:
- Basic Blue 17
- Basic Red 2.

Mention may be made, among triarylmethane dyes which can be used according to the invention, of the following compounds:
- Basic Green 1
- Basic Violet 3
- Basic Violet 14
- Basic Blue 7
- Basic Blue 26.

Mention may be made, among indoamine dyes which can be used according to the invention, of the following compounds:
- 2-P-hydroxyethylamino-5-[bis(P-4'-hydroxyethyl)amino]anilino-1,4-benzoquinone
- 2-P-hydroxyethylamino-5-(2'-methoxy-4'-amino)anilino-1,4-benzoquinone
- 3-N(2'-chloro-4'-hydroxy)phenyl-acetylamino-6-methoxy-1,4-benzoquinone imine
- 3-N(3'-chloro-4'-methylamino)phenyl-ureido-6-methyl-1,4-benzoquinone imine
- 3-[4'-N-(ethyl,carbamylmethyl)-amino]-phenyl-ureido-6-methyl-1,4-benzoquinone imine.
Mention may be made, among dyes of tetraazapentamethine type which can be used according to the invention, of the following compounds which appear in the table below:

<table>
<thead>
<tr>
<th>![Dye 1]</th>
<th>![Dye 2]</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Dye 3]</td>
<td>![Dye 4]</td>
</tr>
<tr>
<td>![Dye 5]</td>
<td>![Dye 6]</td>
</tr>
<tr>
<td>![Dye 7]</td>
<td>![Dye 8]</td>
</tr>
</tbody>
</table>

X representing an anion preferably chosen from chloride, iodide, methyl sulphate, ethyl sulphate, acetate and perchlorate.

Mention may more particularly be made, among polychromophoric dyes, of symmetrical or asymmetrical di- or trichromophoric azo and/or azomethine (hydrazone) dyes comprising, on the one hand, at least one optionally fused 5- or 6-membered aromatic heterocycle comprising at least one quaternized nitrogen atom participating in the said heterocycle and optionally at least one other heteroatom (such as nitrogen, sulphur or oxygen) and, on the other hand,
at least one optionally substituted phenyl or naphthyl group optionally carrying at least one OR group with R representing a hydrogen atom, an optionally substituted Ci-C₆ alkyl group or an optionally substituted phenyl ring or at least one N(R')₂ group with R', which are identical or different, representing a hydrogen atom, an optionally substituted Ci-C₆ alkyl group or an optionally substituted phenyl ring, it being possible for the R' groups to form, with the nitrogen atom to which they are bonded, a saturated 5- or 6-membered heterocycle, or alternatively either and/or both R' groups can form, each with the carbon atom of the aromatic ring in the ortho position with respect to the nitrogen atom, a saturated 5- or 6-membered heterocycle.

Mention may preferably be made, as cationic aromatic heterocycle, of 5- or 6-membered rings comprising from 1 to 3 nitrogen atoms, preferably 1 or 2 nitrogen atoms, one being quaternized, the said heterocycle furthermore optionally being fused with a benzene ring. It should likewise be noted that the heterocycle can optionally comprise another heteroatom other than nitrogen, such as sulphur or oxygen.

If the heterocycles or phenyl or naphthyl groups are substituted, they are substituted, for example, by one or more Ci-Cs alkyl groups optionally substituted by a hydroxyl group, a Ci-C₂ alkoxy group, a Ci₂-C₄ hydroxyalkoxy group, an acetylamino group, an amino group substituted by one or two Ci-C₄ alkyl groups which optionally carry at least one hydroxyl group or it being possible for the two groups to form, with the nitrogen atom to which they are attached, a 5- or 6-membered heterocycle optionally comprising another heteroatom identical to or different from nitrogen; a halogen atom; a hydroxyl group; a Ci-C₂ alkoxy group; a Ci₂-C₄ hydroxyalkoxy group; an amino group; or an amino group substituted by one or two identical or different Ci-C₄ alkyl groups which optionally carry at least one hydroxyl group.

