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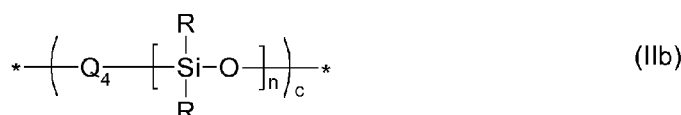
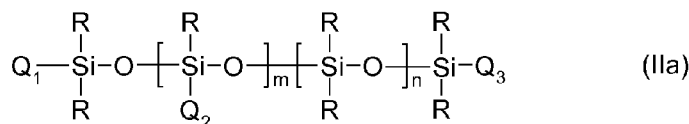
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(54) Title: COSMETIC COMPOSITION COMPRISING A POLYSILOXANE AND A POLYMER BOTH BEARING A HYDROGEN-BOND-GENERATING JOINING GROUP, AND COSMETIC TREATMENT PROCESS



(57) Abstract: The present invention relates to a cosmetic composition comprising: a) at least one polysiloxane bearing a joining group, corresponding to one of the following formulae (IIa) and (IIb): in which: - the R radicals represent a C<sub>1</sub>-C<sub>20</sub> hydrocarbon-based group; - the Q<sub>1</sub>, Q<sub>2</sub> and Q<sub>3</sub> radicals represent either an R radical as defined above; or a joining group capable of forming at least 3 H bonds; it being understood that at least one of the Q<sub>1</sub> to Q<sub>3</sub> radicals is other than R in formula (IIa); - the Q<sub>4</sub> divalent radical represents a joining group capable of forming at least 3 H bonds; b) a polyalkene-based supramolecular polymer which can be obtained by reaction of a functionalised polyalkene polymer with a functionalised joining group, said joining group being capable of forming at least 3 H (hydrogen) bonds. The invention also relates to a cosmetic treatment process using said composition.

**Cosmetic composition comprising a polysiloxane and a polymer both bearing a hydrogen-bond-generating joining group, and cosmetic treatment process**

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The present invention relates to novel cosmetic compositions comprising a mixture of H-bond-generating polymers and to the use thereof in the cosmetics industry, in particular in the makeup field.

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Generally, when women use a makeup product, they want this product to exhibit, after application, good staying power on keratin materials, in particular the skin and/or the lips, and in particular good resistance to grease and to wear, and advantageously good transfer-free properties.

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With regard to this expectation, one or more polymers which are specifically dedicated to providing these properties of improved staying power over time is (are) commonly introduced into compositions of this type.

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By way of illustration of these polymers, mention may in particular be made of polyacrylates and latexes. However, the abovementioned polymers, which are advantageous in terms of staying power properties, are unfortunately capable of generating a feeling of discomfort, during application (difficult spreading, tackiness) and/or after application (tautness, mask effect), of the cosmetic product containing them.

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Supramolecular polymers such as those described in applications EP 2189151 and FR 2938758 are, on the other hand, known for making it possible to obtain, on the skin, a deposit which is both comfortable and has good staying power properties. However, the deposits formed using a galenical formulation incorporating such a supramolecular polymer may have insufficient mechanical strength (which can be reflected by staining of the clothes). Moreover, bringing them into contact with fatty substances, for example a food oil in the case of a lipstick applied to the lips, can affect their integrity. Consequently, there remains a need to be free of these drawbacks with respect to supramolecular polymer-based galenic formulations.

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Moreover, many cosmetic compositions exist for which properties of gloss of the deposited film, after application to keratin materials, are desired. Mention may, for example, be made of lipsticks or nail varnishes. In order to obtain such a result, it is possible to combine particular starting materials, in particular lanolins, with "glossy" oils.

In order to improve the gloss and the staying power over time of the deposited film, it has also been proposed to use oils of triglyceride type, in the case in point

castor oil, functionalised with isophorone diisocyanate (IPDI), as is described in US 5 707 612. The functionalisation with IPDI substantially improves the staying power and the gloss of castor oil; the oils thus crosslinked find an application in particular in the lipstick field.

5 Application EP2140858 has also proposed cosmetic compositions which make it possible to obtain a uniform, film-forming deposit on the substrate, said film allying gloss, gloss fastness and staying power of the composition, while at the same being relatively non-tacky. These effects are obtained through the use of generally solid, functionalised oils which can be obtained by reaction between an oil bearing  
10 a nucleophilic and/or electrophilic reactive function and a joining group capable of establishing hydrogen bonds with one or more partner joining groups, said joining group bearing a reactive function capable of reacting with the reactive function borne by the oil, said joining group also comprising a unit of ureidopyrimidone type.

15 As illustrated in this application, these functionalised oils make it possible to form a cohesive and uniform film or deposit, which does not transfer to the fingers, and which is particularly glossy, said gloss being preserved over time. However, it has been noted that the deposits obtained with these functionalised oils can be more or less tacky and exhibit a certain amount of fragility with respect to wear;  
20 moreover, it has been found that these deposits exhibit, in addition to their tacky nature, a not insignificant sensitivity to fatty substances, in particular over time.

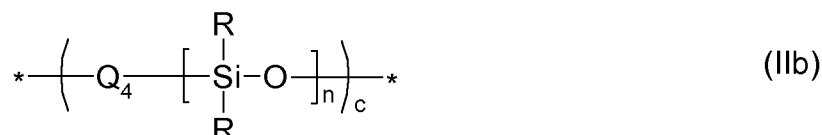
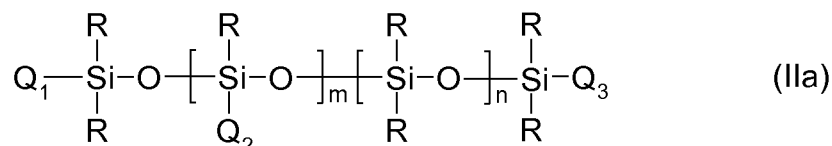
Polysiloxanes bearing H (hydrogen) bond-generating groups and which can be used in the cosmetics field as medium-thickening agents are also known, from application WO2004/052963. However, this document in no way mentions any  
25 possible cosmetic advantages linked to the use of these polysiloxanes.

Now, polymeric or nonpolymeric materials capable of generating deposits which exhibit good resistance, and therefore a certain staying power, with respect to external attacks, in particular to "attacks" by fatty substances, for instance by food oil or sebum, while at the same time preferably retaining their gloss, are sought in  
30 particular in the makeup field.

The objective of the present invention is to overcome these drawbacks and to propose a cosmetic composition which makes it possible to obtain good cosmetic properties such as good adhesion to the support (in particular skin, lips or hair)  
35 and therefore good staying power of the composition, optionally good gloss, while at the same time also resulting in a deposit which is not very tacky or not at all tacky and particularly resistant to external attacks by fatty substances (oil, meal, sebum) and also to rubbing, hence the deposit being worn away to a lesser extent.

A subject of the present invention is a cosmetic composition comprising, in a cosmetically acceptable medium:

- a) at least one polysiloxane bearing a joining group, corresponding to one of the following formulae (IIa) and (IIb):



in which:

- the R radicals, which may be identical or different, represent a linear, branched and/or cyclic, saturated or unsaturated, optionally aromatic, C<sub>1</sub>-C<sub>20</sub> monovalent hydrocarbon-based (in particular alkyl) group which may contain one or more heteroatoms chosen from O, S and N;

- the Q<sub>1</sub>, Q<sub>2</sub> and Q<sub>3</sub> radicals, which may be identical or different, and which are monovalent, represent either an R radical as defined above; or a joining group capable of forming at least 3 H (hydrogen) bonds, preferably at least 4 H bonds, and even better still 4 H bonds;

it being understood that at least one of the Q<sub>1</sub> to Q<sub>3</sub> radicals is other than R in formula (IIa);

- the divalent Q<sub>4</sub> radical represents a joining group capable of forming at least 3 H (hydrogen) bonds, preferably at least 4 H bonds, and even better still 4 H bonds;

- n is an integer between 2 and 1000;

- m is an integer between 0 and 300;

- c is an integer between 1 and 300;

- and m, n and c being such that the number-average molecular weight (M<sub>n</sub>) of the functionalised polysiloxane (IIa) or (IIb) is between 500 and 100 000; and

- b) at least one polyalkene-based supramolecular polymer capable of resulting from the reaction, in particular from the condensation, of at least one polyalkene polymer functionalised with at least one reactive function, with at least one joining group functionalised with at least one reactive group capable of reacting with the reactive group(s) borne by the functionalised polyalkene polymer, said joining group being capable of forming at least 3 H (hydrogen) bonds, preferably at least 4 H bonds, preferentially 4 H bonds.

By virtue of the invention, compositions of which the comfort is improved are obtained; they make it possible to obtain a deposit which is relatively non-tacky, and which may be optionally glossy, while at the same time also being resistant to fatty substances and to mechanical wear.

Moreover, it has been noted that the polymers used in the context of the invention may not be initially compatible with one another, and may not be readily carried in the usual cosmetic media, in particular the usual solvent or oily cosmetic media, such as carbon-based oils, fatty alcohols, fatty or short esters, alkanes or silicone oils.

Supramolecular chemistry makes it possible, through the supramolecular interactions, to mix (polymeric or nonpolymeric) compounds of different chemical natures and to obtain original properties different from those of the compounds used before mixing.

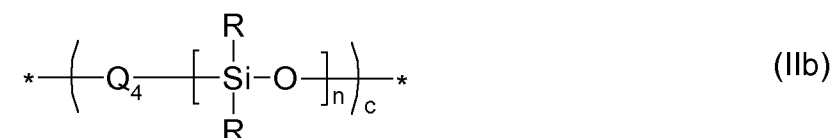
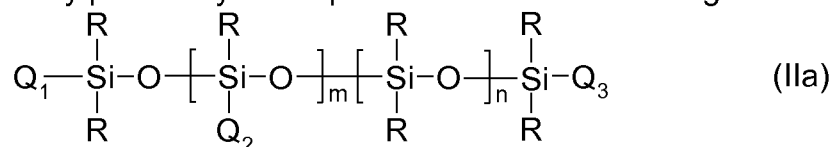
Thus, in the context of the present invention, it has been shown that, in certain cases, it is possible to improve the resistance to wear and the sensitivity to fatty substances of given polymers, by formulating them as a mixture with other polymers which are themselves not very resistant to wear and/or sensitive to fatty substances, without modifying the other properties of the polymers alone, for example retaining their gloss properties. It has, moreover, been possible to demonstrate improved transfer-free and reduced tack properties.

The cosmetic compositions according to the invention therefore comprise a functionalised polysiloxane, i.e. a polysiloxane bearing at least one joining group. Said polysiloxane is capable of generating H (hydrogen) bonds.

### **Functionalised polysiloxane**

The functionalised polysiloxanes according to the present invention are in particular described in patent application WO2004/052963.

