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(54) Title: AEROSOL COMPOSITION COMPRISING A FIXING POLYMER AND A LAMELLAR PARTICULATE MATERIAL, A PROCESS AND A DEVICE

(57) Abstract: The present invention relates to a composition comprising one or more fixing polymers, one or more lamellar particulate materials, one or more organic solvents and one or more propellants. The invention also relates to a process for treating keratin fibres, comprising at least one step of applying the composition according to the invention to said keratin fibres, and also to an aerosol device comprising such a composition.

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AEROSOL COMPOSITION COMPRISING A FIXING POLYMER AND A LAMELLAR PARTICULATE MATERIAL, A PROCESS AND A DEVICE

The present invention relates to a composition comprising one or more fixing polymers, one or more lamellar particulate materials, one or more organic solvents and one or more propellants.

The invention also relates to a process for treating keratin fibres, comprising at least one step of applying the composition according to the invention to said keratin fibres, and also to an aerosol device comprising such a composition.

Styling products are normally used to construct and structure the hairstyle and to give it hold. They are usually in the form of lotions, gels, mousses, creams, sprays, etc. These compositions generally comprise one or more fixing polymers. These polymers allow the formation of a coating film on the hair, and/or the formation of micro-bonds between the individual hairs, thus ensuring the hairstyle hold.

These compositions are subjected to several stress factors, for example heat, humidity, rain or sebum, and repeated mild mechanical stress factors, which bring about a loss of fixing of the hairstyle after only a few hours.

Moreover, these compositions are not always entirely satisfactory in terms of hairstyle hold. It has in particular been found with these compositions that the hairstyle collapses after 3 to 4 hours of exposure to stress factors.

Furthermore, these compositions also have a certain number of drawbacks. These compositions generally lead to a dry feel, a dull and coarse appearance of the hair, and have a tendency to solidify the hairstyle, especially giving a "helmet effect". This effect is often poorly perceived by users.

To increase the durability of the initial fixing of the hairstyle (i.e. the hold of the initial shaping of the hairstyle), it is known practice to incorporate into styling products fibres such as silk or viscose fibres. However, the use of fibres does not afford a pleasant feel and has the drawback of rapidly clogging the diffuser valves.

There is thus a real need to develop compositions which are capable of giving the hairstyle good resistance to deformation and long-lasting fixing, to minimize the supply of residues, and which have styling effects such as giving the hair body and volume, which can persist throughout the day, while at the same time conserving a natural and non-solidified appearance for the head of hair, and affording

satisfactory cosmetic properties, in particular a pleasant cosmetic feel, especially a soft and smooth feel.

It is also desired for these compositions to be less expensive to manufacture, especially by reducing the concentration of fixing polymer(s), while at the same time conserving their properties.

These objectives are achieved by the present invention, the subject of which is especially an anhydrous composition comprising:

- one or more fixing polymers chosen from anionic fixing polymers, amphoteric fixing polymers, and mixtures thereof;
- one or more lamellar particulate materials;
- one or more organic solvents; and
- one or more propellants.

It has thus been found that the composition according to the invention has good styling properties. It makes it possible especially to obtain good resistance to deformation and also good hold of the head of hair over time, in particular for more than 4 hours.

It has also been found that the composition according to the invention gives the head of hair volume, especially after disentangling, and does so without further solidifying the hairstyle.

It also gives the hair a particularly soft and pleasant feel.

Moreover, it has also been found by the Applicant, surprisingly, that when the composition according to the invention is packaged in an aerosol device comprising a spray valve, the dispensing of the composition is facilitated and there is less risk of said valve being clogged, especially in the case of a high concentration of lamellar particulate materials, when compared with the styling products of the prior art.

The compositions according to the invention also have the advantage of having a moderate manufacturing cost while at the same time having satisfactory fixing and cosmetic properties.

Another subject of the present invention relates to a process for treating keratin fibres, in particular human keratin fibres such as the hair, comprising at least one step of applying a composition according to the invention to said keratin fibres.

A subject of the present invention is also an aerosol device comprising a composition according to the invention.

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

For the purposes of the invention, unless otherwise indicated:

- the limits of a range of values are included in that range, in particular in the expressions "between... and ..." and "ranging from ... to ...";
- the expression "at least one" used in the present description is equivalent to the expression "one or more", and may be substituted therefor;
- According to the present patent application, the term "keratin fibres" denotes human keratin fibres and more particularly the hair.

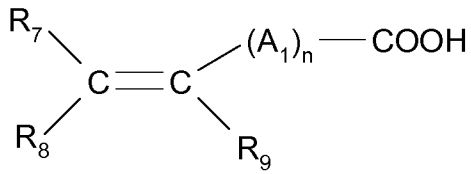
The fixing polymers

The composition according to the invention comprises one or more fixing polymers chosen from anionic fixing polymers, amphoteric fixing polymers, and mixtures thereof.

For the purposes of the present invention, the term "fixing polymer" means a polymer for fixing the shaping of keratin fibres, in particular of the hair.

Preferably, the anionic fixing polymers are chosen from polymers including groups derived from carboxylic acid, sulfonic acid or phosphoric acid and have a number-average molecular mass of between approximately 500 and 5 000 000.

The carboxylic groups are provided by unsaturated mono- or dicarboxylic acid monomers, such as those corresponding to formula (I):



(I)

in which n is an integer from 0 to 10, A_1 denotes a methylene group, optionally connected to the carbon atom of the unsaturated group or to the adjacent methylene group when n is greater than 1, via a heteroatom, such as oxygen or sulfur, R_7 denotes a hydrogen atom or a phenyl or benzyl group, R_8 denotes a hydrogen

atom or a lower alkyl or carboxyl group, and R_9 denotes a hydrogen atom, a lower alkyl group or a $-CH_2-COOH$, phenyl or benzyl group.

In the abovementioned formula, a lower alkyl group preferably denotes a group containing 1 to 4 carbon atoms and in particular methyl and ethyl groups.

The anionic fixing polymers containing carboxylic groups that are preferred according to the invention are:

A) copolymers of acrylic or methacrylic acid or salts thereof.

Among these polymers, mention may be made of copolymers of acrylic or methacrylic acid with a monoethylenic monomer, such as ethylene, styrene, vinyl esters or acrylic or methacrylic acid esters, optionally grafted to a polyalkylene glycol, such as polyethylene glycol, and optionally crosslinked. Such polymers are described in particular in French patent No.1 222 944 and German patent application No. 2 330 956, the copolymers of this type including in their chain an optionally N-alkylated and/or hydroxyalkylated acrylamide unit as described especially in Luxembourg patent application Nos. 75370 and 75371. Mention may also be made of copolymers of acrylic acid and of a C_1-C_4 alkyl methacrylate and terpolymers of vinylpyrrolidone, of acrylic acid and of a C_1-C_{20} alkyl methacrylate, for example lauryl methacrylate, such as the product sold by the company ISP under the name Acrylidone® LM (INCI name: VP/acrylates/lauryl methacrylate copolymer), acrylic acid/ethyl acrylate/N-(t-butyl)acrylamide terpolymers, such as the products Ultrahold® Strong and Ultrahold® 8 sold by the company BASF (INCI name: Acrylates/t-butylacrylamide copolymer), methacrylic acid/ethyl acrylate/*tert*-butyl acrylate terpolymers, such as the products sold under the name Luvimer® 100 P or Luvimer® PRO 55 by the company BASF (INCI name: Acrylates copolymer), copolymers of methacrylic acid and of ethyl acrylate, such as the products sold under the name Luvimer® MAE or Luviflex® Soft by the company BASF (INCI name: Acrylates copolymer), acrylic acid/butyl acrylate/methyl methacrylate terpolymers, such as the product sold under the name Balance® CR by the company Akzo Nobel (INCI name: Acrylates copolymer), or the copolymers of methacrylic acid and of methyl methacrylate sold under the name Eudragit® L 100 by the company Rohm Pharma (INCI name: Acrylates copolymer). Mention may also be made of branched block polymers containing (meth)acrylic acid monomers, such as the product sold under the name Fixate® G-100L by the company Lubrizol (INCI name: AMP-acrylates / allyl methacrylate copolymer);