These polychromophores are connected to one another by means of at least one connecting arm optionally comprising at least one quaternized nitrogen atom which may or may not participate in a saturated or unsaturated and optionally aromatic heterocycle.
Preferably, the connecting arm is a linear, branched or cyclic C\textsubscript{1}-C\textsubscript{20} alkyl chain which is optionally interrupted by at least one heteroatom (such as nitrogen or oxygen) and/or by at least one group comprising it (CO, S\textsubscript{2}O\textsubscript{2}), which is optionally interrupted by at least one heterocycle which may or may not be fused with a phenyl nucleus and which comprises at least one quaternized nitrogen atom participating in the said cycle and optionally at least one other heteroatom (such as oxygen, nitrogen or sulphur), which is optionally interrupted by at least one substituted or unsubstituted phenyl or naphthyl group and which is optionally interrupted by at least one quaternary ammonium group substituted by two optionally substituted C\textsubscript{1}-C\textsubscript{15} alkyl groups, the connecting arm not comprising a nitro, nitroso or peroxo group.

The connection between the connecting arm and each chromophore is generally made by means of a heteroatom substituting the phenyl or naphthyl nucleus or by means of the quaternized nitrogen atom of the cationic heterocycle.

The dye can comprise identical or different chromophores.


Use may also be made of cationic direct dyes mentioned in Applications EP 1 006 153, which describes dyes comprising two chromophores of anthraquinone type connected by means of a cationic connecting arm; EP 1 433 472, EP 1 433 474, EP 1 433 471 and EP 1 433 473, which describes identical or different dichromophoric dyes connected via a cationic or noncationic connecting arm, and EP 6 291 333, which describes in particular dyes comprising three chromophores, one of them being an anthraquinone chromophore to which two chromophores of azo or diazacarbocyanine type or one of its isomers are connected.
Mention may be made, among natural direct dyes which can be used according to the invention, of lawsone, juglone, alizarin, purpurin, carminic acid, kermesic acid, purpurogallin, protocatechualdehyde, indigo, isatin, curcumin, spinulosin, apigenidin, orceins, brazilin, brazilein, haematein or haematoxylin. Use may also be made of extracts or decoctions comprising these natural dyes and in particular cataplasms or henna-based extracts.

When they are present, the direct dye or dyes more particularly represent from 0.001 to 10% by weight of the total weight of the composition and preferably from 0.005 to 5% by weight, with respect to the total weight of the composition (C).

The composition (C) can comprise dyes of one and/or other types. It can optionally result from the mixing of two dyeing compositions, one comprising the oxidation dye or dyes and the other the direct dye or dyes.

The composition (C) can be an anhydrous or aqueous composition. Aqueous composition is understood to mean a composition comprising more than 5% by weight of water, preferably more than 10% by weight of water and more advantageously still more than 20% by weight of water, with respect to the total weight of the composition.

Preferably, the composition (C) is an aqueous composition.

The composition can optionally comprise one or more solvents. Those which were mentioned in the context of the description of the aqueous composition (B) may be suitable for the composition (C), at the concentrations also specified.

The composition (C) can also comprise conventional additives, such as those listed above for the composition (A).

The pH of the composition (C), if it is aqueous, is between 2 and 12, preferably between 8 and 11. The pH is adjusted by using acidifying or alkaline agents, such as those mentioned above.

It is specified that, if the final composition applied to the hair (comprising the compositions (A), (B) and (C)) comprises aqueous ammonia or one of its salts, its content will preferably be less than or equal to 0.03% by weight of the final composition (expressed as NH₃),
more particularly less than or equal to 0.01% by weight, with respect to the final composition.

It is indicated that the final composition results from the mixing of the compositions (A), (B) and (C), these mixing operations being carried out either before application to the keratinous fibres (preparation at the time of use) or directly on the keratinous fibres (successive applications, with or without premixing operations and without intermediate rinsing). Preferably, if the composition comprises aqueous ammonia or one of its salts, then the amount of basifying agent(s) is greater than that of aqueous ammonia (expressed as NH₃).

According to one alternative form, the composition according to the invention obtained after mixing the compositions (A), (B) and (C) described above is such that, after mixing, the amount of fatty substances is greater than 20% by weight, preferably greater than 25% by weight and more advantageously still greater than 30% by weight, with respect to the total weight of the final composition.

According to a first alternative form of the invention, the compositions (A), (B) and (C) are applied, successively and without intermediate rinsing, to the dry or wet keratinous fibres; more particularly, the compositions (A) then (C) and then (B) or (C) then (A) and then (B) are applied.

A specific embodiment of this alternative form corresponds to applying, successively and without intermediate rinsing, the composition resulting from the mixing, prior to application, of the compositions (A) and (C) and then the oxidizing composition (B).

In accordance with a second alternative form of the method, a composition obtained by mixing the compositions (A), (B) and (C) at the time of use, before application, is applied to the dry or wet keratinous fibres. This alternative form is preferred.