They preferably correspond to one of the following formulae (IIa) and (IIb):



in which:

- the R radicals, which may be identical or different, represent a linear, branched and/or cyclic, saturated or unsaturated, optionally aromatic, C<sub>1</sub>-C<sub>20</sub> monovalent hydrocarbon-based (in particular alkyl) group which may contain one or more heteroatoms chosen from O, S and N;
  - 5 - the Q<sub>1</sub>, Q<sub>2</sub> and Q<sub>3</sub> radicals, which may be identical or different, and which are monovalent, represent either an R radical as defined above; or a joining group capable of forming at least 3 H (hydrogen) bonds, preferably at least 4 H bonds, and even better still 4 H bonds;  
it being understood that at least one of the Q<sub>1</sub> to Q<sub>3</sub> radicals is other than R in  
10 formula (IIa);
  - the divalent Q<sub>4</sub> radical represents a joining group capable of forming at least 3 H (hydrogen) bonds, preferably at least 4 H bonds, and even better still 4 H bonds;
  - n is an integer between 2 and 1000;
  - m is an integer between 0 and 300;
  - 15 - c is an integer between 1 and 300;
- and m, n and c being such that the number-average molecular weight (M<sub>n</sub>) of the functionalised polysiloxane (IIa) or (IIb) is between 500 and 100 000.

20 In the formulae above, it is clear that the Q<sub>1</sub> to Q<sub>4</sub> radicals are connected via a silicon-carbon bond to the polysiloxane backbone (or chain), it being possible for said bond to be direct or via a linker such as R<sub>1</sub>, as explained hereinafter.

Preferably, m, n and c are chosen such that the number-average molecular weight of the functionalised polysiloxane (IIa) or (IIb) is between 500 and 100 000, in  
25 particular between 1000 and 50 000, or even between 2000 and 25 000, even better still between 3000 and 15 000.

Preferably, m is between 1 and 50, or even 2 and 20, even better still 3 and 15.

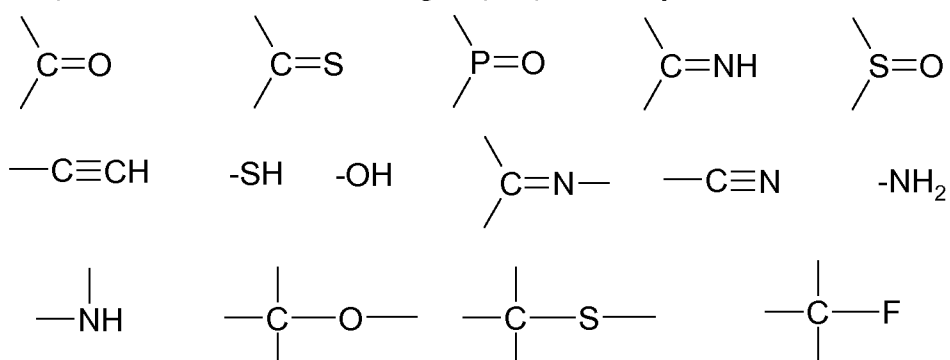
Preferably, n is between 3 and 700, in particular 5 and 400, or even 10 and 200, even better still 20 and 100.

30 Preferably, c is between 2 and 150, better still between 3 and 80, even better still between 4 and 20.

Preferably, the R radical may be a C<sub>1</sub>-C<sub>20</sub>, in particular C<sub>1</sub>-C<sub>12</sub>, linear alkyl group; a C<sub>3</sub>-C<sub>20</sub>, in particular C<sub>3</sub>-C<sub>12</sub>, branched alkyl group; a C<sub>4</sub>-C<sub>20</sub>, in particular C<sub>4</sub>-C<sub>10</sub>, cycloalkyl group; a C<sub>4</sub>-C<sub>20</sub>, in particular C<sub>4</sub>-C<sub>10</sub>, aryl group; a C<sub>5</sub>-C<sub>20</sub>, in particular  
35 C<sub>5</sub>-C<sub>10</sub>, arylalkyl group; these groups being optionally substituted with an NH<sub>2</sub> and/or OH function. The R radical may in particular be chosen from methyl, ethyl, propyl, butyl, isobutyl, pentyl, hexyl, octyl, decyl, dodecyl, octadecyl, cyclohexyl, phenyl, naphthyl, benzyl, phenylethyl, tolyl or xylyl radicals. Preferably, all the R

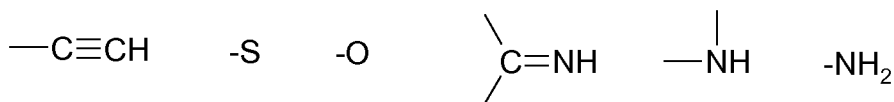
radicals are identical; preferentially, R is a methyl radical.

For the purpose of the invention, the term "joining group" is intended to mean any group comprising H-bond-donating or -accepting groups and capable of establishing at least three H bonds, preferably at least 4 H bonds, preferentially 4 H bonds, with a partner joining group, which may or may not be identical. These joining groups may be lateral to the polymer backbone (in a side branch), and/or borne by the ends of the polymer backbone, and/or in the chain forming the polymer backbone. They may be distributed randomly or in a controlled manner. The functionalised joining groups capable of forming at least 3 H bonds may comprise at least 3 functional groups, preferably at least 4, chosen from:

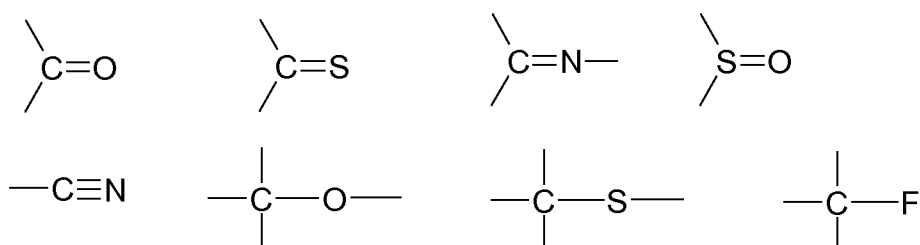


These functional groups can be categorised into two categories:

- functional groups which donate H bonds:

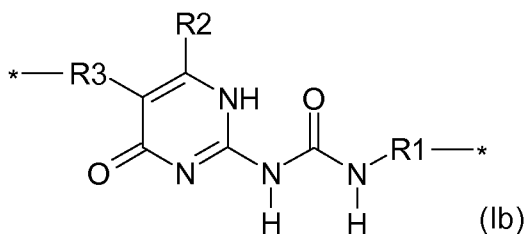
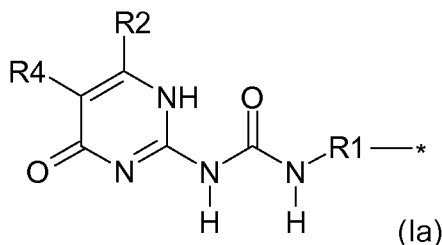


- functional groups which accept H bonds:



Preferably, the joining groups can establish 4 H bonds with an identical (or self-complementary) partner group, among which are 2 donor bonds (for example NH) and 2 acceptor bonds (for example CO and -C=N-).

Preferably, the joining groups Q<sub>1</sub> to Q<sub>4</sub> comprise at least one monovalent unit of formula (Ia) and/or at least one divalent unit of formula (Ib):



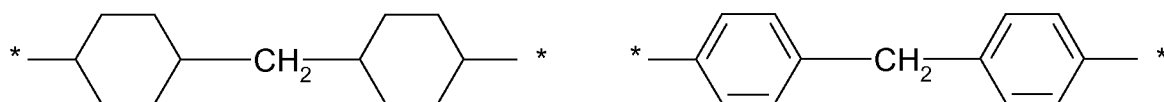
in which:

- R1 and R3, which may be identical or different, represent a divalent carbon-based radical chosen from (i) a linear or branched C<sub>1</sub>-C<sub>32</sub> alkyl group, (ii) a C<sub>4</sub>-C<sub>16</sub> cycloalkyl group and (iii) a C<sub>4</sub>-C<sub>16</sub> aryl group; said groups optionally comprising 1 to 8 heteroatoms chosen from O, N, S, F, Si and P; and/or said groups being optionally substituted with an ester or amide function or with a C<sub>1</sub>-C<sub>12</sub> alkyl radical; or a mixture of these groups;
- R2 and R4, independently of one another, represent a hydrogen atom or a linear, branched or cyclic, saturated or unsaturated, optionally aromatic, C<sub>1</sub>-C<sub>32</sub> carbon-based, in particular hydrocarbon-based (alkyl), radical which can comprise one or more heteroatoms chosen from O, N, S, F, Si and P.

Preferably, the joining group comprises at least one monovalent unit of formula (Ia).

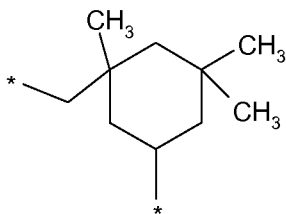
The R1 radical may in particular be:

- a linear or branched, C<sub>2</sub>-C<sub>12</sub> divalent alkylene group, in particular a 1,2-ethylene, 1,6-hexylene, 1,4-butylene, 1,6-(2,4,4-trimethylhexylene), 1,4-(4-methylpentylene), 1,5-(5-methylhexylene), 1,6-(6-methylheptylene), 1,5-(2,2,5-trimethylhexylene) or 1,7-(3,7-dimethyloctylene) group;
- a C<sub>4</sub>-C<sub>12</sub> divalent cycloalkylene or arylene group, in particular chosen from the following radicals: -isophorone-, tolylene, 2-methyl-1,3-phenylene, 4-methyl-1,3-phenylene, 4,4'-methylenebiscyclohexylene, 4,4'-bisphenylenemethylene; or having the structure:



The term "-isophorone-" is intended to mean the divalent radical having the structure:





Preferentially, R1 represents -isophorone-,  $-(CH_2)_6-$  or 4,4'-methylenebiscyclohexylene.

- 5 In particular, the R2 or R4 radicals, independently of one another, may be H or else:
- a C<sub>1</sub>-C<sub>32</sub>, in particular C<sub>1</sub>-C<sub>16</sub>, or even C<sub>1</sub>-C<sub>10</sub>, alkyl group;
  - a C<sub>4</sub>-C<sub>12</sub> cycloalkyl group;
  - a C<sub>4</sub>-C<sub>12</sub> aryl group;
  - 10 - a (C<sub>4</sub>-C<sub>12</sub>)aryl(C<sub>1</sub>-C<sub>18</sub>)alkyl group;
  - a C<sub>1</sub>-C<sub>4</sub> alkoxy group;
  - an arylalkoxy group, in particular a (C<sub>1</sub>-C<sub>4</sub>) arylalkoxy group;
  - a C<sub>4</sub>-C<sub>12</sub> heterocycle;
- or a combination of these radicals, which may optionally be substituted with an
- 15 amino, ester and/or hydroxyl function.

Preferably, R2 represents H, CH<sub>3</sub>, ethyl, C<sub>13</sub>H<sub>27</sub>, C<sub>7</sub>H<sub>15</sub>, phenyl, isopropyl, isobutyl, n-butyl, tert-butyl, n-propyl, or else -CH(C<sub>2</sub>H<sub>5</sub>)(C<sub>4</sub>H<sub>9</sub>).

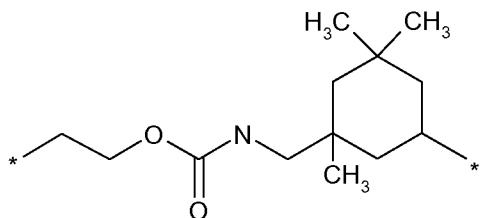
Preferably, R4 = H.