B) crotonic acid copolymers, such as those including, in their chain, vinyl acetate or propionate units and optionally other monomers, such as allyl or methallyl esters, vinyl ether or vinyl ester of a saturated and linear or branched carboxylic acid bearing a long hydrocarbon-based chain, such as those including at least 5 carbon atoms, it being possible for these polymers optionally to be grafted or crosslinked, or alternatively another monomer which is a vinyl, allyl or methallyl ester of an α- or β-cyclic carboxylic acid. Such polymers are described, *inter alia*, in French patent Nos. 1 222 944, 1 580 545, 2 265 782, 2 265 781, 1 564 110 and 2 439 798. Commercial products which fall into this category are the products Resyn® 28-2930 and 28-1310 sold by the company Akzo Nobel (INCI names: VA / crotonates / vinyl decanoate copolymer and VA / crotonates copolymer, respectively). Mention may also be made of the products Luviset® CA 66 sold by the company BASF, Aristoflex® A60 sold by the company Clariant (INCI name: VA / crotonates copolymer) and Mexomere® PW or PAM sold by the company Chimex (INCI name: VA / vinyl butyl benzoate / crotonates copolymer);

C) copolymers of C_4-C_8 monounsaturated carboxylic acids or anhydrides chosen from:

- copolymers comprising (i) one or more maleic, fumaric or itaconic acids or anhydrides and (ii) at least one monomer chosen from vinyl esters, vinyl ethers, vinyl halides, phenylvinyl derivatives, acrylic acid and esters thereof, the anhydride functions of these copolymers optionally being monoesterified or monoamidated. Such polymers are described, in particular, in US patents 2 047 398, 2 723 248 and 2 102 113, and patent GB 839 805. Commercial products are in particular those sold under the names Gantrez® AN or ES by the company ISP, such as Gantrez® ES 225 (INCI name: Ethyl ester of PVM / MA copolymer) or Gantrez® ES 425L (INCI name: Butyl ester of PVM / MA copolymer);

- copolymers comprising (i) one or more maleic, citraconic or itaconic anhydride units and (ii) one or more monomers chosen from allyl or methallyl esters, optionally including one or more acrylamide, methacrylamide, α-olefin, acrylic or methacrylic ester, acrylic or methacrylic acid or vinylpyrrolidone groups in their chain,

the anhydride functions of these copolymers optionally being monoesterified or monoamidated.

These polymers are described, for example, in patents FR 2 350 384 and FR 2 357 241;

D) polyacrylamides including carboxylate groups.

The fixing polymers bearing units derived from sulfonic acid may be chosen from:

A') homopolymers and copolymers including vinylsulfonic, styrenesulfonic, naphthalenesulfonic or acrylamidoalkylsulfonic units.

These polymers may be chosen especially from:

- polyvinylsulfonic acid salts with a molecular mass of between approximately 1000 and 100 000, and also the copolymers with an unsaturated comonomer such as acrylic or methacrylic acids and esters thereof, and also acrylamide or derivatives thereof, vinyl ethers and vinylpyrrolidone;
- polystyrenesulfonic acid salts such as the sodium salts that are sold for example under the name Flexan® II by Akzo Nobel (INCI name: Sodium polystyrene sulfonate). These compounds are described in patent FR 2,198,719;
- polyacrylamidosulfonic acid salts, such as those mentioned in patent US 4 128 631, and more particularly the polyacrylamidoethylpropanesulfonic acid sold under the name Rheocare® HSP-1180 by Cognis (INCI name: polyacrylamidomethylpropane sulfonic acid);

B') sulfonic polyesters, these polymers being advantageously obtained by polycondensation of at least one dicarboxylic acid, of at least one diol or of a mixture of diol and of diamine, and of at least one difunctional monomer including a sulfonic function. Among these polymers, mention may be made of:

- linear sulfonic polyesters such as those described in patent applications US 3 734 874, US 3 779 993, US 4 119 680, US 4 300 580, US 4 973 656, US 5 660 816, US 5 662 893 and US 5 674 479. Such polymers are, for example, the products Eastman® AQ38S Polymer, Eastman® AQ55S Polymer and Eastman® AQ48 Ultra Polymer sold by the company Eastman Chemical (name: Polyester-5) which are

copolymers obtained from diethylene glycol, from 1,4-cyclohexanedimethanol, from isophthalic acid and from sulfoisophthalic acid salt;

- branched sulfonic polyesters such as those described in patent applications WO 95/18191, WO 97/08261 and WO 97/20899. Such compounds are, for example, the products Eastman® AQ10D Polymer (name: Polyester-13)

or Eastman® AQ1350 Polymer provided by the company Eastman Chemical (name: Polyester-13).

Preferably, the anionic fixing polymer(s) are chosen from acrylic acid copolymers, especially the acrylic acid/ethyl acrylate/N-*tert*-butylacrylamide terpolymers sold in particular under the name Ultrahold® Strong by the company BASF, copolymers derived from crotonic acid, especially the vinyl acetate/vinyl *tert*-butylbenzoate/crotonic acid terpolymers and the crotonic acid/vinyl acetate/vinyl neododecanoate terpolymers sold in particular under the name Resyn 28-2930 by the company Akzo Nobel, polymers derived from maleic, fumaric or itaconic acids or anhydrides with vinyl esters, vinyl ethers, vinyl halides, phenylvinyl derivatives and acrylic acid and esters thereof, especially the methyl vinyl ether/monoesterified maleic anhydride copolymers sold, for example, under the name Gantrez® ES 425L or ES 225 by the company ISP, the copolymers of methacrylic acid and of ethyl acrylate, especially those sold under the name Luvimer® MAE by the company BASF, and the vinyl acetate/crotonic acid copolymers sold under the name Luviset® CA 66 by the company BASF, and the vinyl acetate/crotonic acid copolymers grafted with polyethylene glycol sold under the name Aristoflex® A60 by the company Clariant, the vinylpyrrolidone/acrylic acid/lauryl methacrylate terpolymers sold under the name Acrylidone® LM by the company ISP, the AMP-acrylates/allyl methacrylate copolymer sold under the name Fixate® G-100L by the company Lubrizol, the vinyl acetate/crotonic acid/vinyl p-*tert*-butylbenzoate copolymers sold under the name Mexomere® PW or PAM by the company Chimex; and mixtures thereof.