In each of these alternative forms, the ratios by weight R1 of the amounts of compositions [(A) + (C)]/(B) and R2 of the amounts of compositions (A)/(C) vary from 0.1 to 10 and preferably from 0.3 to 3.

In addition, independently of the alternative form employed, the mixture present on the fibres (resulting either from the mixing of the
compositions at the time of use or from the successive application of the latter) is left in place for a period of time generally of the order of 1 minute to 1 hour, preferably 5 minutes to 30 minutes.

The temperature during the method is conventionally between ambient temperature (which can range from 15 to 25°C) and 80°C, preferably between ambient temperature and 60°C.

On conclusion of the treatment, the human keratinous fibres are optionally rinsed with water and are optionally subjected to washing with a shampoo, followed by rinsing with water, before being dried or left to dry.

Another subject-matter of the invention is a ready-for-use composition comprising:
- one or more surfactants,
- one or more oxidizing agents,
- one or more alkaline agents and optionally one or more oxidation dyes and/or one or more direct dyes,
- one or more fatty substances chosen from volatile linear alkanes and optionally one or more additional fatty substances, the total amount of fatty substance being greater than 20% by weight, preferably greater than 25% by weight and more advantageously still greater than 30% by weight, with respect to the total weight of the composition.

The surfactants, the oxidizing agents, the alkaline agents, the oxidation dyes, the direct dyes, the volatile linear alkanes and the additional fatty substances which can be used in this ready-for-use composition are those described above.

Another subject-matter of the invention is a multicompartment device comprising:
- a first compartment including the anhydrous composition (A) as described above comprising one or more fatty substances and one or more surfactants,
- a second compartment including a composition (B) comprising one or more oxidizing agents and optionally one or more fatty substances, and
- a third compartment including a composition (C) comprising one or more alkaline agents,
the said fatty substance or substances being chosen from volatile linear alkanes, additional fatty substances and their mixtures, and
it being understood that one or more volatile linear alkanes is or are present in at least one of the compositions (A), (B) or (C), preferably in the composition (A) or (B).

According to one embodiment, the composition (C) comprises one or more oxidation dyes and/or one or more direct dyes.

This device can also comprise one or more washing and/or conditioning compositions for keratinous fibres intended to be applied before and/or after the dyeing and/or lightening treatment according to the invention.

This device can advantageously be equipped with a means which makes it possible to dispense the desired mixture over the hair, such as the devices described in Patent FR 2586913.

The following examples serve to illustrate the invention.

EXAMPLES

Example 1

A lightening composition was prepared from the three compositions (AI), (B1) and (C1), which are obtained by mixing the ingredients indicated below. The amounts are shown as % by weight, with respect to the weight of each composition.

Anhydrous composition AI

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>% by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octyldodecanol</td>
<td>11.5</td>
</tr>
<tr>
<td>Disteardimonium hectorite*</td>
<td>3.0</td>
</tr>
<tr>
<td>Propylene carbonate</td>
<td>1.0</td>
</tr>
<tr>
<td>Polysorbate 21</td>
<td>11.0</td>
</tr>
</tbody>
</table>
Laureth-2 1.0
Mixture of n-undecane and of n-tridecane according to Example 2 of Application WO 2008/1 55059 72.5
* sold under the trade name Bentone 38VCG by Rheox.