- 20 Preferably, R3 represents a divalent radical -R'3-O-C(O)-NH-R'4- in which R'3 and R'4, which may be identical or different, represent a divalent carbon-based radical chosen from a linear or branched C<sub>1</sub>-C<sub>32</sub> alkyl group or a C<sub>4</sub>-C<sub>16</sub> cycloalkyl group or a C<sub>4</sub>-C<sub>16</sub> aryl group; or a mixture thereof.

- In particular, R'3 and R'4 may represent methylene, 1,2-ethylene, 1,6-hexylene, 25 1,4-butylene, 1,6-(2,4,4-trimethylhexylene), 1,4-(4-methylpentylene), 1,5-(5-methylhexylene), 1,6-(6-methylheptylene), 1,5-(2,2,5-trimethylhexylene), 1,7-(3,7-dimethyloctylene), 4,4'-methylenebiscyclohexylene, 2-methyl-1,3-phenylene, 4-methyl-1,3-phenylene, 4,4'-bisphenylenemethylene, 1,2-tolylene, 1,4-tolylene, 2,4-tolylene, 2,6-tolylene, 1,5-naphthylene, tetramethylxylylene or isophorone.

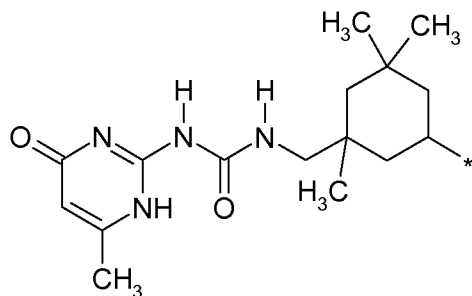
- 30 Most particularly, R'3 may represent a C<sub>1</sub>-C<sub>4</sub> alkylene, in particular 1,2-ethylene. Preferably, R'4 may represent a divalent radical derived from isophorone.

Most particularly, R3 may have the structure:



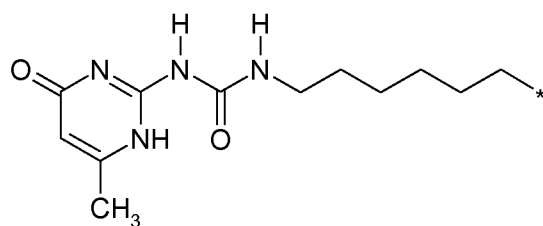
Particularly preferably, in formula (1a), it is possible to have:

- R1 = -isophorone-, R2 = methyl and R4 = H, which results in the unit of formula:



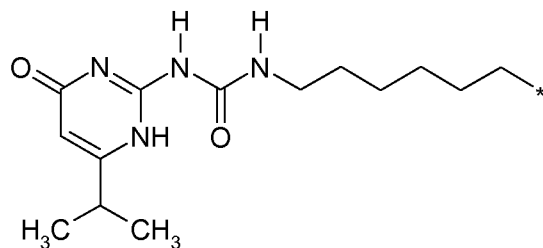
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- R1 = -(CH<sub>2</sub>)<sub>6</sub>-, R2 = methyl and R4 = H, which results in the unit of formula:

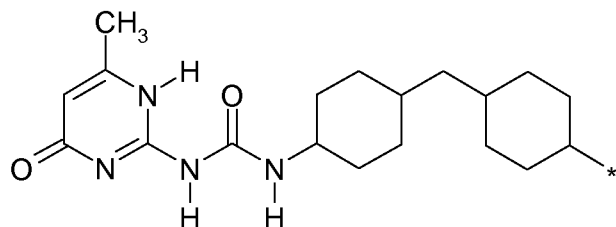


- R1 = -(CH<sub>2</sub>)<sub>6</sub>-, R2 = isopropyl and R4 = H, which results in the unit of formula:

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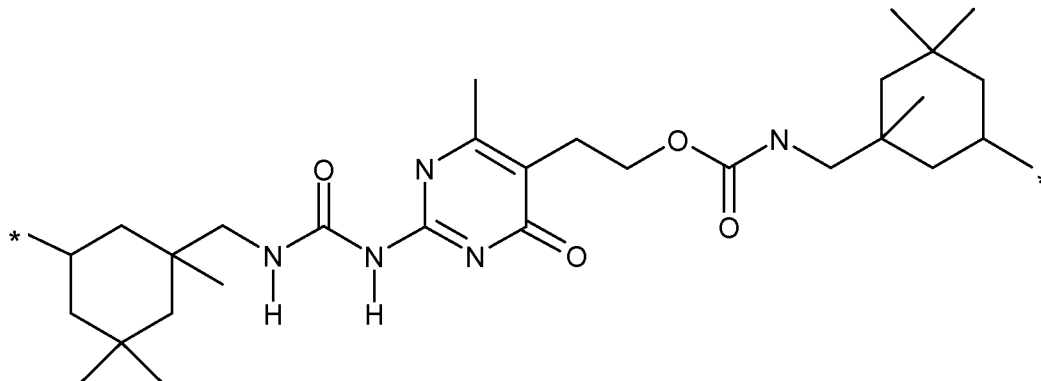
- R1 = 4,4'-methylenebiscyclohexylene, R2 = methyl and R4 = H, which results in the unit of formula:



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Particularly preferably, in formula (1b), R1 represents the radical -isophorone-, R2

= methyl and R3 =  $-(CH_2)_2OCO-NH$ -isophorone-, which results in the divalent unit of formula:



- 5 The functionalised polysiloxanes according to the present invention may result from the reaction, in particular from the polycondensation, of at least one polysiloxane bearing at least one reactive function, for example OH or  $NH_2$ , with at least one joining group bearing at least one reactive function capable of reacting with the reactive function(s) of the polysiloxane.

10

Preferably, the polysiloxane bearing at least one reactive function, capable of forming all or part of the polymer backbone of the functionalised polysiloxane according to the invention, is of formula  $HX-P-X'H$  in which:

- 15 -  $XH$  and  $X'H$  are reactive groups, with  $X$  and  $X'$ , which may be identical or different, being chosen from O, SH, NH or  $NR_a$ ,  $R_a$  representing a  $C_1-C_6$  alkyl group; preferably  $X$  and/or  $X'$  denote O; preferentially  $X$  and  $X'$  denote O;  
 -  $P$  represents a homopolymer or a copolymer of polysiloxane type, preferentially a linear or cyclic polydimethylsiloxane.

- 20 Said polysiloxane may in particular bear at least two reactive functions, which may be at the chain ends. The term telechelic polymers is then used. Said reactive functions may be attached to the polysiloxane via linkers, preferably linear or branched  $C_1-C_4$  alkylene groups, or directly via a single bond. As reactive functions, mention may be made of OH,  $NH_2$ , NHR, SH or NCO functions.

- 25 The reactive functions may also be present pendant on the polymer backbone.

As polysiloxanes bearing reactive functions, mention may in particular be made of:

- 30 - telechelic polysiloxanes (reactive functions at the chain end), such as those bearing hydride functions, and in particular those sold by Gelest under the names DMS-H21, DMS-H25 and DMS-H31; those bearing amino functions and in particular those sold by Gelest under the names DMS-A12, DMS-A15, DMS-A21

and DMS-A32, or by Shin-Etsu under the names X-22-161B or KF-8012; those bearing OH functions and in particular those sold by Shin-Etsu under the names KF-6001, KF-6002, KF-6003 and X-22-176-DX, or by Goldschmidt under the names TEGO-IS4181 and TEGO IS4480P;

- 5 - polysiloxanes comprising pendant reactive functions, such as those bearing hydride functions, and in particular those sold by Gelest under the names HMS-064, HMS-071, HES-992 and HAM-303; those bearing amino functions and in particular those sold by Gelest under the names AMS-152 and AMS-162 or by Shin-Etsu under the names KF-864 or KF 868; those bearing OH functions and in particular OH-functionalised dimethicone copolyols; or else aminomethicones;
- 10 - polysiloxanes having at least one reactive function at the end of the chain and at least one pendant reactive function, such as those bearing a hydride function, sold by Gelest under the name HDP-111 or HPM-502; those bearing an amino and alkoxy function, such as KF857 or KF-862 from Shin-Etsu.

15 In order to form the functionalised polysiloxane according to the invention, use may be made of a joining group Q bearing at least one reactive function, in particular isocyanate or imidazole, capable of reacting with the reactive functions, in particular OH and/or NH<sub>2</sub> (NH<sub>2</sub> only for imidazole), of the polysiloxane, in order

20 to form a covalent bond, in particular of urethane type, between said polysiloxane and said joining group.

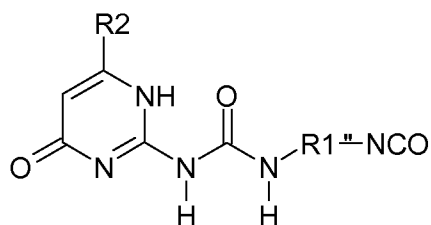
As mentioned above, the joining groups may be connected to the polysiloxane backbone by means of a linker, which is preferably chosen from the following

25 divalent groups: phenylene; 1,4-nitrophenyl; 1,2-ethylene; 1,6-hexylene; 1,4-butylene; 1,6-(2,4,4-trimethylhexylene); 1,4-(4-methylpentylene); 1,5-(5-methylhexylene); 1,6-(6-methylheptylene); 1,5-(2,2,5-trimethylhexylene); 1,7-(3,7-dimethyloctylene); -isophorone-; 4,4'-methylenebiscyclohexylene; tolylene; 2-methyl-1,3-phenylene; 4-methyl-1,3-phenylene; 4,4-bisphenylenemethylene; and

30 preferably: -isophorone-; -(CH<sub>2</sub>)<sub>2</sub>; -(CH<sub>2</sub>)<sub>6</sub>-; -CH<sub>2</sub>CH(CH<sub>3</sub>)-CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>; 4,4'-methylenebiscyclohexylene; 2-methyl-1,3-phenylene.

