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(54) Title: COSMETIC COMPOSITION COMPRISING A ZINC SALT, A CATIONIC POLYMER AND A PROPELLANT

(57) Abstract: The present invention relates to a cosmetic composition comprising: -one or more zinc salts, -one or more cationic polymers in a total amount of greater than or equal to 0.4% by weight relative to the total weight of the composition, -one or more propellants. Another subject of the invention relates to a process for treating keratin fibres, using such a composition, and to the use of such a composition for conditioning keratin fibres and protecting their artificial colour.

# Cosmetic composition comprising a zinc salt, a cationic polymer and a propellant

The present invention relates to a cosmetic composition comprising at least one zinc salt in combination with at least one cationic polymer in a particular content, and at least one propellant, and also to the use of such a composition, preferably in the form of an aerosol foam, for conditioning keratin fibres and protecting their artificial colour from fading.

It is known practice to dye the hair with dye compositions containing oxidation dye precursors, which are generally known as oxidation bases. These oxidation bases are colourless or weakly coloured compounds, which, when combined with oxidizing products, give rise to coloured compounds via a process of oxidative condensation. It is also known that the shades obtained with these oxidation bases can be varied by combining them with couplers or coloration modifiers. The variety of molecules used as oxidation bases and couplers allows a wide range of colours to be obtained.

It is also known practice to dye hair by direct dyeing. The process conventionally used in direct dyeing consists in applying to the hair direct dyes, which are coloured and colouring molecules that have affinity for the hair, in leaving them to stand on the hair and then in rinsing the fibres.

The colorations resulting therefrom are particularly chromatic colorations but are, however, only temporary or semi-permanent since the nature of the interactions that bind the direct dyes to the keratin fibre and their desorption from the surface and/or the core of the fibre are responsible for their weak dyeing power and their poor fastness with respect to washing.

The artificial colour of the hair afforded by a direct dyeing or oxidation dyeing treatment gradually attenuates on repeated washing and exposure to light, leading over time to fading of the coloration of the hair.

In order to improve the fastness of the artificial colour of the hair, detergent care products using a mixture of surfactants, zinc salts and cationic polymers have been proposed. These compositions have the drawback of running on the skin during their rinsing, and may thus irritate the skin or sting the eyes. Their cosmetic rendering is moreover limited.

Furthermore, these compositions need to be rinsed out, at the risk of degrading the hair and irritating the scalp. These rinse-out products therefore cannot be readily used in any situation, especially in a train or in an aeroplane when the user leaves on a journey and does not have access to a bathroom. In addition, these compositions have the drawback of running on the skin during their rinsing, and may thus irritate the skin or sting the eyes.

Thus, there is a need to find cosmetic compositions that are practical and easy to use in all circumstances, especially when travelling, making it possible to improve the fastness of the artificial colour of dyed keratin fibres, in particular human keratin fibres such as the hair, with respect to repeated washing and to sunlight, and giving the treated keratin fibres good conditioning properties, without having the drawbacks of the prior art.

The Applicant has discovered, surprisingly, that by formulating cosmetic compositions comprising at least one zinc salt and at least one cationic polymer in a particular content, and at least one propellant, the drawbacks mentioned above may be overcome.

A first subject of the invention is thus a cosmetic composition comprising:

- one or more zinc salts,
- one or more cationic polymers in a total amount of greater than or equal to 0.4% by weight relative to the total weight of the composition,
- one or more propellants.

In particular, the composition according to the invention affords efficient and long-lasting protection of the colour of keratin fibres against the degradation caused by light, ultraviolet radiation and/or repeated washing (fading of the colour, modification of the initial shade), while at the same time giving the hair a good level of care and smoothness.

The composition according to the invention also has very good working qualities. It does not run, does not irritate the skin, the scalp, the eyes or the hair, and does not require any rinsing step subsequent to the step of applying the composition.

Another subject of the present invention consists of a cosmetic process for treating keratin fibres, preferably human keratin fibres such as the hair, in which a composition according to the invention is applied to keratin fibres and the scalp, without it subsequently being necessary to rinse out the applied composition.

Another subject of the present invention concerns the use of a composition according to the invention, preferably in the form of an aerosol foam, for conditioning keratin fibres, preferably human keratin fibres such as the hair, and for protecting their artificial colour.

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

The composition according to the invention preferably comprises less than 3% by weight and more preferentially less than 1% by weight of anionic surfactants, relative to the total weight of the composition, and better still does not comprise any anionic surfactants.

The composition according to the invention comprises one or more zinc salts.

The term "zinc salt" means any mineral or organic compound comprising in its structure at least one zinc-based cation and an anion derived from a mineral or organic acid.

The zinc salt(s) used according to the invention are preferably chosen from water-soluble zinc salts. Preferably, the zinc salt(s) are non-nitrogenous, i.e. they do not comprise any nitrogen atoms.

The term "water-soluble zinc salt" means any salt with a solubility in water of greater than or equal to 0.5% by weight, at a temperature of 25°C.

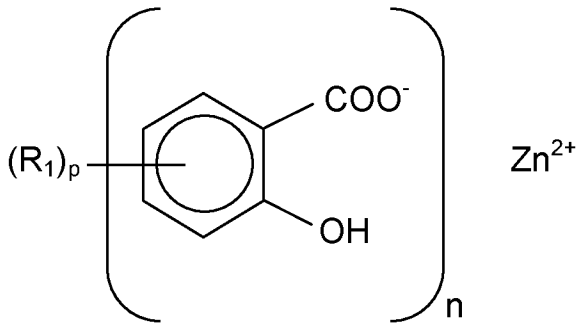
The zinc salt(s) are chosen from mineral and organic zinc salts, and mixtures thereof.

The term "mineral zinc salt" means any zinc salt possibly containing carbon only in the form of carbonate or hydrogen carbonate ions.

Among the mineral zinc salts that may be used, examples that may be mentioned include zinc sulfate and zinc chloride, and mixtures thereof.

Among the organic zinc salts that may be used, examples that may be mentioned include zinc lactate, zinc gluconate, zinc phenolsulfonate, zinc citrate and zinc salicylate, derivatives thereof, and mixtures thereof.

The zinc salicylate and derivatives thereof according to the invention correspond to the following structure:




in which:

n = 2, p is equal to 0, 1, 2 or 3;

$R_1$ denotes a linear or branched $C_1$-$C_{18}$ alkyl group (for example methyl, ethyl, n-propyl, isopropyl or n-butyl); a linear or branched $C_1$-$C_{18}$ hydroxyalkyl group; a halogen atom (for example iodine, bromine or chlorine); a $C_2$-$C_{18}$ acyl group (for example acetyl); a group $COR_2$ or $OCOR_2$, in which $R_2$ denotes a hydrogen atom or a linear or branched $C_1$-$C_{18}$ alkyl group.

Preferentially, zinc salt(s) are chosen from: zinc sulfate, zinc chloride, zinc lactate, zinc gluconate, zinc salicylate and zinc citrate, and mixtures thereof.

Better still, the zinc salt(s) are chosen from: zinc sulfate, zinc chloride, zinc lactate and zinc gluconate, alone or as a mixture.

Even more preferentially, the zinc salt is an organic zinc salt. Even more preferentially, the zinc salt is zinc lactate or zinc gluconate. Better still, the zinc salt is zinc gluconate.

Zinc gluconate is sold, for example, under the name Givobio G Zn by the company SEPPIC in the composition according to the invention.

The composition according to the invention preferably comprises from 0.05% to 10% by weight, in particular from 0.1% to 6.5% by weight and better still from 0.2% to 3% by weight of zinc salt(s) relative to the total weight of the composition.

The concentration of zinc element is preferably less than 2% by weight, in particular ranging from 0.005% to 1.5% by weight and better still from 0.1% to 1% by weight relative to the total weight of the composition.

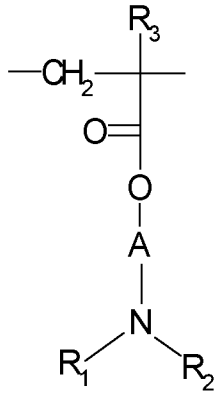
The composition according to the invention comprises one or more cationic polymers.

The cationic polymer(s) that may be used in accordance with the present invention may be selected from all of those already known per se to enhance the cosmetic properties of hair treated with detergent compositions, these being, in particular, the polymers described in patent application EP-A-0 337 354 and in French patent applications FR-A-2 270 846, FR-A-2 383 660, FR-A-2 598 611, FR-A-2 470 596, FR-A-2 519 863 and FR-A-2 875 503.

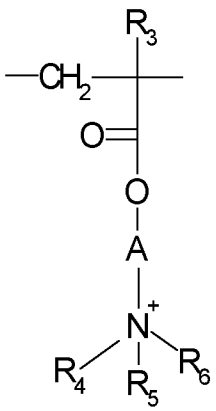
The preferred cationic polymer(s) are chosen from those that contain in their structure units comprising primary, secondary, tertiary and/or quaternary amine groups that may either form part of the main polymer chain or may be borne by a side substituent directly attached thereto.