<table>
<thead>
<tr>
<th>Composition B1 (20-volume oxidizing composition)</th>
<th>% by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen peroxide as a 50% by weight solution</td>
<td>12.00</td>
</tr>
<tr>
<td>Liquid petrolatum</td>
<td>20.00</td>
</tr>
<tr>
<td>Cetearyl alcohol</td>
<td>8.00</td>
</tr>
<tr>
<td>Cetearyl alcohol oxyethylenated with 33 mol of ethylene oxide (EO)</td>
<td>3.00</td>
</tr>
<tr>
<td>Tetrasodium pyrophosphate decahydrate</td>
<td>0.03</td>
</tr>
<tr>
<td>Disodium tin hexahydroxide</td>
<td>0.04</td>
</tr>
<tr>
<td>Pentasodium salt of diethylenetriaminepentaacetic acid</td>
<td>0.15</td>
</tr>
<tr>
<td>Polyquaternium-6</td>
<td>0.50</td>
</tr>
<tr>
<td>Hexadimethrine chloride</td>
<td>0.25</td>
</tr>
<tr>
<td>Phosphoric acid</td>
<td>q.s. for pH 2.3</td>
</tr>
<tr>
<td>Protected oxyethylenated (4 EO) rapeseed amide</td>
<td>1.3</td>
</tr>
<tr>
<td>Tocopherol</td>
<td>0.1</td>
</tr>
<tr>
<td>Glycerol</td>
<td>0.5</td>
</tr>
<tr>
<td>Water</td>
<td>q.s. for 100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Composition CI</th>
<th>% by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monoethanolamine</td>
<td>15.05</td>
</tr>
<tr>
<td>Hydroxyethylcellulose</td>
<td>1.5</td>
</tr>
<tr>
<td>Sodium metabisulphite</td>
<td>0.7</td>
</tr>
<tr>
<td>Ascorbic acid</td>
<td>0.25</td>
</tr>
<tr>
<td>Pentasodium salt of diethylenetriaminepentaacetic acid</td>
<td>1.0</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>6.2</td>
</tr>
<tr>
<td>Ethanol</td>
<td>8.8</td>
</tr>
<tr>
<td>Hexylene glycol</td>
<td>3.0</td>
</tr>
</tbody>
</table>
At the moment of use, the following were mixed:
- 10 parts by weight of the composition A1,
- 15 parts by weight of the composition B1, and
- 4 parts by weight of the composition C1.

The mixture obtained (pH = 9.9 ± 0.1) was subsequently applied to a lock of natural hair exhibiting a height of tone of 4, at the rate of 10 g of mixture per 1 g of hair and a leave-in time of 30 min at 27°C.

At the end of this time, the hair is rinsed, washed with a standard shampoo and dried.

The mixture obtained is odourless, whether during the preparation or during the leave-in time on the locks.

Furthermore, a good level of lightening was obtained, as shown in Table 1 below.

<table>
<thead>
<tr>
<th></th>
<th>L*</th>
<th>a*</th>
<th>b*</th>
<th>ΔE*ab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated natural hair</td>
<td>18.1</td>
<td>2.06</td>
<td>1.87</td>
<td>-</td>
</tr>
<tr>
<td>Natural hair treated with the mixture of the invention</td>
<td>23.04</td>
<td>6.43</td>
<td>7.64</td>
<td>8.77</td>
</tr>
</tbody>
</table>

Example 2

Dyeing compositions were prepared from the three compositions (A2), (B2) and (C2) or (C3), which are obtained by mixing the ingredients indicated below. The amounts are shown as % by weight, with respect to the weight of each composition.

Composition A2
<table>
<thead>
<tr>
<th>Ingredient</th>
<th>% by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid petrolatum</td>
<td>64.5</td>
</tr>
<tr>
<td>Octyldodecanol</td>
<td>11.5</td>
</tr>
<tr>
<td>Polysorbate 21</td>
<td>11.0</td>
</tr>
<tr>
<td>Ethylene glycol distearate</td>
<td>8.0</td>
</tr>
<tr>
<td>Laureth-2</td>
<td>1.0</td>
</tr>
<tr>
<td>Disteardimonium hectorite*</td>
<td>3.0</td>
</tr>
<tr>
<td>Propylene carbonate</td>
<td>1.0</td>
</tr>
</tbody>
</table>

* sold under the trade name Bentone 38VCG by Rheox.

**Composition B2 (20-volume oxidizing composition)**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>% by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxyethylenated (10 EO) behenyl alcohol</td>
<td>6.00</td>
</tr>
<tr>
<td>Sorbitol</td>
<td>5.00</td>
</tr>
<tr>
<td>Mixture of n-undecane and of n-tridecane according to Example 2 of Application WO 2008/1 55059</td>
<td>10.00</td>
</tr>
<tr>
<td>Liquid petrolatum</td>
<td>50.98</td>
</tr>
<tr>
<td>Ammonium laureth sulphate</td>
<td>3.00</td>
</tr>
<tr>
<td>96% Ethanol</td>
<td>2.00</td>
</tr>
<tr>
<td>Sodium salicylate</td>
<td>0.04</td>
</tr>
<tr>
<td>Tetrasodium pyrophosphate</td>
<td>0.04</td>
</tr>
<tr>
<td>Tetrasodium salt of etidronic acid</td>
<td>0.20</td>
</tr>
<tr>
<td>Phosphoric acid</td>
<td>0.15</td>
</tr>
<tr>
<td>Hydrogen peroxide as a 50% by weight solution</td>
<td>12.00</td>
</tr>
<tr>
<td>Hexadimethrine chloride</td>
<td>0.20</td>
</tr>
<tr>
<td>Polyquaternium-6</td>
<td>0.40</td>
</tr>
<tr>
<td>Water</td>
<td>q.s. for 100</td>
</tr>
</tbody>
</table>
Composition C2 or C3