According to a preferred embodiment of the invention, the anionic fixing polymer(s) are chosen from acrylic acid copolymers; crotonic acid-based copolymers; polymers derived from maleic, fumaric or itaconic acids or anhydrides with vinyl esters, vinyl ethers, vinyl halides, phenylvinyl derivatives; acrylic acid and

esters thereof; copolymers of methacrylic acid and of ethyl acrylate; vinyl acetate/crotonic acid copolymers; vinyl acetate/crotonic acid copolymers grafted with polyethylene glycol; vinylpyrrolidone/acrylic acid/lauryl methacrylate terpolymers; AMP-acrylates/allyl methacrylate copolymer, vinyl acetate/crotonic acid/vinyl p-*tert*-butylbenzoate copolymers; and mixtures thereof.

Preferably, when the anionic fixing polymer(s) are present in the composition according to the invention, the total content of the anionic fixing polymer(s) present in the composition is between 0.1% and 20% by weight, more preferentially between 0.5% and 15% by weight, even more preferentially between 1% and 12% by weight and better still between 1.5% and 10% by weight, relative to the total weight of the composition.

Preferably, the amphoteric fixing polymer(s) are chosen from polymers including units B and C distributed randomly in the polymer chain, in which B denotes a unit derived from a monomer including at least one basic nitrogen atom and C denotes a unit derived from an acid monomer including one or more carboxylic or sulfonic groups, or alternatively B and C can denote groups derived from carboxybetaine or sulfobetaine zwitterionic monomers;

B and C may also denote a cationic polymer chain including primary, secondary, tertiary or quaternary amine groups, in which at least one of the amine groups bears a carboxylic or sulfonic group connected via a hydrocarbon-based group or alternatively B and C form part of a chain of a polymer bearing an ethylene-α,β-dicarboxylic unit in which one of the carboxylic groups has been made to react with a polyamine including one or more primary or secondary amine groups.

The amphoteric fixing polymers corresponding to the definition given above that are more particularly preferred are chosen from the following polymers:

(1) copolymers bearing acidic vinyl units and basic vinyl units, such as those resulting from the copolymerization of a monomer derived from a vinyl compound bearing a carboxylic group such as, more particularly, acrylic acid, methacrylic acid, maleic acid, alpha-chloroacrylic acid, and of a basic monomer derived from a substituted vinyl compound containing at least one basic atom, such as, more particularly, dialkylaminoalkyl methacrylate and acrylate,

dialkylaminoalkylmethacrylamide and acrylamide. Such compounds are described in US patent 3 836 537.

(2) polymers including units derived:

a) from at least one monomer chosen from acrylamides and methacrylamides substituted on the nitrogen atom with an alkyl group,

b) from at least one acidic comonomer containing one or more reactive carboxylic groups, and

c) from at least one basic comonomer such as esters with primary, secondary, tertiary and quaternary amine substituents of acrylic and methacrylic acids and the product of quaternization of dimethylaminoethyl methacrylate with dimethyl or diethyl sulfate.

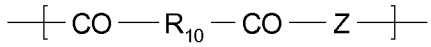
The N-substituted acrylamides or methacrylamides that are more particularly preferred according to the invention are compounds in which the alkyl groups contain from 2 to 12 carbon atoms and more particularly N-ethylacrylamide, N-*tert*-butylacrylamide, N-*tert*-octylacrylamide, N-octylacrylamide, N-decylacrylamide, N-dodecylacrylamide and the corresponding methacrylamides.

The acidic comonomers are more particularly chosen from acrylic acid, methacrylic acid, crotonic acid, itaconic acid, maleic acid and fumaric acid and alkyl monoesters, containing 1 to 4 carbon atoms, of maleic or fumaric acids or anhydrides.

The preferred basic comonomers are aminoethyl, butylaminoethyl, N,N'-dimethylaminoethyl and N-*tert*-butylaminoethyl methacrylates.

The copolymers of which the INCI name is Octylacrylamide/acrylates/butylaminoethyl methacrylate copolymer, such as the products sold under the names Amphomer®, Amphomer® LV71 or Balance® 47 by the company Akzo Nobel, are particularly used;

(3) crosslinked and acylated polyaminoamides partially or totally derived from polyaminoamides of general formula (II):

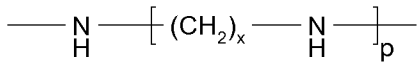


(II)

in which R_{10} represents a divalent group derived from a saturated dicarboxylic acid, from an aliphatic mono- or dicarboxylic acid bearing an ethylenic double bond, from an ester of a lower alkanol containing from 1 to 6 carbon atoms of these acids, or from a group derived from the addition of any one of said acids to a

bis-primary or bis-secondary amine, and Z denotes a group derived from a bis-primary, mono- or bis-secondary polyalkylenepolyamine and preferably represents:

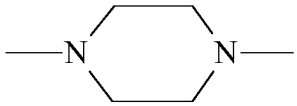
a) in proportions of from 60 mol% to 100 mol%, the group (III)



in which x = 2 and p = 2 or 3, or else x = 3 and p = 2,

this group (III) being derived from diethylenetriamine, from triethylenetetramine or from dipropylenetriamine;

b) in proportions of from 0 to 40 mol%, the group (III) above in which x = 2 and p = 1 and which is derived from ethylenediamine, or the group derived from piperazine:



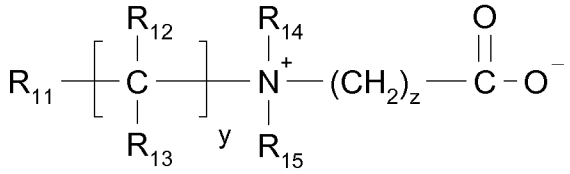
c) in proportions of from 0 to 20 mol%, the -NH-$(CH_2)_6$-NH- group derived from hexamethylenediamine,

these polyaminoamides being crosslinked by addition reaction of a difunctional crosslinking agent chosen from epihalohydrins, diepoxides, dianhydrides and bis-unsaturated derivatives, using from 0.025 to 0.35 mol of crosslinking agent per amine group of the polyaminoamide and acylated by the action of acrylic acid, chloroacetic acid or an alkane sultone, or salts thereof.

The saturated carboxylic acids are preferably chosen from acids containing 6 to 10 carbon atoms, such as adipic acid, -2,2,4-trimethyladipic acid, -2,4,4-trimethyladipic acid and terephthalic acid, and acids bearing an ethylenic double bond, for instance acrylic, methacrylic and itaconic acids.

The alkane sultones used in the acylation are preferably propane sultone or butane sultone; the salts of the acylating agents are preferably the sodium or potassium salts.

(4) polymers including zwitterionic units of formula (IV):



(IV)

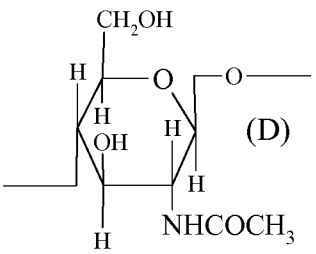
in which R_{11} denotes a polymerizable unsaturated group, such as an acrylate, methacrylate, acrylamide or methacrylamide group, y and z represent an integer from

1 to 3, R_{12} and R_{13} represent a hydrogen atom or a methyl, ethyl or propyl group, and R_{14} and R_{15} represent a hydrogen atom or an alkyl group such that the sum of the carbon atoms in R_{14} and R_{15} does not exceed 10.

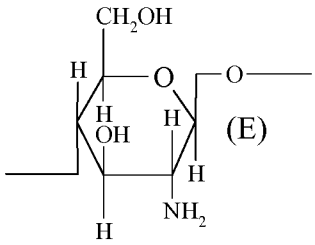
The polymers comprising such units may also include units derived from non-zwitterionic monomers such as dimethyl- or diethylaminoethyl acrylate or methacrylate or alkyl acrylates or methacrylates, acrylamides or methacrylamides or vinyl acetate.