Among the cationic polymers that may be mentioned more particularly are polymers of the polyamine, polyaminoamide and polyquaternary ammonium type. Among these polymers, mention may be made of:

(1) Homopolymers or copolymers derived from crosslinked or non-crosslinked acrylic or methacrylic esters or amides and comprising at least one of the units of formula (I), (II), (III) or (IV) below:



(I)



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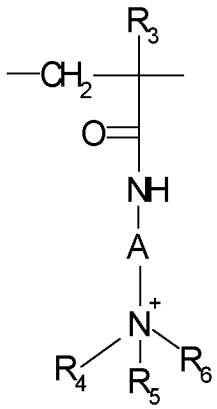

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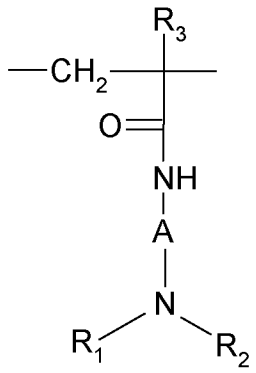


(IV)

in which

$R_1$ and $R_2$, which may be identical or different, each represent a hydrogen atom or an alkyl group containing from 1 to 6 carbon atoms, and preferably methyl or ethyl;

$R_3$, which may be identical or different at each occurrence, denote a hydrogen atom or a group $CH_3$;

A, which may be identical or different, each represent a linear or branched alkyl group of 1 to 6 carbon atoms, preferably 2 or 3 carbon atoms, or a hydroxyalkyl group of 1 to 4 carbon atoms;

$R_4$, $R_5$ and $R_6$, which may be identical or different, each represent an alkyl group containing from 1 to 6 carbon atoms or a benzyl group, and preferably an alkyl group containing from 1 to 6 carbon atoms;

$X^-$ denotes an anion derived from a mineral or organic acid, such as a methosulfate anion or a halide such as chloride or bromide.

The polymers of family (1) can also contain one or more units derived from comonomers which may be chosen from the family of acrylamides, methacrylamides, diacetone acrylamides, acrylamides and methacrylamides substituted on the nitrogen with lower ($C_1$-$C_4$) alkyls, acrylic or methacrylic acids or esters thereof, vinyllactams such as vinylpyrrolidone or vinyl-caprolactam, and vinyl esters.

Thus, among these polymers of family (1), mention may be made of:

- copolymers of acrylamide and of dimethylaminoethyl methacrylate quaternized with dimethyl sulfate or with a dimethyl halide, such as the product sold under the name Hercofloc by the company Hercules,

- copolymers of acrylamide and of methacryloyl-oxyethyltrimethylammonium chloride which are described, for example, in patent application EP-A-080976 and are sold under the name Bina Quat P 100 by the company Ciba Geigy,

- the copolymer of acrylamide and of methacryloyl-oxyethyltrimethylammonium methosulfate sold under the name Reten by the company Hercules,

- quaternized or non-quaternized vinylpyrrolidone/dialkylaminoalkyl acrylate or methacrylate copolymers, such as the products sold under the name Gafquat by the company ISP, such as, for example, Gafquat 734 or Gafquat 755, or alternatively the products known as Copolymer 845, 958 and 937. These polymers are described in detail in French patents 2 077 143 and 2 393 573,

- dimethylaminoethyl methacrylate/vinylcaprolactam/vinylpyrrolidone terpolymers, such as the product sold under the name Gaffix VC 713 by the company ISP,

- vinylpyrrolidone/methacrylamidopropyldimethylamine copolymers sold in particular under the name Styleze CC 10 by ISP,

- quaternized vinylpyrrolidone/dimethylaminopropylmethacrylamide copolymers such as the product sold under the name Gafquat HS 100 by the company ISP, and

- the crosslinked polymers of methacryloyloxy($C_1$-$C_4$)alkyl tri($C_1$-$C_4$)alkylammonium salts, such as the polymers obtained by homopolymerization of dimethylaminoethyl methacrylate quaternized with methyl chloride, or by copolymerization of acrylamide with dimethylaminoethyl methacrylate quaternized with methyl chloride, the homo- or copolymerization being followed by crosslinking with an olefinically unsaturated compound, more particularly methylenebisacrylamide. A crosslinked acrylamide/methacryloyloxyethyltrimethyl-ammonium chloride copolymer (20/80 by weight) in the form of a dispersion containing 50% by weight of the said copolymer in mineral oil can be used more particularly. This dispersion is sold under the name Salcare® SC 92 by the company Ciba. Use may also be made of a crosslinked homopolymer of methacryloyloxyethyltrimethylammonium chloride containing approximately 50% by weight of the homopolymer in mineral oil or in a liquid ester. These dispersions are sold under the names Salcare® SC 95 and Salcare® SC 96 by the company Ciba.

(2) Cationic polysaccharides chosen especially from:

a) cellulose ether derivatives comprising quaternary ammonium groups described in French patent 1 492 597, and in particular the polymers sold under the names "JR" (JR 400, JR 125, JR 30M) or "LR" (LR 400, LR 30M) by the company Union Carbide Corporation. These polymers are also defined in the CTFA dictionary as quaternary ammoniums of hydroxyethylcellulose that have reacted with an epoxide substituted with a trimethylammonium group.

b) cellulose copolymers or cellulose derivatives grafted with a water-soluble quaternary ammonium monomer, described especially in patent US 4 131 576, such as hydroxyalkyl celluloses, for instance hydroxymethyl, hydroxyethyl or hydroxypropyl celluloses grafted especially with a methacryloylethyltrimethyl-ammonium, methacrylamidopropyltrimethylammonium or dimethyldiallyl-ammonium salt.

The commercial products corresponding to this definition are more particularly the products sold under the names Celquat L 200 and Celquat H 100 by the company National Starch.

It is preferred to use a copolymer of hydroxyethylcellulose and of diallyldimethylammonium chloride (Polyquaternium-4), sold, for example, under the name Celquat LOR by the company Akzo Nobel.

c) guar gums containing trialkylammonium cationic groups. Use is made, for example, of guar gums modified with a 2,3-epoxypropyltrimethylammonium salt (for example, chloride).

Such products are sold in particular under the trade names Jaguar C13 S, Jaguar C 15, Jaguar C 17 or Jaguar C162 by the company Meyhall.

(3) Polymers formed from piperazinyl units and divalent alkylene or hydroxyalkylene radicals containing straight or branched chains, optionally interrupted with oxygen, sulfur or nitrogen atoms or with aromatic or heterocyclic rings, and also the oxidation and/or quaternization products of these polymers. Such polymers are described, in particular, in French patents 2 162 025 and 2 280 361.

(4) Water-soluble cationic polyaminoamides, prepared in particular by polycondensation of an acid compound with a polyamine; these polyaminoamides may be crosslinked with an epihalohydrin, a diepoxide, a saturated or unsaturated dianhydride, a bis-unsaturated derivative, a bis-halohydrin, a bis-azetidinium, a bis-haloacyldiamine or a bis-alkyl halide or else by an oligomer resulting from the

reaction of a bifunctional compound which is reactive towards a bis-halohydrin, a bis-azetidinium, a bis-haloacyldiamine, a bis-alkyl halide, an epihalohydrin, a diepoxide or a bis-unsaturated derivative; these polyaminoamides may be alkylated, or quaternized if they contain one or more tertiary amine functions. Such polymers are described, in particular, in French patents 2 252 840 and 2 368 508.

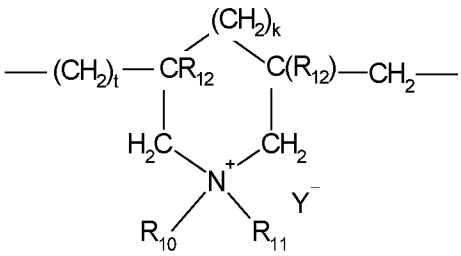
(5) Polyamino amide derivatives resulting from the condensation of polyalkylene polyamines with polycarboxylic acids followed by alkylation with difunctional agents. Mention may be made, for example, of adipic acid/dialkylamino-hydroxyalkyldialkylenetriamine polymers in which the alkyl radical comprises from 1 to 4 carbon atoms and preferably denotes methyl, ethyl or propyl. Such polymers are especially described in French patent 1 583 363.

Among these derivatives, mention may be made more particularly of the adipic acid/dimethylaminohydroxypropyl/diethylenetriamine polymers sold under the name Cartaretine F, F4 or F8 by the company Sandoz.

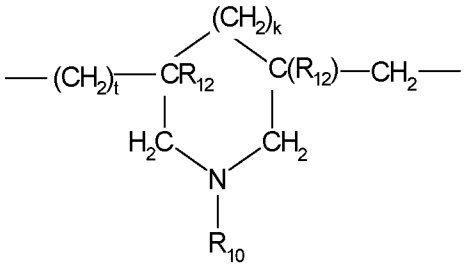
(6) Polymers obtained by reaction of a polyalkylene polyamine containing two primary amine groups and at least one secondary amine group with a dicarboxylic acid chosen from diglycolic acid and saturated aliphatic dicarboxylic acids having from 3 to 6 carbon atoms. The mole ratio between the polyalkylene polyamine and the dicarboxylic acid is between 0.8: 1 and 1.4: 1; the polyaminoamide resulting therefrom is reacted with epichlorohydrin in a molar ratio of epichlorohydrin relative to the secondary amine group of the polyaminoamide of between 0.5: 1 and 1.8: 1. Such polymers are described in particular in US patents 3 227 615 and 2 961 347.

Polymers of this type are sold in particular under the name Hercosett 57 by the company Hercules Inc. or alternatively under the name PD 170 or Delsette 101 by the company Hercules in the case of the adipic acid/epoxypropyl/diethylenetriamine copolymer.