The joining groups bearing a single isocyanate function may be of formula:

35

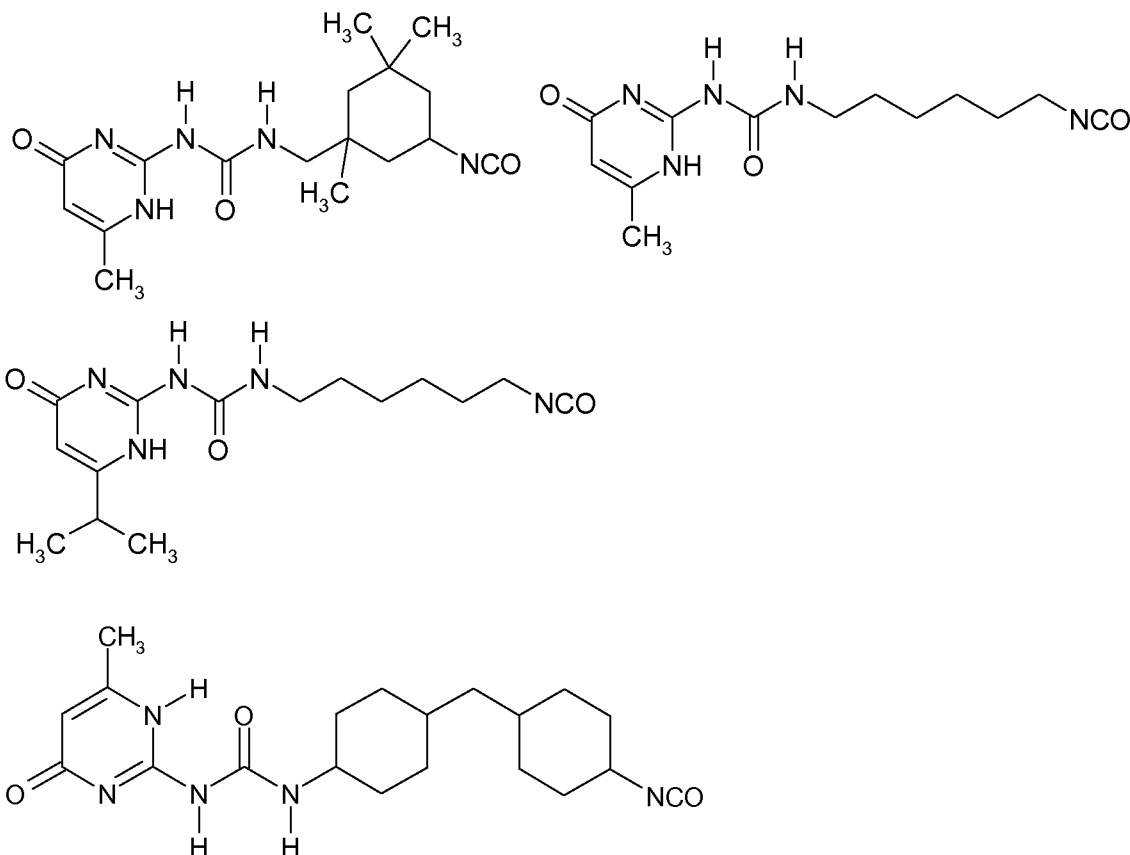


in which R<sup>1</sup> and R<sup>2</sup> are as defined above; and in particular:

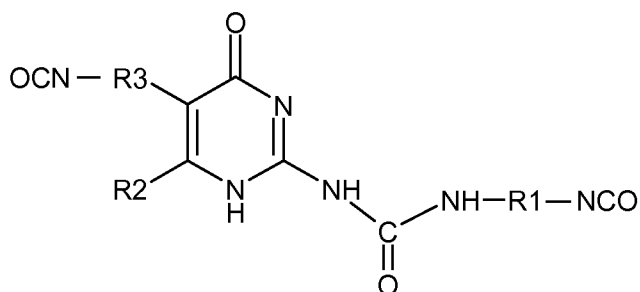
- R<sup>1</sup> represents -isophorone-, -(CH<sub>2</sub>)<sub>6</sub>-, -CH<sub>2</sub>CH(CH<sub>3</sub>)-CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-, 4,4'-methylenebiscyclohexylene or 2-methyl-1,3-phenylene; and/or
- 5 - R<sup>2</sup> represents H, CH<sub>3</sub>, ethyl, C<sub>13</sub>H<sub>27</sub>, C<sub>7</sub>H<sub>15</sub>, phenyl, isopropyl, isobutyl, n-butyl, tert-butyl, n-propyl, or else -CH(C<sub>2</sub>H<sub>5</sub>)(C<sub>4</sub>H<sub>9</sub>).

Preferably, the joining groups bearing an isocyanate function may be chosen from the following groups:

10



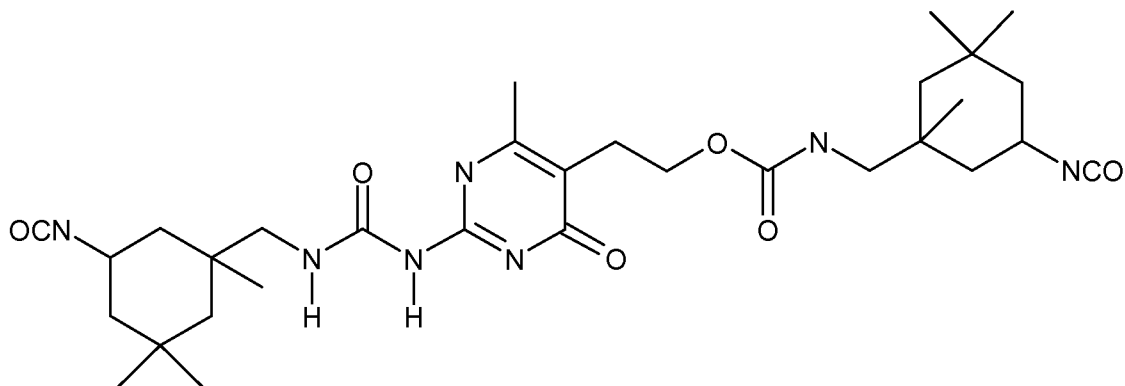
- 15 The joining groups bearing two isocyanate functions may be of formula:



in which R1, R2 and R3 are as defined above, and in particular:

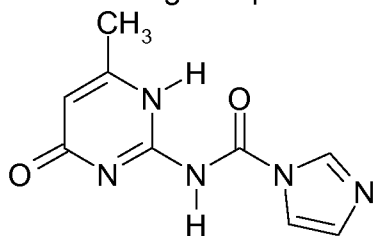
- R1 represents -isophorone-,  $-(CH_2)_2$ -,  $-(CH_2)_6$ -,  $-CH_2CH(CH_3)-CH_2-C(CH_3)_2-CH_2-CH_2$ -, 4,4'-methylenebiscyclo-hexylene, 2-methyl-1,3-phenylene; and/or
- 5 - R2 represents H,  $CH_3$ , ethyl,  $C_{13}H_{27}$ ,  $C_7H_{15}$ , phenyl, isopropyl, isobutyl, n-butyl, tert-butyl, n-propyl, or else  $-CH(C_2H_5)(C_4H_9)$ ; and/or
- R3 represents a divalent radical  $-R'3-O-C(O)-NH-R'4-$  in which R'3 and R'4, which may be identical or different, represent a divalent carbon-based radical chosen from a linear or branched  $C_1$ - $C_{30}$  alkyl group or a  $C_4$ - $C_{12}$  cycloalkyl group
- 10 or a  $C_4$ - $C_{12}$  aryl group; or mixtures thereof; and in particular R'3 represents a  $C_1$ - $C_4$  alkylene, in particular 1,2-ethylene, and R'4 represents the divalent radical derived from isophorone.

A joining group which is most particularly preferred is that of formula:



15

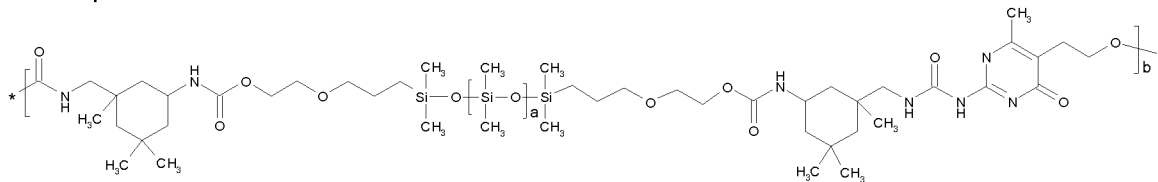
Among the joining groups bearing an imidazole group, mention may be made of the following compound:



- 20 Preferably, the polysiloxanes bearing a joining group have a number-average molecular weight ( $M_n$ ) of between 500 and 100 000, in particular between 1000 and 50 000, or even between 2000 and 25 000, even better still between 3000 and

15 000.

Preferably, the polysiloxanes bearing a joining group according to the invention correspond to the formula below:



In this formula, the end groups are not indicated since they are statistical and may depend on the process.

Preferably, in this formula, a is between 2 and 1000, better still 3 and 700, in particular 5 and 400, or even 10 and 200, even better still 20 and 100; preferably b is between 1 and 300, better still 2 and 150, better still between 3 and 80, even better still between 4 and 20.

According to one particular embodiment of the invention, the joining groups may be attached to the polysiloxane backbone via the functionalisation of the joining group with an isocyanate or imidazole.

According to another embodiment, it is possible to carry out the reverse reaction by prefunctionalising the polysiloxane with a diisocyanate.

The polysiloxane polymer comprising a joining group, alone or as a mixture, may be present in the cosmetic compositions according to the invention in a proportion of from 0.1% to 50% by weight, preferably from 0.2% to 40% by weight, preferentially from 0.5% to 15% by weight, or even 1% to 10% by weight, relative to the total weight of the composition.

### Supramolecular polymer

The cosmetic compositions according to the invention therefore comprise a polyalkene-based (i.e. polyolefin-based) supramolecular polymer.

For the purpose of the present invention, the term "polyalkene-based supramolecular polymer" is intended to mean a polymer resulting from the reaction, in particular from the condensation, of at least one polyalkene polymer functionalised with at least one reactive group, with at least one joining group functionalised with at least one reactive group capable of reacting with the reactive group(s) of the functionalised polyalkene polymer, said joining group being capable of forming at least 3 H (hydrogen) bonds, preferably at least 4 H bonds,

preferentially 4 H bonds.

Preferably, said functionalised polyalkene is hydrogenated.

5 The term "polyalkene" or "polyolefin" is intended to mean a polymer resulting from the polymerisation of at least one monomer of alkene type, comprising an ethylenic unsaturation, it being possible for said monomer to be pendant or in the main chain of the said polymer. The term "polyalkene" or "polyolefin" therefore covers polymers that may optionally comprise a double bond. Preferably, the  
10 supramolecular polymers used according to the invention are prepared from a polymer resulting from the polymerisation of an alkene comprising at least two ethylenic unsaturations.

The supramolecular polymer according to the invention is capable of forming a  
15 supramolecular polymer chain or network by (self)assembly of said polymer according to the invention with at least one other identical or different polymer according to the invention, each assembly involving at least one pair of identical or different matching joining groups borne by each of the polymers according to the invention.

20 The term "joining group" is intended to mean, for the purpose of the invention, any group comprising groups which donate or accept H bonds, and capable of establishing at least three H bonds, preferably at least 4 H bonds, preferentially 4 H bonds, with an identical or different partner joining group. These joining groups  
25 can be lateral to the polymer backbone (in a side branch) and/or borne by the ends of the polymer backbone and/or in the chain forming the polymer backbone. They can be distributed in random or controlled fashion.

#### Functionalised polyalkene

30 The polyalkene polymers are functionalised with at least one reactive group, preferably with at least two reactive groups. The functionalisation is preferably carried out at the chain ends. The term telechelic polymers is then used.

The functionalisation groups, or reactive groups, may be attached to the polyalkene polymer via linkers, preferably linear or branched C<sub>1</sub>-C<sub>4</sub> alkylene  
35 groups, or directly via a single bond.

Preferably, the functionalised polyalkene polymers have a number-average molecular weight (M<sub>n</sub>) of between 1000 and 8000.

More preferably, they have a number-average molecular weight of between 1000



and 5000, or even between 1500 and 4500.