Mention may be made, by way of example, of methyl methacrylate/methyl dimethylcarboxymethylammonioethyl methacrylate copolymers, such as the product sold under the name Diaformer Z-301N or Z-301W by the company Clariant (INCI name: Acrylates copolymer);

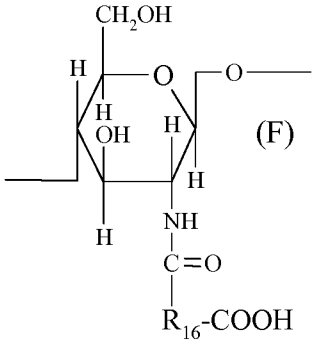
5) polymers derived from chitosan including monomer units corresponding to the following formulae:



(D)

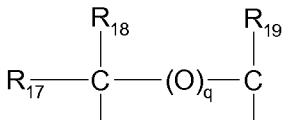


(E)



(F)

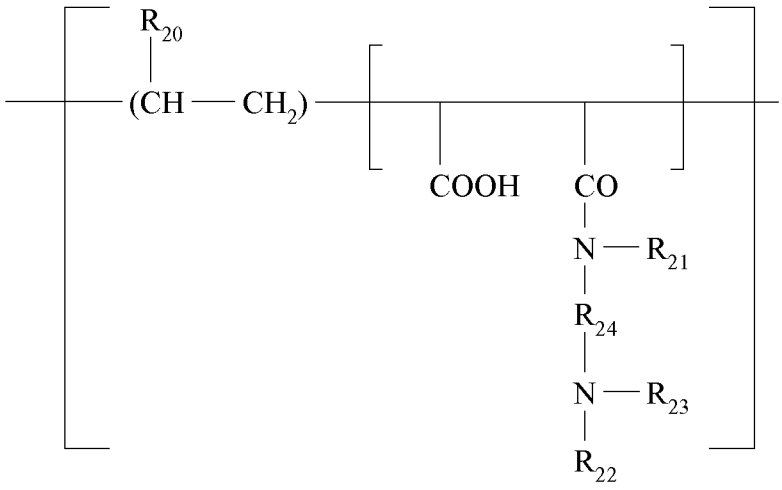
the unit (D) being present in proportions of between 0 and 30%, the unit (E) in proportions of between 5% and 50% and the unit (F) in proportions of between 30% and 90%, it being understood that, in this unit (F), R_{16} represents a group of formula:



in which, if q = 0, R_{17}, R_{18} and R_{19}, which may be identical or different, each represent a hydrogen atom, a methyl, hydroxyl, acetoxy or amino residue, a monoalkylamine residue or a dialkylamine residue that are optionally interrupted with one or more nitrogen atoms and/or optionally substituted with one or more amine, hydroxyl, carboxyl, alkylthio or sulfonic groups, an alkylthio residue in which the alkyl group bears an amino residue, at least one of the groups R_{17}, R_{18} and R_{19} being, in this case, a hydrogen atom;

or, if q = 1, R_{17}, R_{18} and R_{19} each represent a hydrogen atom, and also the salts formed by these compounds with bases or acids.

(6) polymers containing units corresponding to general formula (V) which are described, for example, in French patent 1 400 366:



(V)

in which R_{20} represents a hydrogen atom, a CH_3O, CH_3CH_2O or phenyl group, R_{21} denotes a hydrogen atom or a lower alkyl group such as methyl or ethyl, R_{22} denotes a hydrogen atom or a C_{1-6} lower alkyl group such as methyl or ethyl, R_{23} denotes a C_{1-6} lower alkyl group such as methyl or ethyl or a group corresponding to the formula: $-R_{24}-N(R_{22})_2$, with R_{24} representing a $-CH_2-CH_2-$, $-CH_2-CH_2-CH_2-$, or $-CH_2-CH(CH_3)-$ group and R_{22} having the meanings given above;

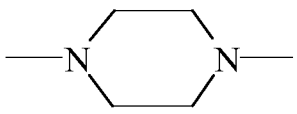
(7) polymers derived from the N-carboxyalkylation of chitosan, such as N-carboxymethyl chitosan or N-carboxybutyl chitosan, for instance the product sold under the name Chitoglycan by the company Sinerga SPA (INCI name: Carboxymethyl chitosan);

(8) amphoteric polymers of the -D-X-D-X- type chosen from:

a) polymers obtained by the action of chloroacetic acid or sodium chloroacetate on compounds comprising at least one unit of formula:

-D-X-D-X-D- (VI)

in which D denotes a group



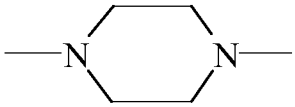
and X denotes the symbol E or E', where E and E', which may be identical or different, denote a divalent group that is an alkylene group with a straight or

branched chain including up to 7 carbon atoms in the main chain, which is unsubstituted or substituted with hydroxyl groups and which may include, in addition to oxygen, nitrogen and sulfur atoms, 1 to 3 aromatic and/or heterocyclic rings; the oxygen, nitrogen and sulfur atoms being present in the form of ether, thioether, sulfoxide, sulfone, sulfonium, alkylamine or alkenylamine groups, hydroxyl, benzylamine, amine oxide, quaternary ammonium, amide, imide, alcohol, ester and/or urethane groups;

b) polymers of formula:

-D-X-D-X- (VI')

in which D denotes a group



and X denotes the symbol E or E' and at least once E'; E having the meaning given above and E' being a divalent group that is an alkylene group with a straight or branched chain containing up to 7 carbon atoms in the main chain, which is unsubstituted or substituted with one or more hydroxyl groups and which includes one or more nitrogen atoms, the nitrogen atom being substituted with an alkyl chain that is optionally interrupted with an oxygen atom and which necessarily includes one or more carboxyl functions or one or more hydroxyl functions betainized by reaction with chloroacetic acid or sodium chloroacetate;

(9) (C_1-C_5)alkyl vinyl ether/maleic anhydride copolymers partially modified by semiamidation with an N,N-dialkylaminoalkylamine, such as N,N-dimethylaminopropylamine, or by semiesterification with an N,N-dialkylaminoalkanol. These copolymers may also comprise other vinyl comonomers, such as vinylcaprolactam.

According to a preferred embodiment of the invention, the amphoteric fixing polymer(s) are chosen from octylacrylamide/acrylates/butylaminoethyl methacrylate copolymers; methyl methacrylate/methyl dimethylcarboxymethyl ammonioethylmethacrylate copolymers; and mixtures thereof.

Preferably, when the amphoteric fixing polymer(s) are present in the composition according to the invention, the total content of the amphoteric fixing

polymer(s) present in the composition is between 0.1% and 20% by weight, more preferentially between 0.5% and 15% by weight, even more preferentially between 1% and 12% by weight and better still between 1.5% and 10% by weight, relative to the total weight of the composition.

According to a particular embodiment, the anhydrous composition may further comprises one or more nonionic fixing polymers.