(7) Alkyldiallylamine or dialkyldiallylammonium cyclopolymers, such as the homopolymers or copolymers containing, as the main constituent of the chain, units conforming to the formula (V) or (VI):



(V)



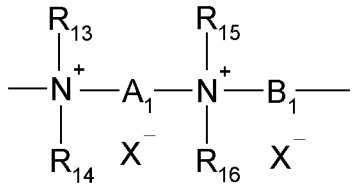
(VI)

in which k and t are equal to 0 or 1, the sum k + t being equal to 1; $R_{12}$ denotes a hydrogen atom or a methyl group; $R_{10}$ and $R_{11}$, independently of one another, denote an alkyl group having from 1 to 6 carbon atoms, a hydroxyalkyl group in which the alkyl group has preferably 1 to 5 carbon atoms, a lower amidoalkyl group (i.e. the alkyl part of which is $C_1$-$C_4$), or else $R_{10}$ and $R_{11}$ may, together with the nitrogen atom to which they are attached, denote heterocyclic groups, such as piperidyl or morpholinyl; Y- is an anion such as bromide, chloride, acetate, borate, citrate, tartrate, bisulfate, bisulfite, sulfate or phosphate. These polymers are especially described in French patent 2 080 759 and in its Certificate of Addition 2 190 406.

$R_{10}$ and $R_{11}$, independently of one another, preferably denote an alkyl group containing from 1 to 4 carbon atoms.

Among the polymers defined above, mention may be made of dialkyldiallylammonium chloride homopolymers, more particularly dimethyldiallylammonium chloride homopolymer (INCI name: Polyquaternium-6) sold, for example, under the name Merquat® 100 by the company Nalco (and homologues thereof of low weight-average molecular masses) and dialkyldiallylammonium chloride homopolymers, more particularly the copolymer of dimethyldiallylammonium chloride and of acrylamide sold under the name Merquat® 550.

(8) The quaternary diammonium polymers containing repeating units corresponding to formula (VII):



(VII)

in which:

$R_{13}$, $R_{14}$, $R_{15}$ and $R_{16}$, which may be identical or different, represent aliphatic, alicyclic or arylaliphatic groups containing from 1 to 6 carbon atoms or lower hydroxyalkylaliphatic groups (i.e. the alkyl part of which is $C_1$-$C_4$), or alternatively $R_{13}$, $R_{14}$, $R_{15}$ and $R_{16}$, together or separately, constitute, with the nitrogen atoms to which they are attached, heterocycles optionally containing a second heteroatom other than nitrogen, or alternatively $R_{13}$, $R_{14}$, $R_{15}$ and $R_{16}$ each represent a linear or branched $C_1$-$C_6$ alkyl group substituted with a nitrile, ester, acyl or amide group or a -CO-O-$R_{17}$-E or -CO-NH-$R_{17}$-E group where $R_{17}$ is an alkylene group and E is a quaternary ammonium group;

$A_1$ and $B_1$ represent polymethylene groups containing from 2 to 8 carbon atoms, which may be linear or branched and saturated or unsaturated and may contain, joined to or intercalated in the main chain, one or more aromatic rings, or one or more oxygen or sulfur atoms or sulfoxide, sulfone, disulfide, amino, alkylamino, hydroxyl, quaternary ammonium, ureido, amide or ester groups, and

X- denotes an anion derived from a mineral or organic acid;

$A_1$, $R_{13}$ and $R_{15}$ may, with the two nitrogen atoms to which they are attached, form a piperazine ring; moreover, if $A_1$ denotes a linear or branched, saturated or unsaturated alkylene or hydroxyalkylene group, $B_1$ may also denote a group:

-$(CH_2)_n$-CO-E'-OC-$(CH_2)_n$-

in which n denotes an integer from 0 to 7 and E' denotes:

a) a glycol residue of formula -O-Z-O-, in which Z denotes a linear or branched hydrocarbon group, or a group conforming to one of the following formulae:

-$(CH_2$-$CH_2$-O)x -$CH_2$-$CH_2$-,

-[$CH_2$-CH($CH_3$)-O]y-$CH_2$-CH($CH_3$)-

in which x and y each denote an integer from 1 to 4, representing a defined and unique degree of polymerization or any number from 1 to 4 representing an average degree of polymerization,

b) a bis-secondary diamine residue such as a piperazine derivative;

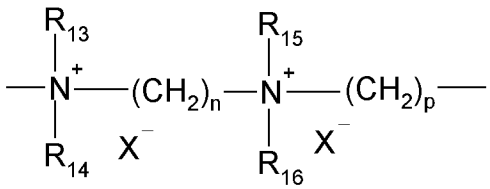
c) a bis-primary diamine residue of formula -NH-Y-NH-, in which Y denotes a linear or branched hydrocarbon-based group, or alternatively the divalent group $-CH_2-CH_2-S-S-CH_2-CH_2-$;

d) a ureylene group of formula -NH-CO-NH-.

Preferably, X- is an anion such as chloride or bromide.

Polymers of this type are described in particular in French patents 2 320 330, 2 270 846, 2 316 271, 2 336 434 and 2 413 907 and US patents 2 273 780, 2 375 853, 2 388 614, 2 454 547, 3 206 462, 2 261 002, 2 271 378, 3 874 870, 4 001 432, 3 929 990, 3 966 904, 4 005 193, 4 025 617, 4 025 627, 4 025 653, 4 026 945 and 4 027 020.

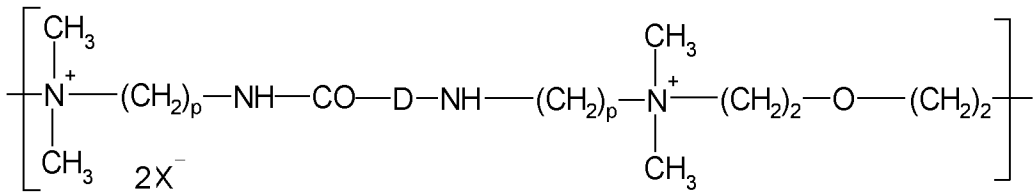
Use may more particularly be made of the polymers which are composed of repeat units corresponding to the formula (VIII):



(VIII)

in which $R_{13}$, $R_{14}$, $R_{15}$ and $R_{16}$, which are identical or different, denote an alkyl or hydroxyalkyl group having from 1 to 4 carbon atoms approximately, n and p are integers ranging from 2 to 8 approximately, and X- is an anion derived from a mineral or organic acid. Preferably, $R_{13}$, $R_{14}$, $R_{15}$ and $R_{16}$ each denote a methyl group. As an example of a polymer that may be used corresponding to formula (VIII), mention may be made of hexadimethrine chloride, sold under the name Mexomer PO by the company Chimex.

(9) Polyquaternary ammonium polymers composed of units of formula (IX):



(IX)

in which:

p denotes an integer ranging from 1 to 6 approximately,

D may be nothing or may represent a group

$—(CH_2)_r—CO—$ in which r denotes a number equal to 4 or 7, and

$X^-$ is an anion derived from a mineral or organic acid.

Cationic polymers comprising units of formula (IX) are especially described in patent application EP-A-122 324 and may be prepared according to the processes described in US patents 4 157 388, 4 390 689, 4 702 906 and 4 719 282.

Among these polymers, the ones that are preferred are those with a molecular mass, measured by carbon-13 NMR, of less than 100 000, and in the formula of which:

p is equal to 3, and

a) D represents a group $-(CH_2)_4-CO-$, X denotes a chlorine atom, the molecular mass measured by carbon-13 NMR ($^{13}C$ NMR) being about 5600; a polymer of this type is sold by the company Miranol under the name Mirapol-AD1,

b) D represents a group $—(CH_2)_7—CO—$, X denotes a chlorine atom, the molecular mass measured by carbon-$^{13}$ NMR ($^{13}C$ NMR) being about 8100; a polymer of this type is sold by the company Miranol under the name Mirapol-AZ1,

c) D denotes the value zero, X denotes a chlorine atom, the molecular mass measured by carbon-$^{13}$ NMR ($^{13}C$ NMR) being about 25 500; a polymer of this type is sold by the company Miranol under the name Mirapol-A15,

d) a "block copolymer" formed from units corresponding to the polymers described in paragraphs a) and c), sold by the company Miranol under the names Mirapol-9 ($^{13}C$ NMR molecular mass of about 7800), Mirapol-175 ($^{13}C$ NMR molecular mass of about 8000) and Mirapol-95 (13C NMR molecular mass of about 12 500).

Even more particularly, the polymer containing units of formula (IX) in which p is equal to 3, D denotes the value zero and X denotes a chlorine atom, the

molecular mass measured by carbon-13 NMR ($^{13}C$ NMR) being about 25 500, is preferred according to the invention.

(10) Quaternary polymers of vinylpyrrolidone and of vinylimidazole, for instance the products sold under the names Luviquat FC 905, FC 550 and FC 370 by the company BASF.

(11) Ethoxylated cationic tallow polyamines such as Polyquart H sold by Henkel, referred to under the name polyethylene glycol (15) tallow polyamine in the CTFA dictionary.

(12) Vinylamide homopolymers or copolymers and in particular partially hydrolysed vinylamide homopolymers such as poly(vinylamine/vinylamide)s. These polymers are formed from at least one vinylamide monomer corresponding to the following formula:

$H_2C=CR^2NRC(O)R^1$

in which R, $R^1$ and $R^2$ are each chosen from a hydrogen atom, a $C_1$-$C_{20}$ alkyl group, an aryl group and an alkylaryl group in which the alkyl part comprises from 1 to 20 carbon atoms.