More preferably, they have a number-average molecular weight of between 2000 and 4000.

- 5 In particular, the functionalised polyalkene polymer capable of forming all or part of the polymer backbone of the supramolecular polymer according to the invention (it preferably forms the entire backbone of the polymer) is of formula  $HX-P-X'H$  in which:
- $XH$  and  $X'H$  are reactive functions, with  $X$  and  $X'$ , which may be identical or  
10 different, chosen from O, S, NH, NCO or  $NR_a$ ,  $R_a$  representing a  $C_1-C_6$  alkyl group; preferably,  $X$  and/or  $X'$  denote O; preferentially,  $X$  and  $X'$  denote O;
  - $P$  represents a homopolymer or a copolymer which can be obtained by polymerisation of one or more linear, cyclic and/or branched, monounsaturated or polyunsaturated,  $C_2-C_{10}$ , preferably  $C_2-C_4$ , alkenes;  $P$  preferably represents a  
15 homopolymer or a copolymer which can be obtained by polymerisation of one or more monounsaturated, linear or branched  $C_2-C_4$  alkenes.

Preferably, the functionalised polyalkene polymer, capable of forming all or part of the polymer backbone of the supramolecular polymer according to the invention (it  
20 preferably forms the entire backbone of the polymer), is of formula  $HO-P-OH$  in which  $P$  represents a homopolymer or a copolymer which can be obtained by polymerisation of one or more linear, cyclic and/or branched, polyunsaturated (preferably diunsaturated),  $C_2-C_{10}$ , preferably  $C_2-C_4$ , alkenes.

$P$  preferably represents a homopolymer or a copolymer which can be obtained by  
25 polymerisation of one or more diunsaturated, linear or branched,  $C_2-C_4$  alkenes.

More preferably,  $P$  represents a polymer chosen from a polyethylene, a polybutylene, a polybutadiene (such as a 1,4-polybutadiene or a 1,2-polybutadiene), a polyisoprene, a poly(1,3-pentadiene), a polyisobutylene, and copolymers thereof, and in particular a poly(ethylene/ butylene).

30

According to one preferred embodiment,  $P$  represents a poly(ethylene/butylene) copolymer.

The preferred poly(ethylene/butylene)s are copolymers of 1-butene and of ethylene. They can be represented schematically by the sequence of following  
35 units:  $[-CH_2-CH_2-]$  and  $[-CH_2CH(CH_2-CH_3)-]$ .

According to a second preferred embodiment,  $P$  is a polybutadiene homopolymer, preferably chosen from a 1,4-polybutadiene or a 1,2-polybutadiene.

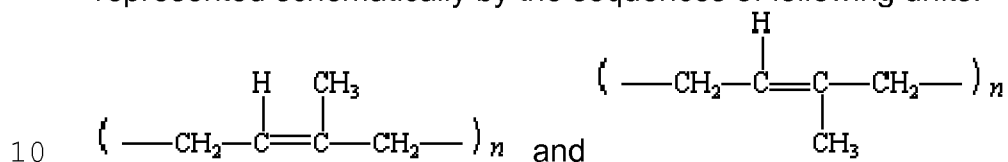
The polybutadienes may be 1,4-polybutadienes or 1,2-polybutadienes, which can respectively be represented schematically by the sequences of following units:

$[-CH_2-CH=CH-CH_2-]$  (1,4-polybutadienes)

$[-CH_2-CH(CH=CH_2)-]$  (1,2-polybutadienes).

- 5 Preferably, they are 1,2-polybutadienes. Preferably, P is a 1,2-polybutadiene homopolymer.

According to another embodiment, P is a polyisoprene. The polyisoprenes can be represented schematically by the sequences of following units:



It is very obviously possible to also use a mixture of above units, in order to form copolymers.

- 15 The functionalised polyalkene polymers may be hydrogenated, in particular completely hydrogenated, in order to avoid risks of crosslinking. Preferably, the functionalised polyalkene polymers used in the compositions according to the invention are hydrogenated.
- 20 The supramolecular polymers may also comprise in their structure other units derived from other monomers. As comonomers, mention may in particular be made of styrene or monomers having an epoxy group. In one preferred embodiment, they do not comprise them and therefore consist solely of polyalkene polymers (100%) to form the polymer backbone. In particular, they are prepared
- 25 only from polyalkenes P as defined above, with P preferably representing a homopolymer or a copolymer which can be obtained by polymerisation of one or more monounsaturated, linear or branched, C<sub>2</sub>-C<sub>4</sub> alkenes, P more preferably representing a polymer chosen from a polyethylene, a polybutylene, a polybutadiene, a polyisoprene, a poly(1,3-pentadiene), a polyisobutylene, and
- 30 copolymers thereof, and preferentially a poly(ethylene/butylene).

The polyalkene polymers are functionalised with at least one reactive group, preferably with at least two reactive groups. The functionalisation is preferably carried out at the end of chains. The term telechelic polymers is then used. The

35 reactive groups may be attached to the polyalkene polymer via linkers, preferably linear or branched C<sub>1</sub>-C<sub>4</sub> alkylene groups, or directly via a single bond. As reactive

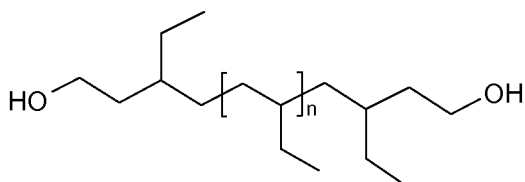
groups, mention may be made of OH, NH<sub>2</sub>, NHR, SH or NCO functions. Preferably, the polyalkene polymers can be functionalised with OH groups, preferably at the ends. Preferably, they exhibit a functionality with respect to hydroxyl ends of 1.8 to 3, and preferably in the region of 2.

- 5 Preferably, the polyalkene polymers are hydrogenated and functionalised with at least two reactive groups X and X' as defined above, with X and/or X' denoting O. Preferably, X and X' denote O.

Among the functionalised polyalkene polymers which are preferred, mention may be made of polydienes, preferably hydrogenated polydienes, comprising hydroxyl  
10 functions, preferably comprising hydroxyl ends, and polyolefins comprising hydroxyl ends, and in particular chosen from homopolymers and copolymers of polybutadiene, of polyisoprene and of poly(1,3-pentadiene).

The polydienes comprising hydroxyl ends are in particular defined, for example, in FR2782723. They may be chosen from homopolymers and copolymers of  
15 polybutadiene, of polyisoprene and of poly(1,3-pentadiene). Mention will in particular be made of the hydroxylated polybutadienes sold by the company Sartomer, such as Krasol® Resins and Poly bd® Resins.

Preferably, they are dihydroxylated hydrogenated 1,2-polybutadiene  
20 homopolymers, such as the Nisso-PB I, GI3000, GI2000 and GI1000 range sold by the company Nisso, which can be represented schematically by the following formula:



Preferably, "n" is between 14 and 105, preferably between 20 and 85. These  
25 polymers have the following number-average molecular weights: GI3000 of Mn=4700, GI2000 of Mn=3300 and GI1000 of Mn=1500. These values were measured by GPC according to the following protocol:

30 Protocol for determining the molecular weights of the supramolecular polymer by GPC

Determination of the number-average (Mn) and weight-average (Mw) molecular weights and also the polydispersity index  $PI = Mw/Mn$ , in polystyrene equivalent.

*Preparation of the calibration solutions*

35 The polystyrene standards are prepared using the Varian kits (ref: PS-H (PL2010-

0200)).

The weights of the standards are the following:

PS 6035000 - PS 3053000 - PS 915000 – PS 483000 – PS 184900 - PS 60450 -  
PS 19720 - PS 8450 - PS 3370 - PS 1260 - PS 580.

5 100 µl of each of the solutions are injected into the column to be calibrated.

*Preparation of the sample:*

A solution at 0.5% of dry matter is prepared in THF.

The solution is prepared approximately 24 h before injection.

10 The solution is filtered through a Millex FH filter (0.45 µm).

The solution is injected into the column.

*Chromatographic conditions:*

Columns: PL Rapid M (batch 5M-Poly-008-15) from Polymer Labs

15 PL-gel HTS-D (batch 5M-MD-72-2) from Polymer Labs

PL-gel HTS-F (10M-2-169B-25) from Polymer Labs

PL-Rapid-F (6M-OL1-011-6) from Polymer Labs

Length: 150 mm - internal diameter: 7.5 mm

Pump: Waters isocratic M1515

20 Eluent: THF

Flow rate: 1 ml/min

Temperature: ambient

Injection: 100 µl at 0.5% of AM in the eluent

Detection: RI 64mV (Waters 2424 refractometer)

25 Temperature: 45°C

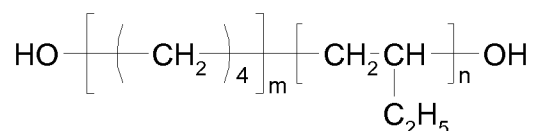
UV at 254 nm in 0.1 OD (Waters 2487 UV detector)

Integrator: Empower option GPC

*Determination of molecular weights*

30 The average molecular weights are determined by plotting the calibration curve:  
log molecular weight = f (elution volume at the top of the RI detection peak) and  
using the Empower option GPC software from Waters.

35 Among the polyolefins comprising hydroxyl ends, mention may preferentially be  
made of polyolefins, which are homopolymers or copolymers, comprising  $\alpha,\omega$ -  
hydroxyl ends, such as polyisobutylenes comprising  $\alpha,\omega$ -hydroxyl ends; and  
copolymers of formula:



in particular those sold by Mitsubishi under the *Polytail* trademark.

### Joining group

5 The supramolecular polymers according to the invention also have, in their structure, at least one residue of a joining group capable of forming at least 3 H bonds, preferably at least 4 H bonds, said joining group being initially functionalised with at least one reactive group.

Unless otherwise specified, the term "joining group" is intended to mean, in the  
10 present description, the group without its reactive function.

The reactive groups are attached to the joining group via linkers L or directly via a single bond.

Preferably, the linker (L) is a saturated or unsaturated, C<sub>1</sub>-C<sub>20</sub> divalent carbon-based group, in particular chosen from a linear or branched C<sub>1</sub>-C<sub>20</sub> alkylene, a C<sub>5</sub>-  
15 C<sub>20</sub> (alkyl)cycloalkylene alkylene (preferably cyclohexylene methylene), a C<sub>11</sub>-C<sub>20</sub> alkylene-biscycloalkylene (preferably alkylene-biscyclohexylene), a C<sub>6</sub>-C<sub>20</sub> (alkyl)arylene and an alkylene-bisarylene (preferably an alkylene-bisphenylene), it being possible for the linker L to be substituted with at least one alkyl group and/or to optionally comprise 1 to 4 heteroatoms N and/or O, in particular in the form of  
20 an NO<sub>2</sub> substituent.

Preferably, the linker is chosen from a phenylene; 1,4-nitrophenyl; 1,2-ethylene; 1,6-hexylene; 1,4-butylene; 1,6-(2,4,4-trimethylhexylene); 1,4-(4-methylpentylene); 1,5-(5-methylhexylene); 1,6-(6-methylheptylene); 1,5-(2,2,5-trimethylhexylene); 1,7-(3,7-dimethyloctylene); -isophorone-; 4,4'-methylenebiscyclohexylene;  
25 tolylene; 2-methyl-1,3-phenylene; 4-methyl-1,3-phenylene or 4,4'-biphenylenemethylene group.