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>C2 (% by weight)</th>
<th>C3 (% by weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentasodium salt of diethylenetriaminepentaaacetic acid</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sodium metabisulphite</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Monoethanolamine</td>
<td>15.05</td>
<td>15.1</td>
</tr>
<tr>
<td>para-Toluenediamine</td>
<td>0.58</td>
<td>2.53</td>
</tr>
<tr>
<td>6-Hydroxybenzomorpholine</td>
<td>-</td>
<td>0.11</td>
</tr>
<tr>
<td>1-(β-Hydroxyethoxy)-2,4-</td>
<td>-</td>
<td>0.066</td>
</tr>
<tr>
<td>diaminobenzene dihydrochloride</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Methyl-2-hydroxy-4-aminobenzene</td>
<td>3.34</td>
<td>-</td>
</tr>
<tr>
<td>Resorcinol</td>
<td>-</td>
<td>2.2</td>
</tr>
<tr>
<td>m-Aminophenol</td>
<td>-</td>
<td>0.4</td>
</tr>
<tr>
<td>5-Amino-6-chloro-o-cresol</td>
<td>0.725</td>
<td>-</td>
</tr>
<tr>
<td>1-Hydroxyethyl-4,5-diaminopyrazole</td>
<td>5.22</td>
<td>-</td>
</tr>
<tr>
<td>sulphate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>para-Aminophenol</td>
<td>0.435</td>
<td>-</td>
</tr>
<tr>
<td>Hydroxyethylcellulose</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Hexylene glycol</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Dipropylene glycol</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Absolute ethyl alcohol</td>
<td>14.06</td>
<td>8.25</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>5</td>
<td>6.2</td>
</tr>
<tr>
<td>Ascorbic acid</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Water</td>
<td>q.s. for 100</td>
<td>q.s. for 100</td>
</tr>
</tbody>
</table>

At the moment of use, the following were mixed:

- 10 parts by weight of composition A2,
- 15 parts by weight of the composition B2, and
- 4 parts by weight of the composition C2 or C3.
Each mixture (A2+B2+C2 or A2+B2+C3) obtained (pH ≈ 9.6 - 9.8) was subsequently applied to a lock of natural hair comprising 90% white hairs at the rate of 10 g of mixture per 1 g of hair and a leave-in time of 30 min at 27°C. At the end of this time, the hair is rinsed, washed with a standard shampoo and dried.

The dyeing mixtures are odourless, whether during the preparation or during the leave-in time on the locks.

An intense red was obtained with the mixture A2+B2+C2 and a powerful chestnut was obtained with the mixture A2+B2+C3.

<table>
<thead>
<tr>
<th></th>
<th>L*</th>
<th>a*</th>
<th>b*</th>
<th>AE*ab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated natural hair</td>
<td>61.17</td>
<td>0.45</td>
<td>12.95</td>
<td>-</td>
</tr>
<tr>
<td>comprising 90% white hairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(UW)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UW treated with the mixture</td>
<td>27.37</td>
<td>26.93</td>
<td>15.8</td>
<td>43.04</td>
</tr>
<tr>
<td>resulting from the composition C2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UW treated with the mixture</td>
<td>23.5</td>
<td>3.02</td>
<td>4.66</td>
<td>38.66</td>
</tr>
<tr>
<td>resulting from the composition C3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CLAIMS

1. Method for dyeing or lightening human keratinous fibres in which:
   (a) an anhydrous composition (A) comprising one or more fatty substances and one or more surfactants;
   (b) a composition (B) comprising one or more oxidizing agents and optionally one or more fatty substances;
   (c) a composition (C) comprising one or more alkaline agents and optionally one or more oxidation dyes and/or one or more direct dyes,
   are applied to the said fibres,
   the said fatty substance or substances being chosen from volatile linear alkanes, additional fatty substances and their mixtures, and
   it being understood that one or more volatile linear alkanes is or are present in at least one of the compositions (A), (B) or (C) and preferably in at least one of the compositions (A) and (B).

2. Method according to Claim 1, characterized in that the volatile linear alkanes are present solely in the compositions (A) and/or (B).

3. Method according to either one of the preceding claims, characterized in that the volatile linear alkane is a linear alkane comprising from 7 to 15 carbon atoms.