In particular, the said monomer may be chosen from N-vinylformamide, N-methyl-N-vinylacetamide and N-vinylacetamide. Preferably, poly(vinylamine/N-vinylformamide) is used, as sold under the name Catiofast VMP by the company BASF or under the name Lupamin 9030 by the company BASF.

These polymers may be formed, for example, by radical polymerization of a vinylamide monomer followed by partial acidic or basic hydrolysis of the amide functions to quaternizable amine functions, as described in patent applications WO 2007/005 577, US 5 374 334, US 6 426 383 and US 6 894 110.

(13) Cationic polyurethanes.

Among the cationic polyurethanes, use is preferably made of the polyurethanes formed by the following monomers:

(a1) at least one N-methyldiethanolamine (noted NMDEA),

(a2) at least one ethylene/butylene nonionic copolymer as sold under the name Krasol LBH-P 2000, and

(b) at least one isophorone diisocyanate (noted IPDI).

Preferably, the amines forming the cationic units (a1) represent from 0.1% to 50%, in particular from 1% to 30% and better still from 5% to 20% by weight relative to the total weight of the final polyurethane.

These polyurethanes and the syntheses thereof are described, for example, in patent application FR-A-2 898 603.

(14) Other cationic polymers that may be used in the context of the invention are cationic proteins or cationic protein hydrolysates, polyalkyleneimines, in particular polyethyleneimines, polymers containing vinylpyridine or vinylpyridinium units, and chitin derivatives.

Among all the cationic polymers that may be used in the context of the present invention, it is preferred to use polysaccharides of family (2) and in particular copolymers of hydroxyethylcellulose and of diallyldimethylammonium chloride (Polyquaternium-4).

The cationic polymer(s) that may be used according to the invention are present in a total amount preferably ranging from 0.4% to 10% by weight, in particular from 0.5% to 5% by weight and better still from 0.5% to 2% by weight relative to the total weight of the composition.

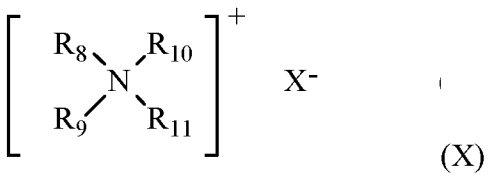
The weight ratio of the amount of zinc element(s) to the amount of cationic polymer(s) preferably ranges from 0.005 to 5, more preferentially from 0.01 to 1 and better still from 0.05 to 0.5.

The composition according to the invention may also comprise one or more cationic surfactants.

The cationic surfactant(s) that may be used in accordance with the present invention are preferably chosen from quaternary ammonium salts.

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

- those having the general formula (X) below:



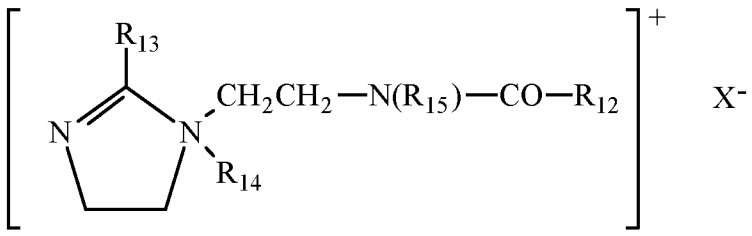
(X)

in which the radicals $R_8$ to $R_{11}$, which may be identical or different, represent an aromatic radical such as aryl or alkylaryl or a linear or branched aliphatic radical comprising from 1 to 30 carbon atoms, at least one of the radicals $R_8$ to $R_{11}$ denoting an alkyl or alkenyl radical comprising from 8 to 30 carbon atoms, preferably from 14 to 30 carbon atoms and better still from 16 to 25 carbon atoms. The aliphatic radicals may comprise heteroatoms especially such as oxygen, nitrogen, sulfur and halogens.

The aliphatic radicals are, for example, chosen from alkyl, alkoxy, polyoxy($C_2$-$C_6$)alkylene, alkylamide, ($C_{12}$-$C_{22}$)alkylamido($C_2$-$C_6$)alkyl, ($C_{12}$-$C_{22}$)alkyl acetate or hydroxyalkyl radicals comprising approximately from 1 to 30 carbon atoms, preferably from 14 to 30 and better still from 16 to 25 carbon atoms; X- is an anion chosen from the group of the halides such as chloride, phosphates, acetates, lactates, ($C_2$-$C_6$)alkyl sulfates, or alkyl- or alkylaryl-sulfonates such as methosulfate.

Among the quaternary ammonium salts of formula (X), it is preferred to use alkyltrimethylammonium chlorides in which the alkyl radical comprises from about 12 to 22 carbon atoms, in particular behenyltrimethylammonium or cetyltrimethylammonium salts or oleocetyldimethylhydroxyethylammonium salts,

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

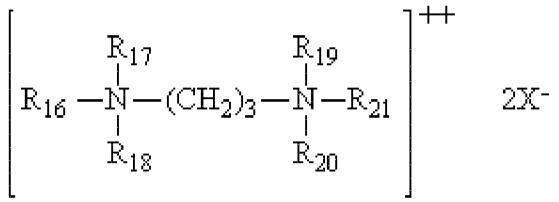



(XI)

in which $R_{12}$ represents an alkenyl or alkyl radical comprising from 8 to 30 carbon atoms, for example derived from tallow fatty acids, $R_{13}$ represents a hydrogen atom, a $C_1$-$C_4$ alkyl radical or an alkenyl or alkyl radical comprising from 8 to 30 carbon atoms, $R_{14}$ represents a $C_1$-$C_4$ alkyl radical, $R_{15}$ represents a hydrogen atom or a $C_1$-$C_4$ alkyl radical and X- is an anion chosen from the group of halides, phosphates, acetates, lactates, alkyl sulfates, or alkyl- or alkylaryl-sulfonates. Preferably, $R_{12}$ and $R_{13}$ denote a mixture of alkenyl or alkyl radicals comprising from 12 to 21 carbon atoms, for example fatty acid derivatives of tallow, $R_{14}$ denotes a

methyl radical and $R_{15}$ denotes a hydrogen atom. Such a product is sold, for example, under the name Rewoquat® W 75 by the company Rewo;

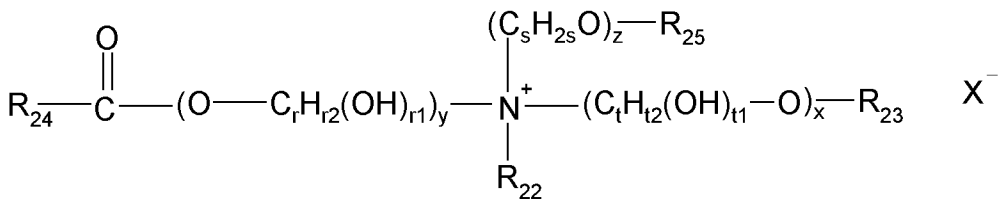
- quaternary diammonium or triammonium salts, in particular of formula (XII):



(XII)

in which $R_{16}$ denotes an alkyl radical containing approximately from 16 to 30 carbon atoms, which is optionally hydroxylated and/or interrupted with one or more oxygen atoms, $R_{17}$ is chosen from hydrogen and an alkyl radical containing from 1 to 4 carbon atoms or a group $(R_{16a})(R_{17a})(R_{18a})N\text{-}(CH_2)_3$, $R_{16a}$, $R_{17a}$, $R_{18a}$, $R_{18}$, $R_{19}$, $R_{20}$ and $R_{21}$, which may be identical or different, are chosen from hydrogen and an alkyl radical containing from 1 to 4 carbon atoms, and X- is an anion chosen from the group of halides, acetates, phosphates, nitrates and methyl sulfates. Compounds of this kind are, for example, Finquat CT-P, available from the company Finetex (Quaternium 89), and Finquat CT, available from the company Finetex (Quaternium 75),

- quaternary ammonium salts containing at least one ester function, such as those of formula (XIII) below:

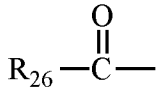


(XIII)

in which:

$R_{22}$ is chosen from $C_1$-$C_6$ alkyl and $C_1$-$C_6$ hydroxyalkyl or dihydroxyalkyl radicals;

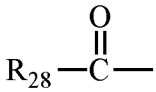
$R_{23}$ is chosen from:

- the radical 

- linear or branched, saturated or unsaturated $C_1$-$C_{22}$ hydrocarbon-based radicals $R_{27}$,

- a hydrogen atom,

$R_{25}$ is chosen from:

- the radical 

- linear or branched, saturated or unsaturated $C_1$-$C_6$ hydrocarbon-based radicals $R_{29}$,

- a hydrogen atom,

$R_{24}$, $R_{26}$ and $R_{28}$, which may be identical or different, are chosen from linear or branched, saturated or unsaturated $C_7$-$C_{21}$ hydrocarbon-based radicals;

r, s and t, which may be identical or different, are integers ranging from 2 to 6,

r1 and t1, which may be identical or different, are equal to 0 or 1, and

r2 and t2 are integers such that r2+r1=2r and t1+t2=2t;

y is an integer ranging from 1 to 10;

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

X- is a simple or complex, organic or mineral anion;

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

The alkyl radicals $R_{22}$ may be linear or branched, but more particularly linear.

$R_{22}$ preferably denotes a methyl, ethyl, hydroxyethyl or dihydroxypropyl radical, and more particularly a methyl or ethyl radical.