Preferably, the linker is chosen from the groups:

-C<sub>5</sub>-C<sub>20</sub> (alkyl)cycloalkylene alkylene, such as isophorone,  
C<sub>11</sub>-C<sub>15</sub> alkylene-biscycloalkylene, such as 4,4'-methylenebiscyclohexylene,  
30 C<sub>1</sub>-C<sub>20</sub> alkylene, such as -(CH<sub>2</sub>)<sub>2</sub>-; -(CH<sub>2</sub>)<sub>6</sub>-; -CH<sub>2</sub>CH(CH<sub>3</sub>)-CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>,  
and

C<sub>6</sub>-C<sub>20</sub> (alkyl)phenylene, such as 2-methyl-1,3-phenylene.

Preferably, L is chosen from: -isophorone-; -(CH<sub>2</sub>)<sub>2</sub>-; -(CH<sub>2</sub>)<sub>6</sub>-; -CH<sub>2</sub>CH(CH<sub>3</sub>)-CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>; 4,4'-methylenebiscyclohexylene and 2-methyl-1,3-phenylene.

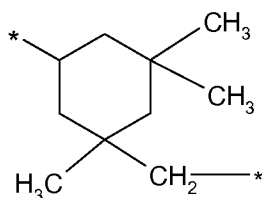
35

According to one particularly preferred embodiment, the linker is an

alkylcycloalkylene alkylene.

Preferably, according to this embodiment, the linker is an isophorone group. The term "isophorone" is intended to mean the following group:

5



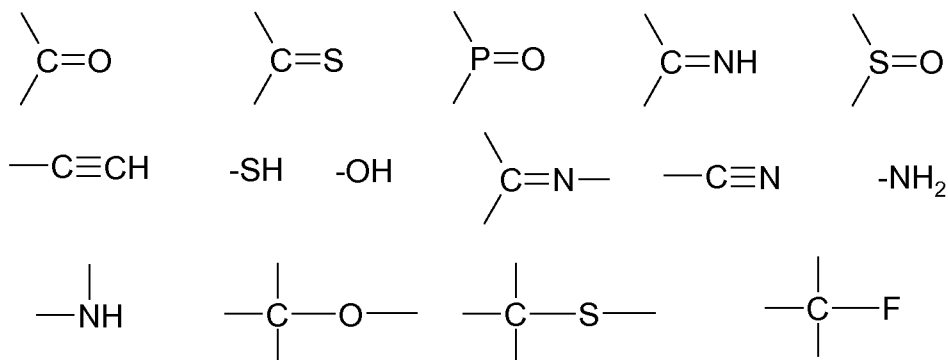
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Said reactive groups functionalising the joining group should be capable of reacting with the reactive group(s), in particular -OH group(s), borne by the functionalised polyalkene.

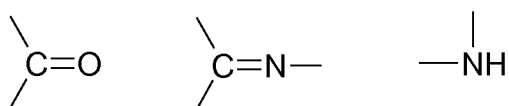
As reactive groups, mention may be made of isocyanate (-N=C=O) or thioisocyanate (-N=C=S) groups. The reactive group is preferably an -N=C=O (isocyanate) group.

15

The functionalised joining groups capable of forming at least 3 H bonds may comprise at least 3 identical or different functional groups, preferably at least 4, chosen from:



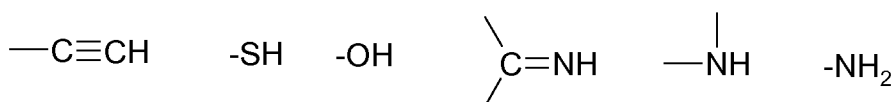
and preferably chosen from



20

These functional groups can be categorised into two categories:

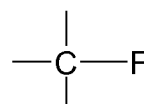
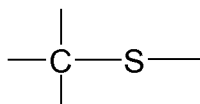
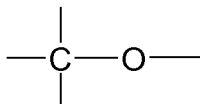
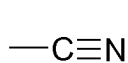
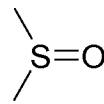
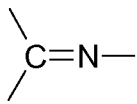
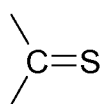
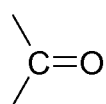
- functional groups which donate H bonds:



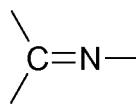
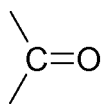
preferably



- functional groups which accept H bonds:



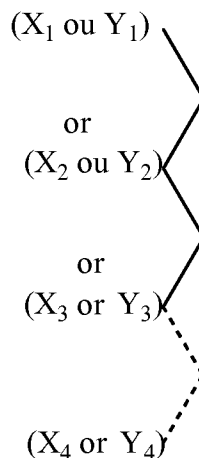
preferably



5

The joining groups capable of forming at least 3 H bonds form a base structural element comprising at least 3 functional groups, preferably at least 4 functional groups, and more preferentially 4 functional groups capable of establishing H bonds. Said base structural elements capable of establishing H bonds can be represented schematically in the following way:

10



where  $X_i$  is a functional group which accepts H bonds (which may be identical or different) and  $Y_i$  is a functional group which donates H bonds (which may be identical or different).

15 Thus, each structural element must be able to establish H bonds with one or more partner structural elements which are identical (i.e. self-complementary) or different, such that each pairing of two partner structural elements takes place by formation of at least three H bonds, preferably at least four H bonds, and more preferentially 4 H bonds.

20 An acceptor of protons X will be paired with a donor of protons Y. Several possibilities are thus offered, for example pairing of:

XXXX with YYYY;

XXXV with YYYY;

XXYX with YXYX;

XYXX with YXXY;

5 XXYX with YXXY, which is optionally self-complementary;

XYYX with YXXY, which is optionally self-complementary.

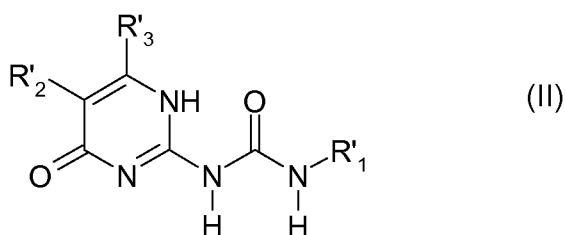
Preferably, the joining groups can establish 4 H bonds with an identical (or self-complementary) partner group, among which are 2 donor bonds (for example NH) and 2 acceptor bonds (for example CO and -C=N-).

10

Preferably, the joining groups capable of forming at least 3, or even at least 4 H bonds are chosen from the following family, it being understood that all the tautomeric forms are included:

- ureidopyrimidones of formula

15



In this formula, the meaning of the radicals is the following:

-R'1 represents a single bond, a hydrogen atom, a halogen atom or a linear, branched and/or cyclic, saturated or unsaturated, optionally aromatic, C<sub>1</sub>-C<sub>30</sub> monovalent carbon-based (in particular alkyl) group which can contain one or more heteroatoms such as O, S, or N;

20

The R'1 radical may in particular be a C<sub>4</sub>-C<sub>12</sub> cycloalkyl group; a linear or branched C<sub>1</sub>-C<sub>30</sub> alkyl group or a C<sub>4</sub>-C<sub>12</sub> aryl group; optionally substituted with an amino, thio and/or hydroxyl function.

25

Preferably, R'1 is a C<sub>4</sub>H<sub>9</sub>; phenyl, 1,4-nitrophenyl; 1,2-ethylene; 1,6-hexylene; 1,4-butylene; 1,6-(2,4,4-trimethylhexylene); 1,4-(4-methylpentylene); 1,5-(5-methylhexylene); 1,6-(6-methylheptylene); 1,5-(2,2,5-trimethylhexylene); 1,7-(3,7-dimethyloctylene); -isophorone-; 4,4'-methylenebiscyclohexylene; tolylene; 2-methyl-1,3-phenylene; 4-methyl-1,3-phenylene or 4,4-bisphenylenemethylene group; or a single bond.

30

Preferentially, R'1 represents -isophorone-; -(CH<sub>2</sub>)<sub>2</sub>-; -(CH<sub>2</sub>)<sub>6</sub>-; -CH<sub>2</sub>CH(CH<sub>3</sub>)-CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-; 4,4'-methylenebiscyclohexylene; 2-methyl-1,3-phenylene, or a single bond;



-R'<sub>2</sub> represents a single bond, a divalent group of C<sub>1</sub>-C<sub>6</sub> alkylene type, or a monovalent group chosen from a hydrogen atom or a linear, branched and/or cyclic, saturated or unsaturated, optionally aromatic, C<sub>1</sub>-C<sub>30</sub> monovalent hydrocarbon-based group which can contain one or more heteroatoms such as O, S or N;

Preferably, R'<sub>2</sub> can be a single bond or H, a C<sub>1</sub>-C<sub>30</sub> alkyl group; a C<sub>4</sub>-C<sub>12</sub> cycloalkyl group; a C<sub>4</sub>-C<sub>12</sub> aryl group; a (C<sub>4</sub>-C<sub>12</sub>)aryl(C<sub>1</sub>-C<sub>12</sub>)alkyl group; these groups being optionally substituted with an amino, thio and/or hydroxyl function. Preferentially, R'<sub>2</sub> represents H, CH<sub>3</sub>, CH<sub>2</sub>OH, (CH<sub>2</sub>)<sub>2</sub>-OH, C<sub>13</sub>H<sub>27</sub>, C<sub>7</sub>H<sub>15</sub> or phenyl; or a single bond;

R'<sub>3</sub> represents a hydrogen atom or a linear, branched and/or cyclic, saturated or unsaturated, optionally aromatic, C<sub>1</sub>-C<sub>30</sub> monovalent hydrocarbon-based group which can contain one or more heteroatoms such as O, S or N;

Preferably, R'<sub>3</sub> can be a C<sub>4</sub>-C<sub>12</sub> cycloalkyl group; a linear or branched C<sub>1</sub>-C<sub>30</sub> alkyl group or a C<sub>4</sub>-C<sub>12</sub> aryl group; optionally substituted with an amino, thio and/or hydroxyl group; preferentially, R'<sub>3</sub> represents H, CH<sub>3</sub>, CH<sub>2</sub>OH or (CH<sub>2</sub>)<sub>2</sub>-OH, and even better still methyl;

it being understood that at least one, in particular one or two, of the R'<sub>1</sub> and R'<sub>2</sub> groups is a single bond.

Preferably:

- the R'<sub>1</sub> radicals (or else the R'<sub>1</sub> and R'<sub>2</sub> radicals) are single bonds constituting the point of attachment of the joining group to the linker capable of forming at least 3 H bonds (preferably 4) on the rest of the graft. Preferably, said point of attachment is borne only by R'<sub>1</sub> which is a single bond;

- the R'<sub>2</sub> radical represents a divalent group chosen from a single bond or a C<sub>1</sub>-C<sub>6</sub> alkylene, or a monovalent group chosen from a single bond, a hydrogen atom, or a linear or branched, saturated, C<sub>1</sub>-C<sub>10</sub> monovalent hydrocarbon-based group which can contain one or more heteroatoms such as O, S, or N, these groups being optionally substituted with a hydroxyl, amino and/or thio function.