Preferentially, the nonionic fixing polymers are chosen from:

- polyalkyloxazolines;
- vinyl acetate homopolymers;
- vinyl acetate copolymers, for instance copolymers of vinyl acetate and of acrylic ester, copolymers of vinyl acetate and of ethylene, or copolymers of vinyl acetate and of maleic ester, for example of dibutyl maleate;
- acrylic ester homopolymers and copolymers, for instance copolymers of alkyl acrylates and of alkyl methacrylates, such as the products provided by the company Röhm GmbH under the name Eudragit® NE 30D (INCI name: Acrylates copolymer);
- copolymers of acrylonitrile and of a nonionic monomer chosen, for example, from butadiene and alkyl (meth)acrylates;
- styrene homopolymers;
- styrene copolymers, for instance copolymers of styrene, of alkyl acrylate and of alkyl methacrylate; copolymers of styrene and of butadiene; or copolymers of styrene, of butadiene and of vinylpyridine;
- polyamides;
- vinyllactam homopolymers, such as the vinylpyrrolidone homopolymers sold, for example, under the names Luviskol® K30 powder by the company BASF or PVP K30L or K60 solution or K90 by the company ISP, or such as the polyvinylcaprolactam sold under the name Luviskol® Plus by the company BASF (INCI name: PVP);
- vinyllactam copolymers, such as a poly(vinylpyrrolidone/vinyllactam) copolymer sold under the trade name Luvitec® VPC 55K65W by the company BASF, poly(vinylpyrrolidone/vinyl acetate) copolymers, such as those sold under the name PVP/VA® S630L, E735, E635 and W735 by the company ISP, Luviskol® VA 73, VA 64 and VA 37 by the company BASF (INCI name:

VP/VA copolymer); and vinylpyrrolidone/methacrylamide/vinylimidazole terpolymers, for instance the product sold under the name Luviset® Clear by the company BASF (INCI name: VP/methacrylamide/vinylimidazole copolymer).

The alkyl groups of the nonionic polymers mentioned above preferably contain from 1 to 6 carbon atoms.

Use may also be made, according to the invention, of fixing polymers of grafted silicone type comprising a polysiloxane portion and a portion constituted of a non-silicone organic chain, one of the two portions constituting the main chain of the polymer and the other being grafted onto said main chain.

These polymers are described, for example, in the patent applications EP-A-0 412 704, EP-A-0 412 707, EP-A-0 640 105 and WO 95/00578, EP-A-0 582 152 and WO 93/23009, and the patents US 4 693 935, US 4 728 571 and US 4 972 037.

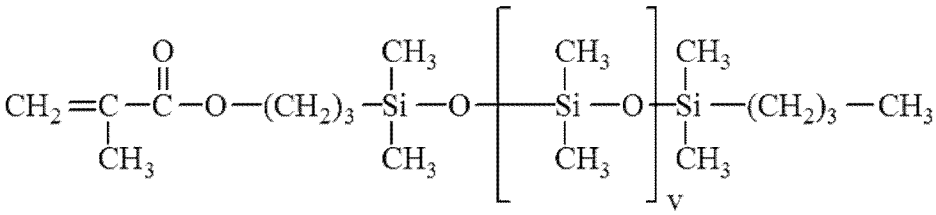
These polymers may be amphoteric, anionic or nonionic and they are preferably anionic or nonionic.

Such polymers are, for example, copolymers that may be obtained by free radical polymerization from the monomer mixture formed from:

a) 50% to 90% by weight of *tert*-butyl acrylate,

b) 0 to 40% by weight of acrylic acid,

c) 5% to 40% by weight of a silicone macromer of formula:



in which v is a number ranging from 5 to 700, the weight percentages being calculated relative to the total weight of the monomers.

Other examples of grafted silicone polymers are in particular polydimethylsiloxanes (PDMSs) to which mixed polymer units of the poly(meth)acrylic acid type and of the poly(alkyl (meth)acrylate) type are grafted via a thiopropylene-type connecting link and polydimethylsiloxanes (PDMSs) to which

polymer units of the poly(isobutyl (meth)acrylate) type are grafted via a thiopropylene-type connecting link.

Grafted silicone polymers are sold, for example, under the names Silicone Plus Polymer® VS80 and VA70 by 3M (INCI names: Polysilicone-8 and Polysilicone-7, respectively).

Another type of silicone fixing polymer that may be mentioned is the product Luviflex® Silk, sold by the company BASF (INCI name: PEG/PPG-25/25 dimethicone/acrylates copolymer).

Functionalized or non-functionalized, silicone or non-silicone, cationic, nonionic, anionic or amphoteric polyurethanes or mixtures thereof may also be used as fixing polymers.

The polyurethanes particularly targeted by the present invention are those described in the patent applications EP 0 751 162, EP 0 637 600, EP 0 648 485 and FR 2 743 297, of which the applicant is the proprietor, and also in the patent applications EP 0 656 021 and WO 94/03510 of BASF and EP 0 619 111 of National Starch.

As polyurethanes that are particularly suitable for use in the present invention, mention may be made of the products sold under the names Luviset Pur® and Luviset® Si Pur by the company BASF (INCI names: Polyurethane-1 and Polyurethane-6, respectively).

Preferably, when the nonionic fixing polymer(s) are present in the composition according to the invention, the total content of the nonionic fixing polymer(s) present in the composition is between 0.1% and 20% by weight, more preferentially between 0.5% and 15% by weight, even more preferentially between 1% and 12% by weight and better still between 1.5% and 10% by weight, relative to the total weight of the composition.

More preferentially, the fixing polymer(s) are chosen from anionic fixing polymers, amphoteric fixing polymers, and mixtures thereof.

According to a preferred embodiment of the invention, the fixing polymer(s) are chosen from acrylic acid copolymers; crotonic acid-based copolymers; polymers derived from maleic, fumaric or itaconic acids or anhydrides with vinyl esters, vinyl ethers, vinyl halides, phenylvinyl derivatives; acrylic acid and esters thereof;

copolymers of methacrylic acid and of ethyl acrylate; vinyl acetate/crotonic acid copolymers; vinyl acetate/crotonic acid copolymers grafted with polyethylene glycol; vinylpyrrolidone/acrylic acid/lauryl methacrylate terpolymers; AMP-acrylates/allyl methacrylate copolymer, vinyl acetate/crotonic acid/vinyl p-*tert*-butylbenzoate copolymers; octylacrylamide/acrylates/butylaminoethyl methacrylate copolymers; methyl methacrylate/methyl dimethylcarboxymethylammonioethylmethacrylate copolymers; and mixtures thereof.

According to another preferred embodiment of the invention, the total content of the fixing polymer(s) chosen from anionic fixing polymers, amphoteric fixing polymers and mixtures thereof present in the composition is between 0.1% and 20% by weight, more preferentially between 0.5% and 15% by weight, even more preferentially between 1% and 12% by weight and better still between 1.5% and 10% by weight, relative to the total weight of the composition.

Preferably, the total content of the fixing polymer(s) according to the invention present in the composition is between 0.1% and 20% by weight, more preferentially between 0.5% and 15% by weight, even more preferentially between 1% and 12% by weight, even better still between 1.5% and 10% by weight, relative to the total weight of the composition.

The lamellar particulate materials

The composition according to the invention comprises one or more lamellar particulate materials.

The term “lamellar particulate material” means a particulate material for which one of the dimensions is smaller than the other two.

Such lamellar particulate materials usually have a thickness E that is smaller than their length L1 and their width L2. In the case of circular particles, the length L1 and the width L2 represent the diameter D of the particle.

Preferably, the ratio E/L1 and the ratio E/L2 are less than or equal to 0.5, more preferentially less than or equal to 0.3 and even more preferentially less than or equal to 0.1.