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

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

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

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

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

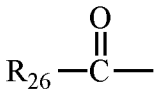
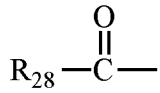
Advantageously, y is equal to 1.

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

The anion X- is preferably a halide (chloride, bromide or iodide) or an alkylsulphate, more particularly methylsulphate. It is possible, however, to use methanesulfonate, phosphate, nitrate or tosylate, an anion derived from organic acid, such as acetate or lactate, or any other anion that is compatible with ester-functional ammonium.

The anion X- is even more particularly chloride or methylsulphate.

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

- $R_{22}$ denotes a methyl or ethyl radical;
- x and y are equal to 1;
- z is equal to 0 or 1;
- r, s and t are equal to 2, with r1, r2, t1 and t2 being as defined previously;
- X- being as defined previously;
- $R_{23}$ is chosen from:
  - the radical 
  - methyl, ethyl or C14-C22 hydrocarbon-based radicals;
  - a hydrogen atom;
- $R_{25}$ is chosen from:
  - the radical 
  - a hydrogen atom;
- $R_{24}$, $R_{26}$ and $R_{28}$, which may be identical or different, are selected from linear or branched, saturated or unsaturated $C_{13}$-$C_{17}$ hydrocarbon-based radicals, and

preferably from linear or branched, saturated or unsaturated $C_{13}$-$C_{17}$ alkyl and alkenyl radicals.

The hydrocarbon-based radicals are advantageously linear.

Mention may be made, for example, of the compounds of formula (XIII) such as diacyloxyethyldimethylammonium, diacyloxyethyl hydroxyethylmethylammonium, monoacyloxyethyldihydroxyethylmethylammonium, triacyloxyethylmethylammonium or monoacyloxyethylhydroxyethyldimethyl ammonium salts (chloride or methyl sulfate, in particular), and mixtures thereof. The acyl radicals preferably contain 14 to 18 carbon atoms and are obtained more particularly from a plant oil such as palm oil or sunflower oil. When the compound contains several acyl radicals, these radicals may be identical or different.

These products are obtained, for example, by direct esterification of triethanolamine, triisopropanolamine, alkyldiethanolamine or alkyl diisopropanolamine, which are optionally oxyalkylenated, with fatty acids or with fatty acid mixtures of plant or animal origin, or by transesterification of the methyl esters thereof. This esterification is followed by a quaternization by means of an alkylating agent such as an alkyl (preferably methyl or ethyl) halide, a dialkyl (preferably methyl or ethyl) sulfate, methyl methanesulfonate, methyl para-toluenesulfonate, glycol chlorohydrin or glycerol chlorohydrin.

Such compounds are sold, for example, under the names Dehyquart® by the company Henkel, Stepanquat® by the company Stepan, Noxamium® by the company Ceca or Rewoquat® WE 18 by the company Rewo-Witco.

It is also possible to use the ammonium salts containing at least one ester function that are described in patents US-A-4 874 554 and US-A-4 137 180.

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

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

Among the quaternary ammonium salts containing at least one ester function, which may be used, it is preferred to use dipalmitoylethylhydroxy-ethylmethylammonium salts.

The cationic surfactants that are particularly preferred in the composition of the invention are chosen from behenyltrimethylammonium chloride,

oleocetyldimethylhydroxyethylammonium chloride, cetyltrimethylammonium chloride and dipalmitoylethylhydroxyethylmethylammonium salts.

When they are present, the amount of the cationic surfactant(s) is preferably in the range from 0.01% to 20% by weight and better still from 0.5% to 10% by weight, relative to the total weight of the composition.

The composition according to the invention may also comprise at least one anionic, nonionic, amphoteric or zwitterionic surfactant, with the proviso that the concentration of anionic surfactant is preferably less than 3% by weight and more preferentially less than 1% by weight relative to the total weight of the composition.

When the composition according to the invention contains at least one anionic, nonionic, amphoteric or zwitterionic surfactant, this surfactant is preferably nonionic.

Examples of nonionic surfactants that may be used in the cosmetic composition according to the invention are described, for example, in the Handbook of Surfactants by M.R. Porter, published by Blackie & Son (Glasgow and London), 1991, pp. 116-178. They are especially chosen from polyethoxylated, polypropoxylated and/or polyglycerolated alcohols, α-diols and ($C_1$–$C_{20}$)alkylphenols, containing at least one fatty chain comprising, for example, from 8 to 18 carbon atoms, the number of ethylene oxide and/or propylene oxide groups possibly ranging especially from 2 to 50, and the number of glycerol groups possibly ranging especially from 2 to 30.

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

Unless otherwise mentioned, the term “fatty” compound (for example a fatty acid) denotes a compound comprising, in its main chain, at least one saturated or unsaturated alkyl chain containing at least 8 carbon atoms, preferably from 8 to 30 carbon atoms, and even better still from 10 to 22 carbon atoms.

By way of example, use may be made of lauryl ether polyoxyethylenated with 4 mol of ethylene oxide (INCI: Laureth-4) and/or hydrogenated castor oil oxyethylenated with 40 mol of ethylene oxide (INCI: PEG-40 hydrogenated castor oil) in the composition according to the invention.

When they are present, the amount of the nonionic surfactant or surfactants varies preferably from 0.01% to 20% by weight, more preferably from 0.2% to 10% by weight, relative to the total weight of the composition.

The composition according to the invention may also comprise one or more fatty alcohols.

For the purposes of the present invention, the term "fatty alcohol" means any saturated or unsaturated, linear or branched pure fatty alcohol comprising at least 8 carbon atoms and not oxyalkylenated.

The fatty alcohol may have the structure R-OH in which R denotes a saturated or unsaturated, linear or branched radical containing from 8 to 40 and preferably from 8 to 30 carbon atoms; R preferably denotes a $C_{12}$-$C_{24}$ alkyl or $C_{12}$-$C_{24}$ alkenyl group. R may be substituted with one or more hydroxyl groups.

Examples of fatty alcohols that may be mentioned include lauryl alcohol, myristyl alcohol, cetyl alcohol, dodecyl alcohol, decyl alcohol, stearyl alcohol, oleyl alcohol, behenyl alcohol, linoleyl alcohol, undecylenyl alcohol, palmitoleyl alcohol, arachidonyl alcohol and erucyl alcohol, and mixtures thereof.

The fatty alcohol may represent a mixture of fatty alcohols, which means that several species of fatty alcohol may coexist, in the form of a mixture, in a commercial product.

Fatty alcohol mixtures that may be mentioned include cetylstearyl alcohol and cetearyl alcohol.

Among all the fatty alcohols that may be used according to the invention, use is preferably made of one or more fatty alcohols chosen from cetyl alcohol, stearyl alcohol and myristyl alcohol.

When they are present, the composition according to the invention may preferably comprise from 0.1% to 10% by weight, better still from 1% to 6% by weight and even better still from 1% to 4% by weight of fatty alcohol(s) relative to the total weight of the composition.

The composition according to the invention may also comprise one or more silicones, preferably amino silicones.

For the purposes of the present invention, the term "amino silicone" means any silicone comprising at least one primary, secondary or tertiary amine function or a quaternary ammonium group.

The amino silicones used in the cosmetic composition according to the present invention are chosen from:

(a) the compounds corresponding to formula (XIV) below:

$(R^1)_a(T)_{3-a}$-Si[OSi$(T)_2]_n$-[OSi(T)b$(R^1)_{2-b}]_m$-OSi$(T)_{3-a}$-$(R^1)_a$ (XIV)

in which:

T is a hydrogen atom or a phenyl, hydroxyl (-OH) or $C_1$-$C_8$ alkyl radical, and preferably methyl, or a $C_1$-$C_8$ alkoxy, preferably methoxy,

a denotes the number 0 or an integer from 1 to 3, and preferably 0,

b denotes 0 or 1, and in particular 1,

m and n are numbers such that the sum (n + m) can range especially from 1 to 2000 and in particular from 50 to 150, it being possible for n to denote a number from 0 to 1999 and in particular from 49 to 149, and for m to denote a number from 1 to 2000 and in particular from 1 to 10;

$R_1$ is a monovalent radical of formula -$C_qH_{2q}$L in which q is a number from 2 to 8 and L is an optionally quaternized amino group chosen from the following groups:

-N$(R^2)$-$CH_2$-$CH_2$-N$(R^2)_2$;

-N$(R^2)_2$; -N+$(R^2)_3$ Q-;

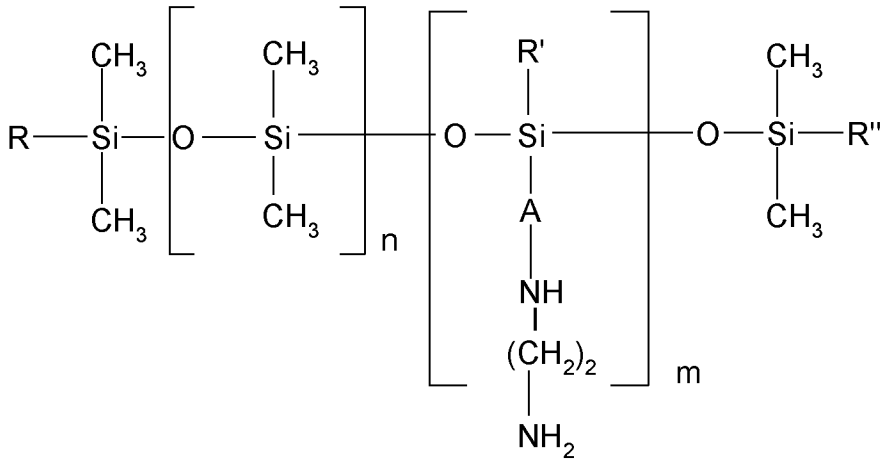
-N+$(R^2)$ $(H)_2$ Q-;

-N+$(R^2)_2$HQ-;

-N$(R^2)$-$CH_2$-$CH_2$-N+$(R^2)(H)_2$ Q-,

in which $R^2$ can denote a hydrogen atom, a phenyl, a benzyl or a saturated monovalent hydrocarbon-based radical, for example a $C_1$-$C_{20}$ alkyl radical, and Q- represents a halide ion such as, for example, fluoride, chloride, bromide or iodide.