Preferably, the R'<sub>2</sub> radical may be a single bond or a monovalent group chosen from H, CH<sub>2</sub>OH, (CH<sub>2</sub>)<sub>2</sub>-OH and CH<sub>3</sub>.

According to one particularly preferred embodiment, R'<sub>2</sub> is H;

- the R'<sub>3</sub> radical represents a divalent or monovalent group; in particular, R'<sub>3</sub> is chosen from a hydrogen atom or a linear or branched, saturated, C<sub>1</sub>-C<sub>10</sub> monovalent hydrocarbon-based group which can contain one or more

heteroatoms such as O, S or N, said hydrocarbon-based group being optionally substituted with a hydroxyl, amino and/or thio function.

Preferably, the R'<sub>3</sub> radical may be a monovalent group chosen from H, CH<sub>2</sub>OH, (CH<sub>2</sub>)<sub>2</sub>-OH and CH<sub>3</sub>.

5 According to a particularly preferred embodiment, R'<sub>3</sub> is a methyl group.

According to one preferred embodiment, the joining groups are chosen from 2-ureidopyrimidone and 6-methyl, 2-ureidopyrimidone.

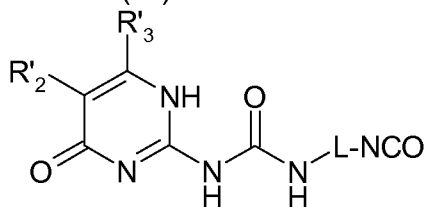
Preferably, the preferred joining group is 6-methyl-2-ureidopyrimidone.

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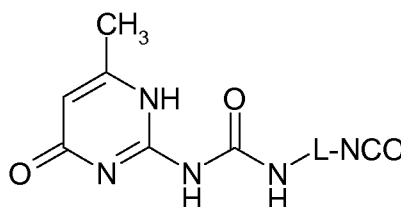
The joining groups, and in particular the ureidopyrimidone joining groups, can be added directly or else formed in situ during the process for preparing the supramolecular polymer. The first and second preparation modes described hereinafter illustrate, respectively, these two alternatives.

15

In particular, the functionalised joining groups capable of reacting with the functionalised polyalkene polymer so as to give the supramolecular polymer according to the invention are preferably of formula (III) and preferentially of formula (IV):



(III)



(IV)

20

in which:

L is a single bond or a linker as defined above;

In particular, L is a linear, cyclic and/or branched, saturated or unsaturated, or even aromatic, C<sub>1</sub>-C<sub>20</sub> divalent carbon-based (alkylene) group, optionally comprising 1 to 4 N and/or O heteroatoms, in particular in the form of an NO<sub>2</sub> substituent, and in particular a phenylene; 1,4-nitrophenyl; 1,2-ethylene; 1,6-hexylene; 1,4-butylene; 1,6-(2,4,4-trimethylhexylene); 1,4-(4-methylpentylene); 1,5-(5-methylhexylene); 1,6-(6-methylheptylene); 1,5-(2,2,5-trimethylhexylene); 1,7-(3,7-dimethyloctylene); -isophorone-; 4,4'-methylenebiscyclohexylene; tolylene; 2-methyl-1,3-phenylene; 4-methyl-1,3-phenylene; or 4,4-bisphenylenemethylene group. Preferably, L is -isophorone-; -(CH<sub>2</sub>)<sub>2</sub>-; -(CH<sub>2</sub>)<sub>6</sub>-; -CH<sub>2</sub>CH(CH<sub>3</sub>)-CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-; 4,4'-methylenebiscyclohexylene or 2-methyl-1,3-phenylene; and better still isophorone;

30

- R'<sub>2</sub> represents a single bond, a divalent group of C<sub>1</sub>-C<sub>6</sub> alkylene type, or a monovalent group chosen from a hydrogen atom or a linear, branched and/or cyclic, saturated or unsaturated, optionally aromatic, C<sub>1</sub>-C<sub>30</sub> monovalent hydrocarbon-based group which can contain one or more heteroatoms such as O,  
5 S or N;

Preferably, R'<sub>2</sub> can be a single bond or H, a C<sub>1</sub>-C<sub>30</sub> alkyl group; a C<sub>4</sub>-C<sub>12</sub> cycloalkyl group; a C<sub>4</sub>-C<sub>12</sub> aryl group; a (C<sub>4</sub>-C<sub>12</sub>)aryl(C<sub>1</sub>-C<sub>12</sub>)alkyl group; these groups being optionally substituted with an amino, ester and/or hydroxyl function. Preferentially,  
10 R'<sub>2</sub> represents H, CH<sub>3</sub>, CH<sub>2</sub>OH, (CH<sub>2</sub>)<sub>2</sub>-OH, C<sub>13</sub>H<sub>27</sub>, C<sub>7</sub>H<sub>15</sub> or phenyl; or a single bond;

- R'<sub>3</sub> represents a hydrogen atom or a linear, branched and/or cyclic, saturated or unsaturated, optionally aromatic, C<sub>1</sub>-C<sub>30</sub> monovalent hydrocarbon-based group which can contain one or more heteroatoms such as O, S or N;

15 Preferably, R'<sub>3</sub> may be a C<sub>4</sub>-C<sub>12</sub> cycloalkyl group; a linear or branched C<sub>1</sub>-C<sub>30</sub> alkyl group or a C<sub>4</sub>-C<sub>12</sub> aryl group; optionally substituted with an amino, ester and/or hydroxyl function; preferentially, R'<sub>3</sub> represents H, CH<sub>3</sub>, CH<sub>2</sub>OH or (CH<sub>2</sub>)<sub>2</sub>-OH; and even better still methyl.

20 Preferably, the R'<sub>2</sub> radical represents a divalent group chosen from a single bond or a C<sub>1</sub>-C<sub>6</sub> alkylene, or a monovalent group chosen from a single bond, a hydrogen atom, or a linear or branched, saturated, C<sub>1</sub>-C<sub>10</sub> monovalent hydrocarbon-based group which can contain one or more heteroatoms such as O,  
25 S or N, these groups being optionally substituted with a hydroxyl, amino and/or thio function.

Preferably, the R'<sub>2</sub> radical may be a single bond or a monovalent group chosen from H, CH<sub>2</sub>OH, (CH<sub>2</sub>)<sub>2</sub>-OH and CH<sub>3</sub>.

According to one particularly preferred embodiment, R'<sub>2</sub> is H.

30 Preferably, the R'<sub>3</sub> radical represents a divalent or monovalent group, in particular R'<sub>3</sub> is chosen from a hydrogen atom or a linear or branched, saturated, C<sub>1</sub>-C<sub>10</sub> monovalent hydrocarbon-based group which can contain one or more heteroatoms such as O, S or N, said hydrocarbon-based group being optionally  
35 substituted with a hydroxyl, amino and/or thio function.

Preferably, the R'<sub>3</sub> radical may be a monovalent group chosen from H, CH<sub>2</sub>OH, (CH<sub>2</sub>)<sub>2</sub>OH and CH<sub>3</sub>.

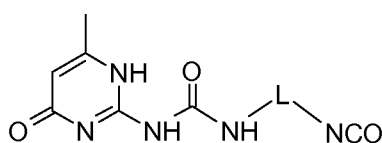
According to one particularly preferred embodiment, R'<sub>3</sub> is a methyl group.

Preferably, L is chosen from the groups:

- C<sub>5</sub>-C<sub>20</sub> (alkyl)cycloalkylene alkylene, such as isophorone,
  - C<sub>11</sub>-C<sub>25</sub> alkylene-biscycloalkylene, such as 4,4'-methylenebiscyclohexylene,
  - 5 - C<sub>1</sub>-C<sub>20</sub> alkylene, such as -(CH<sub>2</sub>)<sub>2</sub>-; -(CH<sub>2</sub>)<sub>6</sub>-; -CH<sub>2</sub>CH(CH<sub>3</sub>)-CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>,  
and
  - C<sub>6</sub>-C<sub>20</sub> (alkyl)phenylene, such as 2-methyl-1,3-phenylene.
- Preferably, L is chosen from: -isophorone-; -(CH<sub>2</sub>)<sub>6</sub>- and 4,4'-methylenebiscyclohexylene.

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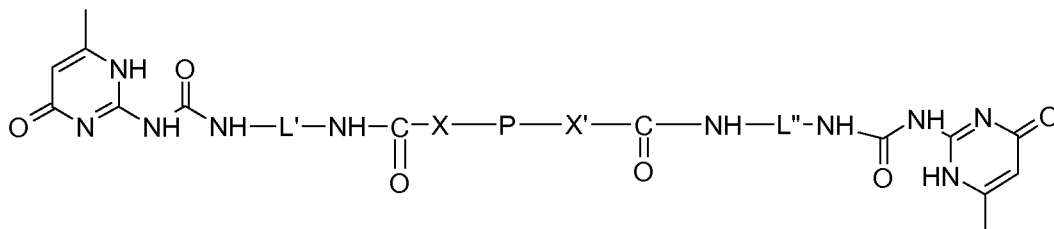
According to one particularly preferred embodiment, the joining group is of formula:



in which L is isophorone.

15

In one particularly preferred embodiment, the supramolecular polymer of the invention corresponds to the formula:



in which:

- 20 - L' and L'' have, independently of one another, the meaning indicated above for L;
- X, X' = O and P has the meaning indicated above for the functionalised polyalkene polymer.

Preferably, L' and L'' represent a saturated or unsaturated, linear, cyclic and/or branched, C<sub>1</sub>-C<sub>20</sub> divalent carbon-based (alkylene) group. Preferably, L' and L'' are  
 25 chosen from a linear or branched C<sub>1</sub>-C<sub>20</sub> alkylene, a C<sub>5</sub>-C<sub>20</sub> (alkyl)cycloalkylene, an alkylene-biscycloalkylene and a C<sub>6</sub>-C<sub>20</sub> (alkyl)arylene. Preferably, L' and L'' represent an -isophorone-; -(CH<sub>2</sub>)<sub>2</sub>-; -(CH<sub>2</sub>)<sub>6</sub>-; -CH<sub>2</sub>CH(CH<sub>3</sub>)-CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>; 4,4'-methylenebiscyclohexylene or 2-methyl-1,3-phenylene group.

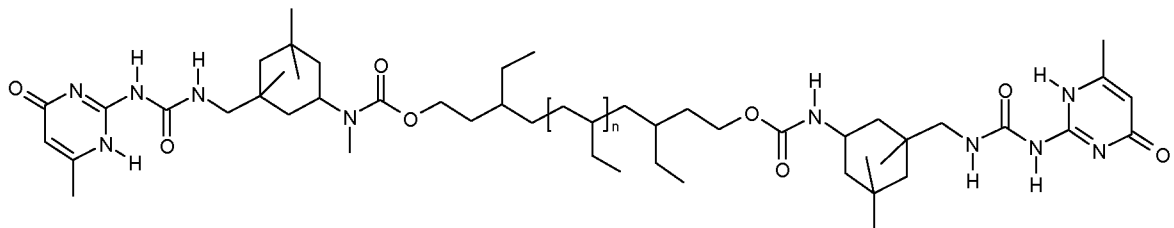
Preferably, L' and L'' are identical.