4. Method according to any one of the preceding claims, characterized in that the volatile linear alkane is chosen from n-heptane (C_7), n-octane (C_8), n-nonane (C_9), n-decane (C_10), n-undecane (C_11), n-dodecane (C_12), n-tridecane (C_13), n-tetradecane (C_14), n-pentadecane (C_15) and their mixtures and preferably from n-nonane, n-undecane, n-dodecane, n-tridecane, n-tetradecane and their mixtures.

5. Method according to any one of the preceding claims, characterized in that the volatile linear alkane is of vegetable origin.

6. Method according to any one of the preceding claims, characterized in that the additional fatty substance or substances are
chosen from $C_{6-16}$ alkanes other than volatile linear alkanes, non-
silicone oils of animal, vegetable, mineral or synthetic origin, $C_{6-30}$
fatty alcohols, $C_{6-30}$ fatty acid and/or $C_{6-30}$ fatty alcohol esters, non-
silicone waxes, silicones and their mixtures.

7. Method according to any one of the preceding claims, characterized in that the fatty substance or substances are chosen from volatile linear alkanes, liquid $C_{6-30}$ fatty alcohols, liquid petrolatum, polydecenes, liquid esters of $C_{6-30}$ fatty acids or of $C_{6-30}$ fatty alcohols, and their mixtures.

8. Method according to any one of the preceding claims, characterized in that the composition (A) or (B) comprises one or more volatile linear alkanes, alone or in combination with at least one additional fatty substance.

9. Method according to any one of Claims 1 to 7, characterized in that the compositions (A) and (B) comprise one or more volatile linear alkanes, alone or in combination with at least one additional fatty substance.

10. Method according to any one of the preceding claims, characterized in that the total content of fatty substances ranges from 50 to 90% by weight, preferably from 55 to 90% by weight and better still from 60 to 85% by weight, with respect to the weight of the anhydrous composition (A).

11. Method according to any one of the preceding claims, characterized in that the total content of fatty substances ranges from 5 to 70% by weight, preferably from 10 to 65% by weight, with respect to the weight of the composition (B).

12. Method according to any one of the preceding claims, characterized in that the surfactant present in the anhydrous composition (A) is a nonionic surfactant more particularly chosen from mono- or polyalkylenated or mono- or polyglycerated nonionic surfactants.

13. Method according to any one of the preceding claims, characterized in that the alkaline agent is chosen from:
   - aqueous ammonia,
- organic amines exhibiting a pKₐ at 25°C of less than 12, and their organic and inorganic salts,
- inorganic bases,
- ammonium salts, and
- their mixtures.

14. Method according to Claim 13, characterized in that the alkaline agent is chosen from organic amines exhibiting a pKₐ at 25°C of less than 12 and preferably monoethanolamine.

15. Method according to any one of the preceding claims, characterized in that the compositions (A), (B) and (C) are applied successively and without intermediate rinsing.

16. Method according to any one of Claims 1 to 14, characterized in that the composition resulting from the mixing, prior to application, of the compositions (A) and (C) and then the oxidizing composition (B) are applied successively without intermediate rinsing.

17. Method according to any one of Claims 1 to 14, characterized in that a composition obtained by mixing the compositions (A), (B) and (C) at the time of use, before application, is applied.

18. Ready-for-use composition comprising:
- one or more surfactants,
- one or more oxidizing agents,
- one or more alkaline agents and optionally one or more oxidation dyes and/or one or more direct dyes,
- one or more fatty substances chosen from volatile linear alkanes and optionally one or more additional fatty substances, the total amount of fatty substance being greater than 20% by weight, preferably greater than 25% by weight and more advantageously still greater than 30% by weight, with respect to the total weight of the composition.

19. Multicompartment device comprising:
- a first compartment including the anhydrous composition (A) according to one of Claims 1 to 10 and 12,
- a second compartment including a composition (B) comprising one or more oxidizing agents and optionally one or more fatty substances as defined in one of Claims 1 to 9 and 11, and
- a third compartment including a composition (C) according to one of Claims 1 and 13 and 14 comprising one or more alkaline agents, the said fatty substance or substances being chosen from volatile linear alkanes, additional fatty substances and their mixtures, and it being understood that one or more volatile linear alkanes is or are present in at least one of the compositions (A), (B) or (C), preferably in the composition (A) or (B); the composition (C) optionally comprising one or more oxidation dyes and/or one or more direct dyes.