In particular, the amino silicones corresponding to the definition of formula (XIV) are chosen from the compounds corresponding to formula (XV) below:



(XV)

in which R, R' and R", which may be identical or different, denote a $C_1$-$C_4$ alkyl radical, preferably $CH_3$; a $C_1$-$C_4$ alkoxy radical, preferably methoxy; or OH; A represents a linear or branched, $C_3$-$C_8$ and preferably $C_3$-$C_6$ alkylene radical; m and n are integers dependent on the molecular weight and whose sum is between 1 and 2000.

According to a first possibility, R, R' and R", which may be identical or different, represent a $C_1$-$C_4$ alkyl or hydroxyl radical, A represents a $C_3$ alkylene radical and m and n are such that the weight-average molecular mass of the compound is between 5000 and 500 000 approximately. Compounds of this type are referred to in the CTFA dictionary as "amodimethicones".

According to a second possibility, R, R' and R", which may be identical or different, represent a $C_1$-$C_4$ alkoxy or hydroxyl radical, at least one of the radicals R or R" is an alkoxy radical and A represents a $C_3$ alkylene radical. The hydroxy/alkoxy molar ratio is preferably between 0.2/1 and 0.4/1 and advantageously equal to 0.3/1. Moreover, m and n are such that the weight-average molecular mass of the compound is between 2000 and 106. More particularly, n is between 0 and 999 and m is between 1 and 1000, the sum of n and m being between 1 and 1000.

In this category of compounds, mention may be made, inter alia, of the product Belsil® ADM 652 sold by Wacker.

According to a third possibility, R and R", which are different, represent a $C_1$-$C_4$ alkoxy or hydroxyl radical, at least one of the radicals R or R" is an alkoxy radical, R' represents a methyl radical and A represents a $C_3$ alkylene radical. The hydroxy/alkoxy molar ratio is preferably between 1/0.8 and 1/1.1 and advantageously

is equal to 1/0.95. Moreover, m and n are such that the weight-average molecular mass of the compound is between 2000 and 200 000. More particularly, n is between 0 and 999 and m is between 1 and 1000, the sum of n and m being between 1 and 1000.

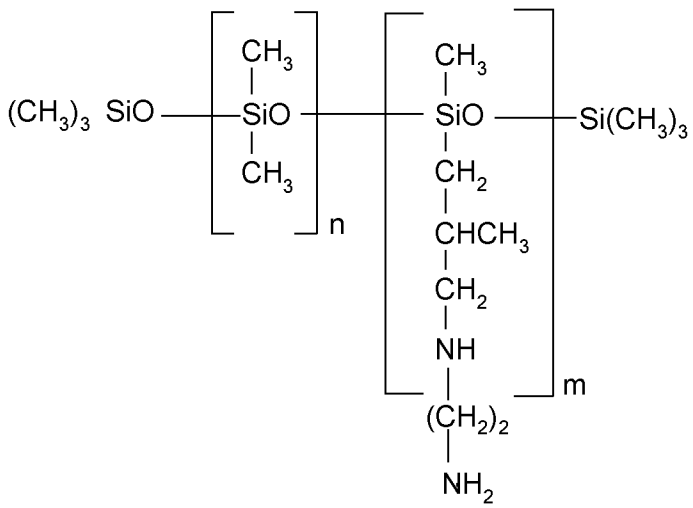
More particularly, mention may be made of the product Fluid WR® 1300 sold by Wacker.

According to a fourth possibility, R and R" represent a hydroxyl radical, R' represents a methyl radical and A is a $C_4$-$C_8$ and preferably $C_4$ alkylene radical. Moreover, m and n are such that the weight-average molecular mass of the compound is between 2000 and 106. More particularly, n is between 0 and 1999 and m is between 1 and 2000, the sum of n and m being between 1 and 2000.

A product of this type is especially sold under the name DC 28299 by Dow Corning.

Note that the molecular weight of these silicones is determined by gel permeation chromatography (room temperature, polystyrene standard; μ styragem columns; THF eluent; flow rate of 1 mm/m; 200 μl of a solution containing 0.5% by weight of silicone in THF are injected, and detection is performed by refractometry and UV-metry).

A product corresponding to the definition of formula (XIV) is in particular the polymer known in the CTFA dictionary as "trimethylsilyl amodimethicone", corresponding to formula (XVI) below:

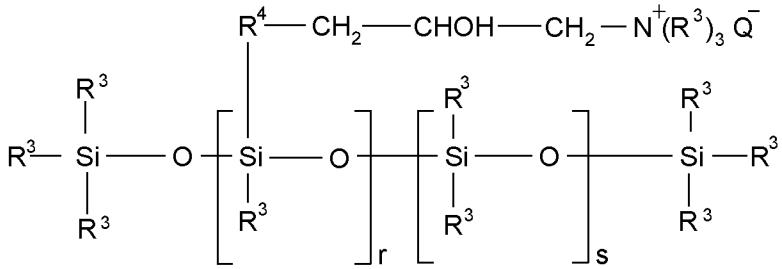


(XVI)

in which n and m have the meanings given above in accordance with formula (XV).

Such compounds are described, for example, in patent EP 95238; a compound of formula (XVI) is sold, for example, under the name Q2-8220 by the company OSI.

(b) the compounds corresponding to formula (XVII) below:



(XVII)

in which:

$R^3$ represents a $C_1$-$C_{18}$ monovalent hydrocarbon-based radical, and in particular a $C_1$-$C_{18}$ alkyl or $C_2$-$C_{18}$ alkenyl radical, for example methyl;

$R^4$ represents a divalent hydrocarbon-based radical, especially a $C_1$-$C_{18}$ alkylene radical or a divalent $C_1$-$C_{18}$, for example $C_1$-$C_8$, alkylenoxy radical;

Q- is a halide ion, especially chloride;

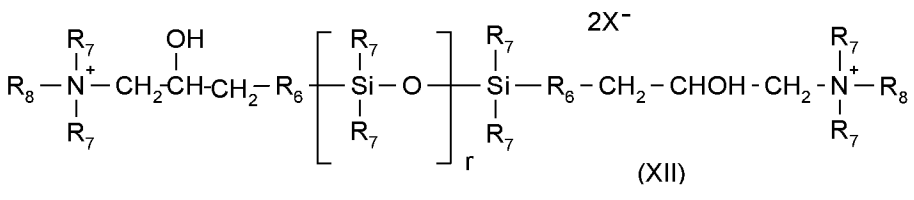
r represents a mean statistical value from 2 to 20 and in particular from 2 to 8;

s represents a mean statistical value from 20 to 200 and in particular from 20 to 50.

Such compounds are described more particularly in patent US 4 185 087.

A compound falling within this class is the product sold by the company Union Carbide under the name Ucar Silicone ALE 56.

(c) the quaternary ammonium silicones of formula (XVIII):



(XII)

(XVIII)

in which:

$R_7$, which may be identical or different, represent a monovalent hydrocarbon-based radical containing from 1 to 18 carbon atoms, and in particular a $C_1$-$C_{18}$ alkyl radical, a $C_2$-$C_{18}$ alkenyl radical or a ring comprising 5 or 6 carbon atoms, for example methyl;

$R_6$ represents a divalent hydrocarbon-based radical, especially a $C_1$-$C_{18}$ alkylene radical or a divalent $C_1$-$C_{18}$, and for example $C_1$-$C_8$, alkylenoxy radical linked to the Si via an SiC bond;

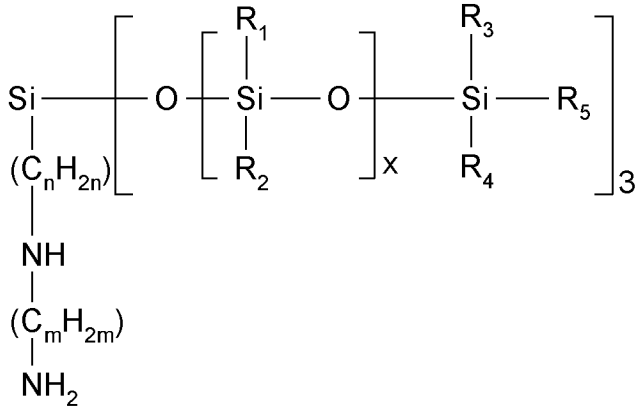
$R_8$, which may be identical or different, represent a hydrogen atom, a monovalent hydrocarbon-based radical containing from 1 to 18 carbon atoms, and in particular a $C_1$-$C_{18}$ alkyl radical, a $C_2$-$C_{18}$ alkenyl radical or a radical -$R_6$-NHCO$R_7$;

X- is an anion such as a halide ion, especially chloride, or an organic acid salt (acetate, etc.);

r represents a mean statistical value from 2 to 200 and in particular from 5 to 100;

These silicones are described, for example, in patent application EP-A-0 530 974.