The mean thickness E of the lamellar particulate materials may range from 0.1 to 2 μm and preferably from 0.2 to 1.5 μm.

The mean length L1 of the lamellar particulate materials may range from 1 to 200 μm, preferably from 1 to 100 μm, and more preferentially from 1 to 60 μm.

The mean width L2 of the lamellar particulate materials may range from 1 to 200 μm, preferably from 1 to 100 μm, and more preferentially from 1 to 60 μm.

The lamellar particulate material(s) used according to the invention may be mineral or organic.

Examples of lamellar particulate materials include fillers, pigments, which are especially mineral, and nacres. Lamellar fillers and/or lamellar nacres may be used.

As examples of lamellar fillers that are suitable for use in the invention, mention may be made of talc, barium sulfate, kaolin, precipitated calcium carbonate, magnesium carbonate, magnesium hydrogen carbonate, hydroxyapatite, lauroyl lysine, glass, polytetrafluoroethylene (PTFE) particles (for instance Ceridust 9205 F from Clariant, or Fluoropure 103 C from Shamrock Technologies), boron nitride (for instance Softouch boron nitride powder CC6058 from Momentive Performance Materials, Ceram Blanche 1 and Ceram Blanche by the company SPCI and PUHP by the company Saint-Gobain Ceramics), mica, lamellar silica (SG Flake 3M from the companies Maprecos and Chemicelen from Sumitomo), and mixtures thereof.

As examples of lamellar nacres that are suitable for use in the invention, mention may be made especially of bismuth oxychloride, mica coated with titanium or with bismuth oxychloride (Biron LF 2000 from Merck), bismuth oxychloride and zinc oxide powder (such as Pearl II UCR from Farmaquimia), and mixtures thereof.

As examples of mineral pigments in lamellar form that may be used according to the invention, mention may be made especially of zirconium oxides, aluminium oxides, and a mixture thereof.

As other lamellar particulate materials which may be in lamellar form and which may be used according to the invention, mention may be made of muscovite, phlogopite, tiotite, sericite, lepidolite, paragonite, margarite and roscoelite.

Preferably, the composition according to the invention comprises one or more lamellar particulate materials chosen from talc, barium sulfate, kaolin, precipitated calcium carbonate, magnesium carbonate, magnesium hydrogen carbonate, hydroxyapatite, lauroyl lysine, glass, polytetrafluoroethylene (PTFE) particles, boron nitride, lamellar silica, bismuth oxychloride, bismuth oxychloride

and zinc oxide powder, zirconium oxides, aluminium oxides, mica, muscovite, phlogopite, tiotite, sericite, lepidolite, paragonite, margarite and roscoelite; optionally at least partially covered with a layer of metallic material; and mixtures thereof.

More preferentially, the composition according to the invention comprises one or more lamellar particulate materials chosen from boron nitride, mica, lauroyl lysine, and mixtures thereof; even more preferentially, the composition according to the invention comprises boron nitride.

Advantageously according to this preference, when the composition comprises boron nitride, the total content of boron nitride is between 0.05% and 5% by weight, more preferentially between 0.1% and 4.5% by weight, even more preferentially between 0.5% and 4% by weight and better still between 0.75% and 3.75% by weight relative to the total weight of the composition.

Preferably, the lamellar particulate material(s) mentioned above are at least partially covered with a layer of metallic material.

More preferentially according to this preference, said metallic material(s), at least partially covering the lamellar particulate material(s) mentioned above, are chosen from metal oxides such as titanium oxides (TiO_2), iron oxides (Fe_2O_3), tin oxides, chromium oxides, bismuth oxychloride, barium sulfates, and the following materials: MgF_2, CrF_3, ZnS, ZnSe, SiO_2, Al_2O_3, MgO, Y_2O_3, SeO_3, SiO, HfO_2, ZrO_2, CeO_2, Nb_2O_5, Ta_2O_5, MoS_2, and mixtures thereof.

Preferably, the lamellar particulate material(s) present in the composition according to the invention represent a total content of between 0.05% and 5% by weight, more preferentially between 0.1% and 4.5% by weight, even more preferentially between 0.5% and 4% by weight, even better still between 0.75% and 3.75% by weight, relative to the total weight of the composition.

According to a preferred embodiment of the invention, the weight ratio between the content of lamellar particulate material(s) present in the composition, on the one hand, and the total content of fixing polymer(s) chosen from anionic fixing polymers, amphoteric fixing polymers and mixtures thereof present in the composition, on the other hand, is less than or equal to 1, more preferentially between

0.05 and 0.75; even more preferentially between 0.10 and 0.60; better still between 0.15 and 0.50.

According to another preferred embodiment of the invention, the weight ratio between the content of lamellar particulate material(s) present in the composition, on the one hand, and the total content of fixing polymer(s) present in the composition, on the other hand, is less than or equal to 1, more preferentially between 0.05 and 0.75; even more preferentially between 0.10 and 0.60; better still between 0.15 and 0.50.

The organic solvents

The composition according to the present invention comprises one or more organic solvents.

According to the invention, an organic solvent is liquid at room temperature (25°C) and atmospheric pressure (760 mmHg).

Preferably, the organic solvent(s) are chosen from linear or branched monoalcohols containing from 1 to 8 carbon atoms, polyols, polyethylene glycols, aromatic alcohols, and mixtures thereof.

More preferentially, the organic solvent(s) are chosen from ethanol, propanol, butanol, isopropanol, isobutanol, propylene glycol, dipropylene glycol, isoprene glycol, butylene glycol, glycerol, sorbitol, benzyl alcohol and phenoxyethanol, and mixtures thereof.

Even more preferentially, the organic solvent(s) are chosen from ethanol, dipropylene glycol and benzyl alcohol, and mixtures thereof.

Preferably, the organic solvent(s) present in the composition according to the invention represent a total content ranging from 10% to 95% by weight, more preferentially from 20% to 90% by weight and even more preferentially from 30% to 85% by weight, relative to the total weight of the composition.

The propellants

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

The propellant(s) that may be used according to the invention are preferably chosen from liquefied gases such as dimethyl ether, chlorinated and/or fluorinated hydrocarbons such as trichlorofluoromethane, dichlorodifluoromethane, chlorodifluoromethane, 1,1,1,2-tetrafluoroethane, chloropentafluoroethane, 1-chloro-1,1-difluoroethane or 1,1-difluoroethane, or volatile hydrocarbons especially such as C_3-C_5 alkanes, for instance propane, isopropane, n-butane, isobutane or pentane.

According to one preferred embodiment of the invention, the propellant(s) are chosen from volatile, optionally halogenated hydrocarbons, for example n-butane, propane, isobutane, pentane and halogenated derivatives thereof; dimethyl ether; and mixtures thereof; more preferentially from dimethyl ether, C_3-C_5 alkanes, in particular propane, n-butane and isobutane, and mixtures thereof.

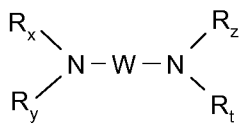
Preferably, the content of the propellant(s) present in the composition is between 1% and 90% by weight, more preferentially between 10% and 80% by weight, even more preferentially between 20% and 60% by weight, even better still between 30% and 50% by weight, relative to the total weight of the composition.

The organic alkaline agents

The composition according to the present invention may optionally also comprise one or more organic alkaline agents.