(d) the amino silicones of formula (XIX):



(XIX)

in which:

- $R_1$, $R_2$, $R_3$ and $R_4$, which may be identical or different, denote a $C_1$-$C_4$ alkyl radical or a phenyl group,
- $R_5$ denotes a $C_1$-$C_4$ alkyl radical or a hydroxyl group,
- n is an integer ranging from 1 to 5,
- m is an integer ranging from 1 to 5,

and in which x is selected such that the amine number is between 0.01 and 1 meq/g.

The silicone that is particularly preferred is amodimethicone.

When they are present, the composition according to the invention may preferably comprise from 0.01% to 10% by weight, better still from 0.1% to 2% by weight and even better still from 0.1% to 1% by weight of silicone(s), preferably amino silicone(s), relative to the total weight of the composition.

The composition according to the invention may also comprise one or more cosmetic additives commonly used in the art, for instance antioxidants, organic ultraviolet screening agents, inorganic ultraviolet screening agents, thickeners, softeners, moisturizers, emollients, plasticizers, mineral fillers, clays, mineral colloids, nacres, fragrances, peptizers, preserving agents, fixing or non-fixing polymers, proteins and vitamins, and mixtures of these compounds.

A person skilled in the art will take care to choose the optional additives and their amounts so that they do not interfere with the properties of the compositions of the present invention.

When they are present, these additives may represent individually an amount ranging from 0.001 to 90% by weight, preferably from 0.001 to 50% by weight and better still from 0.001 to 20% by weight, relative to the total weight of the composition according to the invention.

The composition according to the invention generally comprises water or a mixture of water and one or more organic solvents.

Organic solvents that may be mentioned include lower alcohols ($C_1$-$C_4$), such as ethanol, isopropanol, tert-butanol or n-butanol, polyols such as propylene glycol and glycerol, polyol ethers, $C_5$-$C_{10}$ alkanes, $C_3$-$C_4$ ketones such as acetone, $C_1$-$C_4$ alkyl acetates such as methyl acetate, ethyl acetate and butyl acetate, dimethoxyethane and diethoxyethane, and mixtures thereof.

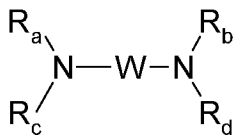
When the composition according to the invention comprises one or more organic solvents, these solvents may be present in a proportion of from 0.1% to 30% by weight and preferably 0.1% to 10% by weight relative to the total weight of the composition.

The pH of the composition according to the invention, if it is aqueous, generally ranges from 1.5 to 11, preferably from 2 to 6.5 and better still from 2 to 5.5.

It may be adjusted to the desired value by means of acidifying or basifying agents usually used in the dyeing of keratin fibres, or alternatively using standard buffer systems.

Among the acidifying agents, examples that may be mentioned include mineral or organic acids, for instance hydrochloric acid, orthophosphoric acid, sulfuric acid and sulfonic acids, and carboxylic acids, for instance acetic acid, tartaric acid, citric acid or lactic acid.

Examples of basifying agents that may be mentioned include aqueous ammonia, alkali metal carbonates, alkanolamines, such as monoethanolamine, diethanolamine and triethanolamine, and derivatives thereof, sodium hydroxide, potassium hydroxide and the compounds of formula (XX) below:



(XX)

in which:

W is a propylene residue optionally substituted with a hydroxyl group or a $C_1$-$C_4$ alkyl group;

Ra, Rb, Rc and Rd, which may be identical or different, represent a hydrogen atom or a $C_1$-$C_4$ alkyl or $C_1$-$C_4$ hydroxyalkyl group.

The composition according to the invention comprises one or more propellants.

The propellant(s) are preferably chosen from dimethyl ether, $C_1$-$C_4$ hydrocarbons and especially linear or branched $C_1$-$C_4$ alkanes, for instance isobutane, butane, isopropane and propane, and mixtures thereof. Preferably, the propellant is a mixture of hydrocarbons and in particular of isobutane, butane and propane, more preferentially in relative weight proportions of 56/24/20. Such a mixture is sold, for example, under the name Propel 45 by the company Repsol.

The propellant(s) preferably represent from 1% to 40% by weight, more preferentially from 3% to 35% by weight, and better still from 3% to 10% by weight, relative to the total weight of the composition.

The composition according to the invention is conditioned in an aerosol device.

Preferably, the composition generated by the aerosol is in the form of a foam.

Another subject of the invention is a cosmetic treatment process that comprises the application to keratin fibres, preferably human keratin fibres such as the hair, and the scalp, of a composition according to the invention as described above, with or without and preferably without subsequent rinsing of the said keratin fibres.

The composition according to the invention that is applied may be massaged on the hair so as to accelerate the penetration, by hand or using any other adequate means, such as a brush or a comb.

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

EXAMPLES

Leave-on compositions according to the invention

The amounts are indicated as weight percentages of active material (AM) relative to the total weight of each composition.

The weight ratio of the amount of zinc element(s) to the amount of cationic polymer(s) (noted R') was calculated for each composition.

| Composition 1 | |
|---|---|
| Polyquaternium-4 (sold under the name Celquat LOR by Akzo Nobel) | 1.425 |
| Zinc gluconate (sold under the name Givobio G Zn by SEPPIC) | 0.95 |
| Isobutane/butane/propane mixture (56/24/20) sold under the name Propel 45 by the company Repsol. | 5 |
| Citric acid | qs pH = 3.5 |
| Water | qs 100 |
| R' | 0.1 |

| Composition 2 | |
|---|---|
| Polyquaternium-4 (sold under the name Celquat LOR by Akzo Nobel) | 1.455 |
| Zinc sulfate heptahydrate (sold by Merck) | 0.776 |
| Isobutane/butane/propane mixture (56/24/20) sold under the name Propel 45 by the company Repsol. | 3 |
| Citric acid | qs pH = 3.5 |
| Water | qs 100 |
| R' | 0.2 |

| Composition 3 | |
|---|---|
| Polyquaternium-4 (sold under the name Celquat LOR by Akzo Nobel) | 1.425 |
| Hexadecyltrimethylammonium chloride (INCI: Cetrimonium chloride) (sold under the name Arquad 16-25 LO by Akzo Nobel) | 0.19 |
| Laureth-4 (sold under the name Brij L4-LQ-WL by Croda) | 0.38 |
| Methyl paraben (sold under the name Nipagin M by the company Clariant) | 0.19 |
| Phenoxyethanol (sold under the name Sepicide LD by SEPPIC) | 0.475 |
| Propylene glycol (sold under the name Propylene glycol USP/EP by Dow Chemicals) | 2.375 |
| Zinc gluconate (sold under the name Givobio G Zn by SEPPIC) | 0.475 |
| Fragrance | 0.285. |
| PEG-40 hydrogenated castor oil (INCI: PEG-40 hydrogenated castor oil) (sold under the name Emulgin HRE 40 by Cognis) | 0.855 |
| Isobutane/butane/propane mixture (56/24/20) sold under the name Propel 45 by the company Repsol. | 5 |
| Citric acid | qs pH = 3.5 |
| Water | qs 100 |
| R' | 0.05 |

A formulated foam generated via an aerosol device was applied very easily to wet hair using compositions 1, 2 or 3.

It was observed that these colour-protecting compositions according to the invention give a satisfactory level of care and of smoothing of the hair.

# CLAIMS

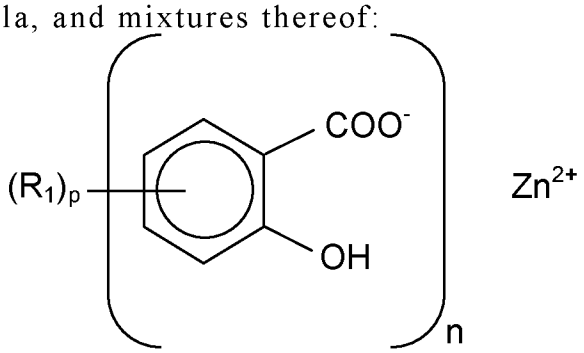
1. Cosmetic composition comprising:

- one or more zinc salts,
- one or more cationic polymers in a total amount of greater than or equal to 0.4% by weight relative to the total weight of the composition,
- one or more propellants.

2. Composition according to Claim 1, characterized in that the zinc salt(s) are chosen from water-soluble mineral or organic zinc salts, and mixtures thereof.

3. Composition according to either of the preceding claims, characterized in that the zinc salt(s) are chosen from mineral salts and in particular from zinc sulfate and zinc chloride.

4. Composition according to any one of Claims 1 to 3, characterized in that the zinc salt(s) are chosen from organic salts and in particular from zinc lactate, zinc gluconate, zinc phenolsulfonate, zinc citrate and zinc salicylate, or derivatives thereof corresponding to the following formula, and mixtures thereof:




in which formula:

n = 2, p is equal to 0, 1, 2 or 3;

$R_1$ denotes a linear or branched $C_1$-$C_{18}$ alkyl group (for example methyl, ethyl, n-propyl, isopropyl or n-butyl); a linear or branched $C_1$-$C_{18}$ hydroxyalkyl group; a halogen atom; a $C_2$-$C_{18}$ acyl

group; a group $COR_2$ or $OCOR_2$, in which $R_2$ denotes a hydrogen atom or a linear or branched $C_1$-$C_{18}$ alkyl group.

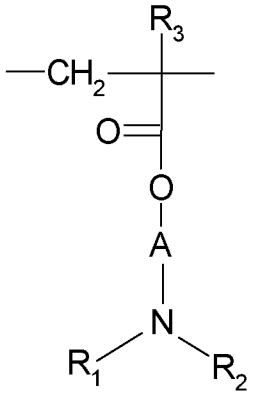
5. Composition according to any one of Claims 1 to 4, characterized in that the zinc salt is chosen from zinc lactate and zinc gluconate, and is preferably zinc gluconate.

6. Composition according to any one of the preceding claims, characterized in that the concentration of zinc salt(s) ranges from 0.05% to 10% by weight, preferably from 0.1% to 6.5% by weight and better still from 0.2% to 3% by weight relative to the total weight of the composition.

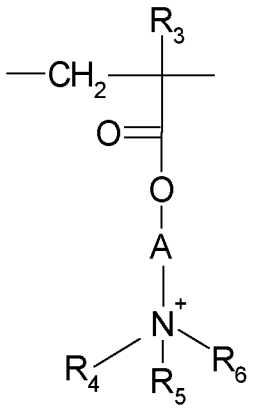
7. Composition according to any one of the preceding claims, characterized in that the concentration of zinc element is less than 2% by weight, and in particular ranges from 0.005% to 1.5% by weight and better still from 0.1% to 1% by weight relative to the total weight of the composition.

8. Composition according to any one of the preceding claims, characterized in that the cationic polymer(s) are chosen from:

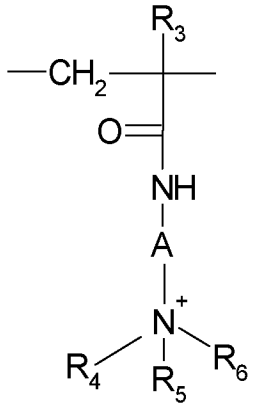
(1) Homopolymers or copolymers derived from crosslinked or non-crosslinked acrylic or methacrylic esters or amides and comprising at least one of the units of formula (I), (II), (III) or (IV) below:



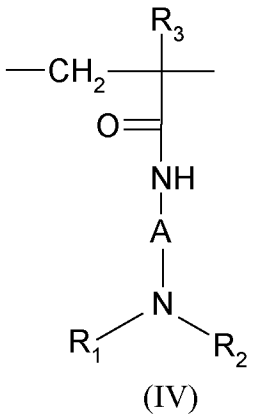

(I)




(II)




(III)




(IV)

in which

$R_1$ and $R_2$, which may be identical or different, each represent a hydrogen atom or an alkyl group containing from 1 to 6 carbon atoms, and preferably methyl or ethyl;

$R_3$, which may be identical or different at each occurrence, denote a hydrogen atom or a group $CH_3$;

A, which may be identical or different, each represent a linear or branched alkyl group of 1 to 6 carbon atoms, preferably 2 or 3 carbon atoms, or a hydroxyalkyl group of 1 to 4 carbon atoms;

$R_4$, $R_5$ and $R_6$, which may be identical or different, each represent an alkyl group containing from 1 to 6 carbon atoms or a benzyl group, and preferably an alkyl group containing from 1 to 6 carbon atoms;

$X^-$ denotes an anion derived from a mineral or organic acid, such as a methosulfate anion or a halide such as chloride or bromide;

(2) Cationic polysaccharides;

(3) Polymers formed from piperazinyl units and divalent alkylene or hydroxyalkylene radicals containing straight or branched chains, optionally interrupted with oxygen, sulfur or nitrogen atoms or with aromatic or heterocyclic rings, and also the oxidation and/or quaternization products of these polymers;

(4) Water-soluble cationic polyamino amides prepared in particular by polycondensation of an acidic compound with a polyamine;

(5) Polyamino amide derivatives resulting from the condensation of polyalkylene polyamines with polycarboxylic acids followed by alkylation with difunctional agents;

(6) The polymers obtained by reaction of a polyalkylene polyamine containing two primary amine groups and at least one secondary amine group with a dicarboxylic acid chosen from diglycolic acid and saturated aliphatic dicarboxylic acids having from 3 to 6 carbon atoms;

(7) Cyclopolymers of alkyldiallylamine or of dialkyldiallylammonium;

(8) Quaternary diammonium polymers;

(9) Quaternary polyammonium polymers;

(10) Quaternary polymers of vinylpyrrolidone and of vinylimidazole;

(11) Ethoxylated cationic tallow polyamines;

(12) Cationic vinylamide homopolymers or copolymers and in particular partially hydrolysed vinylamide homopolymers such as poly(vinylamine/vinylamide)s;

(13) Cationic polyurethanes;

(14) Cationic proteins or cationic protein hydrolysates, polyalkyleneimines, in particular polyethyleneimines, polymers containing vinylpyridine or vinylpyridinium units, and chitin derivatives.

9. Composition according to any one of the preceding claims, characterized in that it comprises at least one cationic polymer chosen from cationic polysaccharides.

10. Composition according to any one of the preceding claims, characterized in that the total concentration of cationic polymer(s) ranges from 0.4% to 10% by weight, preferably from 0.5% to 5% by weight and better still from 0.5% to 2% by weight relative to the total weight of the composition.

11. Composition according to any one of the preceding claims, characterized in that the propellant(s) are chosen from

dimethyl ether and linear or branched $C_1$-$C_4$ alkanes, and mixtures thereof.

12. Composition according to any one of the preceding claims, characterized in that it additionally comprises one or more nonionic surfactants.

13. Cosmetic composition according to any one of the preceding claims, characterized in that it also comprises one or more fatty alcohols, and/or one or more silicones.

14. Composition according to any one of the preceding claims, characterized in that it is conditioned in an aerosol device.

15. Composition according to any one of the preceding claims, characterized in that it is used in the form of a foam.

16. Cosmetic process for treating keratin fibres, characterized in that a composition as defined according to any one of Claims 1 to 15 is applied to keratin fibres, with or without and preferably without subsequent rinsing of the said keratin fibres.

17. Use of a composition as defined in any one of Claims 1 to 15, for conditioning keratin fibres and protecting their artificial colour.

# INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/073297

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61K8/20 A61K8/23 A61K8/27 A61K8/365 A61K8/368
A61K8/04 A61K8/73 A61Q5/00 A61Q5/12 A61K8/46
ADD.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, CHEM ABS Data, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | EP 1 923 042 A1 (OREAL [FR])<br>21 May 2008 (2008-05-21) | 1-17 |
| Y | claims 1-7, 14<br>paragraph [0006] - paragraph [0010]<br>paragraph [0022] - paragraph [0026]<br>paragraph [0031] - paragraph [0034]<br>paragraph [0042] - paragraph [0053]<br>paragraph [0117] - paragraph [0118]<br>----- | 1-17 |
| X | US 2008/229521 A1 (LALLEMAN BORIS [FR])<br>25 September 2008 (2008-09-25) | 1-17 |
| Y | claims 1-11, 13, 15, 17<br>paragraph [0014]<br>paragraph [0103] - paragraph [0108]<br>paragraph [0122] - paragraph [0193]<br>paragraph [0363]<br>----- | 1-17 |

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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

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

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

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

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

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 25 January 2012 | 06/02/2012 |

| Name and mailing address of the ISA/ | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016 | Hauss, Regina |

# INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/073297

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | EP 2 198 837 A1 (OREAL [FR])<br>23 June 2010 (2010-06-23)<br>claim 1<br>examples<br>paragraph [0007] - paragraph [0008]<br>----- | 1-17 |
| Y | WO 2009/085838 A1 (ISP INVESTMENTS INC [US]; YAN ZHOU [US]; DONNA LAURA N [US]; RAYMOND R) 9 July 2009 (2009-07-09)<br>claims 1, 2, 15, 16<br>examples<br>----- | 1-17 |
| Y | US 2009/098079 A1 (SCHIEMANN HARTMUT [DE] ET AL) 16 April 2009 (2009-04-16)<br>claims<br>examples<br>----- | 1-17 |
| Y | DE 20 2005 009611 U1 (WELLA AG)<br>8 September 2005 (2005-09-08)<br>claims<br>examples<br>----- | 1-17 |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2011/073297

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| EP 1923042 A1 | 21-05-2008 | AT 455531 T | 15-02-2010 |
| | | EP 1923042 A1 | 21-05-2008 |
| | | ES 2338175 T3 | 04-05-2010 |
| | | FR 2907668 A1 | 02-05-2008 |
| | | PT 1923042 E | 16-03-2010 |
| | | US 2008134449 A1 | 12-06-2008 |
| | | US 2010147319 A1 | 17-06-2010 |
| | | US 2010147320 A1 | 17-06-2010 |
| US 2008229521 A1 | 25-09-2008 | NONE | |
| EP 2198837 A1 | 23-06-2010 | EP 2198837 A1 | 23-06-2010 |
| | | FR 2940094 A1 | 25-06-2010 |
| | | US 2010166693 A1 | 01-07-2010 |
| WO 2009085838 A1 | 09-07-2009 | EP 2234673 A1 | 06-10-2010 |
| | | US 2011219552 A1 | 15-09-2011 |
| | | WO 2009085838 A1 | 09-07-2009 |
| US 2009098079 A1 | 16-04-2009 | NONE | |
| DE 202005009611 U1 | 08-09-2005 | NONE | |