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

The organic alkaline agent(s) are preferably chosen from alkanolamines, in particular mono-, di- or tri- hydroxy(C_1-C_6)alkylamines, such as 2-amino-2-methylpropanol, oxyethylenated and/or oxypropylenated ethylenediamines, amino acids, the polyamines of formula (VII) below, and mixtures thereof:



(VII)

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

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

The term "alkanolamine" means an organic amine comprising a primary, secondary or tertiary amine function, and one or more linear or branched C_1 to C_8 alkyl groups bearing one or more hydroxyl radicals.

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

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

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

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

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

Such basic amino acids are preferably chosen from those corresponding to formula (VIII) below, and also salts thereof:

$R\text{-}CH_2\text{-}CH(NH_2)\text{-}C(O)\text{-}OH$ (VIII)

in which formula (VIII) R represents a group chosen from imidazolyl, preferably imidazolyl-4-yl; aminopropyl; aminoethyl; $-(CH_2)_2N(H)\text{-}C(O)\text{-}NH_2$; and $-(CH_2)_2\text{-}N(H)\text{-}C(NH)\text{-}NH_2$.

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

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

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

Preferably, the alkaline agent(s) that are useful in the invention are chosen from aqueous ammonia, alkanolamines, amino acids in neutral or ionic form, in particular basic amino acids, and preferably corresponding to those of formula (VIII).

According to a preferred embodiment of the invention, the organic alkaline agent(s) are chosen from monoethanolamine, diethanolamine, triethanolamine, monoisopropanolamine, diisopropanolamine, N,N-dimethylethanolamine, 2-amino-2-methyl-1-propanol, triisopropanolamine, 2-amino-2-methyl-1,3-propanediol, 3-amino-1,2-propanediol, 3-dimethylamino-1,2-propanediol and tris(hydroxymethyl)aminomethane, and mixtures thereof; more preferentially, the organic alkaline agent is 2-amino-2-methyl-1-propanol.

Preferably, when the organic alkaline agent(s) are present in the composition, the total content of the organic alkaline agent(s) is between 0.1% and

10% by weight, more preferentially between 0.3% and 10% by weight, and even more preferentially between 0.4% and 5% by weight, relative to the total weight of the composition.

The composition according to the invention may optionally also comprise one or more additives, for instance anticaking agents, natural or synthetic thickeners or viscosity regulators other than the fixing polymers described previously; vitamins or provitamins; silicones; preserving agents; dyes; fragrances.

A person skilled in the art will take care to select the optional additives and the amount thereof such that they do not harm the properties of the composition of the present invention.

These additives may be present in the composition according to the invention in an amount ranging from 0 to 20% by weight, relative to the total weight of the composition.

The composition according to the invention is anhydrous. According to the invention, the term "anhydrous" means that the composition according to the invention comprises no water, or that the composition comprises less than 5% by weight, preferably less than 2% by weight, preferentially less than 1% by weight, more preferentially less than 0.5% by weight, better still less than or equal to 0.1% by weight, of water relative to the total weight of the composition. In particular, the composition does not include added water, the possible presence of water being linked to the commercial raw materials used.

According to a variant of the invention, the composition according to the invention comprises water, preferably in a total content of between 20% and 95% by weight, more preferentially between 30% and 90% by weight and even more preferentially between 40% and 85% by weight, relative to the total weight of the composition.

When the composition according to the invention is aqueous, the pH of the composition according to the invention generally ranges from 3 to 12, preferably from 4 to 11, preferentially from 5 to 10 and better still from 6 to 9.

The pH of the composition may be adjusted to the desired value by means of basifying agents especially as described previously or of acidifying agents that are

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

As a variant of the invention, another subject of the present invention is a composition according to the invention comprising:

- one or more fixing polymers chosen from anionic fixing polymers and amphoteric fixing polymers, as described previously, and mixtures thereof;
- one or more lamellar particulate materials as described previously, in a total content between 0.5% and 4.5% by weight, more preferentially between 0.5% and 4% by weight, and even more preferentially between 0.75% and 3.75% by weight, relative to the total weight of the composition;
- one or more organic solvents as described previously; and
- one or more propellants, as described previously.

A subject of the present invention is also the use of the composition as described previously, for shaping and/or styling keratin fibres, in particular human keratin fibres such as the hair.

A subject of the present invention is also a process for the treatment of, preferably for shaping and/or styling, keratin fibres, in particular human keratin fibres such as the hair, comprising at least one step of applying to said keratin fibres a composition as described previously.

Preferably, the keratin fibres are not rinsed after the step(s) of applying the composition according to the invention.

In a first embodiment of the process according to the invention, the composition is applied to wet hair.

In a second embodiment of the process according to the invention, the composition is applied to dry hair.

Preferably, the composition is applied to dry hair.

Another subject of the present invention relates to an aerosol device comprising a composition as described previously.

Preferably, the aerosol device is intended for treating keratin fibres, in particular human keratin fibres such as the hair; more preferentially intended for shaping and/or styling said keratin fibres.

The composition according to the invention is advantageously packaged under pressure, in an aerosol device, for example a monobloc device, which comprises a spraying means and a container.

The spraying means is generally constituted of a dispensing valve controlled by a dispensing head, which itself comprises a nozzle via which the composition of the invention is sprayed.

The container containing the pressurized composition may be opaque or transparent. It may be made of glass, polymer or metal, and may optionally be coated with a protective varnish coat.

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

EXAMPLE:

A composition (A) according to the invention and a comparative composition (B) were prepared using the following ingredients, the contents of which are indicated in the tables below (as g of active material).

Example 1:

Ingredients	Composition (A) (Invention)	Composition (B) (Outside the invention)
N-Octylacrylamide/methyl methacrylate/hydroxypropyl methacrylate/acrylic acid/t-butylaminoethyl methacrylate copolymer	5	5
Boron nitride (5-15 µm)	1.25	-
2-Amino-2-methyl-1-propanol	0.82	0.82
Ethyl alcohol	qs 100	qs 100
Dimethyl ether	45	45

Each of the compositions (A) and (B) is packaged in a separate aerosol device constituted of an aluminium can with a maximum filling volume of 150 mL, and a means for spraying the composition.

The means for spraying the composition is constituted especially by:

- a Coster valve of reference C30585, i.e.: Nozzle 2 orifices ×0.5 mm/internal restriction: 0.8 mm/additional gas intake 0.4 mm; and
- a diffuser of reference DSCO 425 (V04.776 BC/BC) i.e.: 3.9 mm direct outlet push button.

Each of the compositions (A) and (B) is sprayed per half-head onto nine models, at a rate of 3 seconds of spraying per half-head.

The fixing power (lacquering power, helmet effect) was evaluated just after application, and then 4 hours after application.

Just after application, the fixing power imparted by composition (A) according to the invention was judged to be superior to that imparted by the comparative composition (B) in six out of nine cases.

Four hours after the application, the fixing power (lacquering power) imparted by composition (A) according to the invention was judged to be superior to that imparted by the comparative composition (B) in seven out of nine cases.

Furthermore, less friability of composition (A) according to the invention was observed in comparison with the comparative composition (B).

Composition (A) according to the invention has improved hairstyle shape fixing and hold over time relative to the comparative composition (B).

Example 2:

The compositions (C), (D) and (E) according to the invention were prepared using the following ingredients. The contents of which are indicated in the tables below (as g of active material).

Ingredients	Composition (C) (Invention)
Octylacrylamide/acrylates/butylaminoethyl methacrylate copolymer	5
Mica	1.25
2-Amino-2-methyl-1-propanol	0.8
Ethyl alcohol	qs 100
Dimethyl ether	45

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Ingredients	Composition (D) (Invention)
VA/crotonates/vinyl neodecanoate copolymer	5
Mica	1.25
2-Amino-2-methyl-1-propanol	0.52
Ethyl alcohol	qs 100
Dimethyl ether	45

Ingredients	Composition (E) (Invention)
Acrylates/t-butylacrylamide copolymer	5
Lauroyl lysine	2.5
2-Amino-2-methyl-1-propanol	0.61
Ethyl alcohol	qs 100
Dimethyl ether	45

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The compositions (C), (D) and (E) are packaged in standard aerosol devices and then applied to the hair.

The compositions (C), (D) and (E) according to the invention provide a very good fixation and a very good hold of the hairstyle.

CLAIMS

1. Anhydrous composition comprising:
- one or more fixing polymers chosen from anionic fixing polymers, amphoteric fixing polymers, and mixtures thereof;
- one or more lamellar particulate materials;
- one or more organic solvents; and
- one or more propellants.

2. Composition according to the preceding claim, characterized in that the anionic fixing polymer(s) are chosen from acrylic acid copolymers; crotonic acid-based copolymers; polymers derived from maleic, fumaric or itaconic acids or anhydrides with vinyl esters, vinyl ethers, vinyl halides, phenylvinyl derivatives; acrylic acid and esters thereof; copolymers of methacrylic acid and of ethyl acrylate; vinyl acetate/crotonic acid copolymers; vinyl acetate/crotonic acid copolymers grafted with polyethylene glycol; vinylpyrrolidone/acrylic acid/lauryl methacrylate terpolymers; AMP-acrylates/allyl methacrylate copolymer, vinyl acetate/crotonic acid/vinyl p-*tert*-butylbenzoate copolymers; and mixtures thereof.

3. Composition according to Claim 1, characterized in that the amphoteric fixing polymer(s) are chosen from octylacrylamide/acrylates/butylaminoethyl methacrylate copolymers; methyl methacrylate/methyl dimethylcarboxymethyl ammonioethylmethacrylate copolymers; and mixtures thereof.

4. Composition according to Claim 1, characterized in that the fixing polymer(s) are chosen from acrylic acid copolymers; crotonic acid-based copolymers; polymers derived from maleic, fumaric or itaconic acids or anhydrides with vinyl esters, vinyl ethers, vinyl halides, phenylvinyl derivatives; acrylic acid and esters thereof; copolymers of methacrylic acid and of ethyl acrylate; vinyl acetate/crotonic acid copolymers; vinyl acetate/crotonic acid copolymers grafted with polyethylene glycol; vinylpyrrolidone/acrylic acid/lauryl methacrylate terpolymers; AMP-acrylates/allyl methacrylate copolymer, vinyl acetate/crotonic acid/vinyl p-*tert*-butylbenzoate copolymers; octylacrylamide/acrylates/butylaminoethyl methacrylate

copolymers; methyl methacrylate/methyl dimethylcarboxymethylammonioethyl-methacrylate copolymers; and mixtures thereof.

5. Composition according to any one of the preceding claims, characterized in that the total content of the fixing polymer(s) is between 0.1% and 20% by weight, more preferentially between 0.5% and 15% by weight, even more preferentially between 1% and 12% by weight, and better still between 1.5% and 10% by weight, relative to the total weight of the composition.

6. Composition according to any one of the preceding claims, characterized in that the lamellar particulate material(s) are chosen from talc, barium sulfate, kaolin, precipitated calcium carbonate, magnesium carbonate, magnesium hydrogen carbonate, hydroxyapatite, lauroyl lysine, glass, polytetrafluoroethylene (PTFE) particles, boron nitride, lamellar silica, bismuth oxychloride, bismuth oxychloride and zinc oxide powder, zirconium oxides, aluminium oxides, mica, muscovite, phlogopite, tiotite, sericite, lepidolite, paragonite, margarite and roscoelite; and mixtures thereof.

7. Composition according to the preceding claim, characterized in that the lamellar particulate material(s) are chosen from boron nitride, mica, lauroyl lysine, and mixtures thereof; preferably, the composition comprises boron nitride.

8. Composition according to any one of the preceding claims, characterized in that the total content of the lamellar particulate material(s) is between 0.05% and 5% by weight, preferably between 0.1% and 4.5% by weight, more preferentially between 0.5% and 4% by weight and even more preferentially between 0.75% and 3.75% by weight, relative to the total weight of the composition.

9. Composition according to any one of the preceding claims, characterized in that the organic solvent(s) are chosen from ethanol, propanol, butanol, isopropanol, isobutanol, propylene glycol, dipropylene glycol, isoprene glycol, butylene glycol, glycerol, sorbitol, benzyl alcohol, phenoxyethanol, and mixtures thereof; more preferentially from ethanol, dipropylene glycol, benzyl alcohol, and mixtures thereof; preferably, the total content of the organic solvent(s) is between 10% and 95% by weight, more preferentially between 20% and 90% by

weight, even more preferentially between 30% and 85% by weight, relative to the total weight of the composition.

10. Composition according to any one of the preceding claims, characterized in that the propellant(s) are chosen from volatile, optionally halogenated hydrocarbons, for example n-butane, propane, isobutane, pentane and halogenated derivatives thereof; dimethyl ether; and mixtures thereof; more preferentially from dimethyl ether, C_3-C_5 alkanes, in particular propane, n-butane and isobutane, and mixtures thereof; preferably, the content of the propellant(s) is between 1% and 90% by weight, more preferentially between 10% and 80% by weight, even more preferentially between 20% and 60% by weight, better still between 30% and 50% by weight, relative to the total weight of the composition.

11. Use of the composition as defined according to any one of Claims 1 to 10, for shaping and/or styling of keratin fibres, in particular human keratin fibres such as the hair.

12. Process for the treatment of, preferably for shaping and/or styling, keratin fibres, in particular human keratin fibres such as the hair, comprising at least one step of applying to said keratin fibres a composition as defined according to any one of Claims 1 to 10.

13. Aerosol device comprising a composition as defined according to any one of Claims 1 to 10; preferably intended for treating keratin fibres, in particular human keratin fibres such as the hair; more preferentially intended for shaping and/or styling said keratin fibres.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/086562

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61Q5/06 A61K8/04 A61K8/19 A61K8/02 A61K8/81
A61K8/33 A61K8/34
ADD.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DATABASE GNPD [Online] MINTEL; 24 November 2016 (2016-11-24), anonymous: "Volume Boosting Set", XP055505695, retrieved from www.gnpd.com Database accession no. 3920455 abstract pages 1, 4 -----	1-13
Y	WO 02/096379 A1 (OREAL [FR]; BELLI EMMANUELLE [FR]; PATAUT FRANCOISE [FR]; NOCERINO CEC) 5 December 2002 (2002-12-05) page 2, line 5 - line 21 page 3, line 1 - line 20 page 34 ----- -/--	1-13

[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 application or patent but published on or after the international filing date

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

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

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

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

"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
5 February 2019	14/02/2019

Name and mailing address of the ISA/	Authorized officer
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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	WO 2013/167530 A2 (OREAL [FR]) 14 November 2013 (2013-11-14) page 22, line 10 - page 23, line 3	1-13
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2018/086562

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