30 Preferably, L' and L'' are an isophorone group.

Preferably, P represents a polyethylene, a polybutylene, a polybutadiene, a polyisoprene, a poly(1,3-pentadiene), a polyisobutylene, or one of their copolymers, in particular a poly(ethylene/butylene), and is preferably hydrogenated.

5 Preferably, P is a hydrogenated polybutadiene, preferably a hydrogenated 1,2-polybutadiene.

In one particularly preferred embodiment, the supramolecular polymer of the invention corresponds to the formula:



Preferably, n is such that the number-average molecular weight ( $M_n$ ) of said polymer is between 1000 and 8000, in particular between 1000 and 5000, or even between 1500 and 4500, and even better still between 2000 and 4000.

### Preparation process

The polymer according to the invention can be prepared by means of the processes usually employed by those skilled in the art, in particular in order to form a urethane bond between the free OH functions of a polyalkene and the isocyanate functions borne by the joining group.

By way of nonlimiting illustration, a first general preparation process consists in:

- optionally making sure that the polymer to be functionalised does not comprise residual water;
- heating said polymer comprising at least one reactive function, in particular 2 reactive functions, in particular OH, to a temperature which can be between 60°C and 140°C, it being possible for the hydroxyl number of the polymer to act as reference in order to measure the state of progression of the reaction;
- adding, preferably directly, the joining group, in particular the ureidopyrimidone group, bearing the reactive functions, in particular isocyanate reactive functions, such as those described in patent WO 2005/ 042641; in particular such as the joining groups of cas number 32093-85-9 and 709028-42-2;
- optionally stirring the mixture, under a controlled atmosphere, at a temperature of the order of 90-130°C, for 1 to 24 hours;

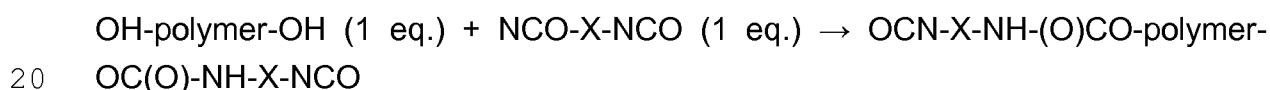
- optionally monitoring, by infrared spectroscopy, the disappearance of the band characteristic of the isocyanates (between 2500 and 2800  $\text{cm}^{-1}$ ), so as to halt the reaction at the complete disappearance of the peak, and then allowing the final product to return to ambient temperature.

- 5 The reaction can also be monitored by quantitative determinations of the hydroxyl functions; it is also possible to add ethanol in order to make sure that the residual isocyanate functions have completely disappeared.

The reaction can be carried out in the presence of a solvent, in particular methyltetrahydrofuran, tetrahydrofuran, toluene, propylene carbonate or butyl acetate. It is also possible to add a catalyst that is conventional for the formation of a urethane bond. By way of example, mention may be made of dibutyltin dilaurate. At the end, the polymer can be washed and dried, or even purified, according to the general knowledge of those skilled in the art.

- 15 According to the 2nd method of preparation, which is preferred, the reaction can comprise the following steps:

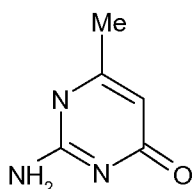
(i) functionalisation of the polymer, preferably predried, with a diisocyanate according to the reaction scheme:



The diisocyanate can optionally be in excess with respect to the polymer. This first step can be carried out in the presence of solvent, at a temperature of between 20°C and 100°C. This first step can be followed by a period of stirring, under a controlled atmosphere, for 1 to 24 hours. The mixture can be optionally heated.

- 25 The state of progression of this first step can be monitored by quantitative determination of the hydroxyl functions; then

(ii) reaction of the prepolymer obtained above with 6-methylisocytosine of formula:



- 30 This second step can optionally be carried out in the presence of a cosolvent, such as toluene, butyl acetate or propylene carbonate. The reaction mixture can be heated at between 80°C and 140°C for a period of time varying between 1 and 24 hours. The presence of a catalyst, in particular dibutyltin dilaurate, can promote the production of the desired final product.

The reaction can be monitored by infrared spectroscopy, by monitoring the disappearance of the peak characteristic of the isocyanate between 2200 and 2300  $\text{cm}^{-1}$ . At the end of the reaction, ethanol can be added to the reaction medium in order to neutralise the possible residual isocyanate functions. The reaction mixture can be optionally filtered. The polymer can also be directly stripped in a cosmetic solvent.

According to one particular embodiment, said supramolecular polymer is solubilised in a hydrocarbon-based, preferably volatile, oil, in particular isododecane.

Thus, the composition of the invention will comprise at least one hydrocarbon-based, preferably volatile, oil, in particular at least isododecane, especially provided by the solution of supramolecular polymer.

In particular, the supramolecular polymer(s) may be present in a composition according to the invention in a content ranging from 0.1% to 99% by weight of dry matter, relative to the total weight of the composition.

In particular, the supramolecular polymer(s) may be present in a composition according to the invention in a content ranging from 1% to 80% by weight of dry matter, relative to the total weight of the composition.

According to one preferred variant, the supramolecular polymer(s) may be present in a composition according to the invention in a content ranging from 2% to 70% by weight of dry matter, relative to the total weight of the composition.

According to an even more preferred variant, the supramolecular polymer(s) may be present in a composition according to the invention in a content ranging from 3% to 60% by weight of dry matter, relative to the total weight of the composition.

According to an even more preferred variant, the supramolecular polymer(s) may be present in a composition according to the invention in a content ranging from 4% to 50% by weight of dry matter, relative to the total weight of the composition.

According to an even more preferred variant, the supramolecular polymer(s) may be present in a composition according to the invention in a content ranging from 5% to 40% by weight of dry matter, relative to the total weight of the composition.

In one particular embodiment of the invention, a makeup composition is provided in the form of a composition for the skin, in particular of the face, or the lips, and the supramolecular polymer(s) may be present therein in a content ranging from 2.5% to 60% by weight of dry matter, relative to the total weight of the composition.

According to an even more preferred variant, a makeup composition is provided in the form of a composition for the skin, in particular for the face, or the lips, and the supramolecular polymer(s) may be present therein in a content ranging from 2.5% to 40% by weight of dry matter, relative to the total weight of the composition.

5 According to an even more preferred variant, a makeup composition is provided in the form of a composition for the skin, in particular for the face, or the lips, and the supramolecular polymer(s) may be present therein in a content ranging from 3% to 30% by weight of dry matter, relative to the total weight of the composition.

10 Advantageously, a composition according to the invention, in particular in the case of a makeup composition for the skin and/or the lips, comprises at least one supramolecular polymer and at least one functionalised polysiloxane in a supramolecular polymer/functionalised polysiloxane weight ratio of between 0.01 and 50.

15 Preferably, they are present in a weight ratio of between 0.1 and 30. Even more preferably, they are present in a weight ratio of between 0.5 and 20.

Advantageously, a composition according to the invention, in particular in the case of a makeup composition for the skin and/or the lips, comprises a supramolecular  
20 polymer content of between 5% and 99% by weight of dry matter, relative to the weight of the composition excluding volatile compound(s) (in particular relative to the weight of the composition excluding volatile oil(s), such as isododecane for example).

This content reflects the resulting content of supramolecular polymer(s) in a  
25 deposit made with the compositions according to the invention, in particular on keratin materials such as the skin and/or the lips for example, after evaporation of the volatile compounds.

Preferably, the composition according to the invention, in particular in the case of a makeup composition, comprises a supramolecular polymer content of between  
30 10% and 90% by weight of dry matter, relative to the weight of the composition excluding volatile compound(s), preferably between 15% and 80% by weight of dry matter.

### **Liquid fatty phase**

35 The cosmetic compositions according to the invention comprise, moreover, a cosmetically acceptable medium, i.e. a medium which is compatible with keratin materials such as the skin of the face or of the body, the eyelashes, the eyebrows, the lips and the nails.



Said medium may comprise a liquid fatty phase, which may comprise at least one compound chosen from volatile or non-volatile carbon-based, hydrocarbon-based and/or silicone and/or fluoro oils and/or solvents of mineral, animal, plant or synthetic origin, alone or as a mixture, provided that they form a uniform, stable mixture and are compatible with the intended use.

According to one preferred embodiment, in particular in the case of the makeup and/or care compositions for keratin materials, in particular such as the lips or the skin, the compositions according to the invention comprise at least one volatile or non-volatile oil.

The term "oil" is intended to mean a water-immiscible, non-aqueous compound which is liquid at ambient temperature (25°C) and atmospheric pressure (760 mmHg).

For the purpose of the invention, the term "volatile" is intended to mean any compound that is capable of evaporating on contact with keratin materials, or the lips, in less than one hour, at ambient temperature (25°C) and atmospheric pressure (1 atm). In particular, this volatile compound has a non-zero vapour pressure, at ambient temperature and atmospheric pressure, especially ranging from 0.13 Pa to 40 000 Pa, in particular ranging from 1.3 Pa to 13 000 Pa, and more particularly ranging from 1.3 Pa to 1300 Pa. In contrast, the term "non-volatile" is intended to mean a compound that remains on keratin materials or the lips at ambient temperature and atmospheric pressure for at least one hour, and which in particular has a vapour pressure of less than  $10^{-3}$  mmHg (0.13 Pa).

Preferably, the physiologically acceptable medium of the composition according to the invention may comprise, in a liquid fatty phase, at least one oil and/or one solvent which can be chosen, alone or as a mixture, from:

1/ esters of monocarboxylic acids with monoalcohols and polyalcohols; advantageously, the said ester is a C<sub>12</sub>-C<sub>15</sub> alkyl benzoate or corresponds to the following formula: R'<sub>1</sub>-COO-R'<sub>2</sub> in which:

R'<sub>1</sub> represents a linear or branched alkyl radical of 1 to 40 carbon atoms and preferably of 7 to 19 carbon atoms, optionally comprising one or more ethylenic double bonds, which is optionally substituted, and the hydrocarbon-based chain of which may be interrupted with one or more heteroatoms chosen from N and O and/or one or more carbonyl functions, and

R'<sub>2</sub> represents a linear or branched alkyl radical of 1 to 40 carbon atoms, preferably 3 to 30 carbon atoms and better still 3 to 20 carbon atoms, optionally

comprising one or more ethylenic double bonds, which is optionally substituted, and the hydrocarbon-based chain of which may be interrupted with one or more heteroatoms chosen from N and O and/or one or more carbonyl functions.

The term "optionally substituted" means that R'<sub>1</sub> and/or R'<sub>2</sub> may bear one or more substituents chosen, for example, from groups comprising one or more heteroatoms chosen from O and/or N, such as amino, amine, alkoxy and hydroxyl. Examples of groups R'<sub>1</sub> are those derived from fatty acids, preferably higher fatty acids, chosen from the group formed by acetic acid, propionic acid, butyric acid, caproic acid, caprylic acid, pelargonic acid, capric acid, undecanoic acid, lauric acid, myristic acid, palmitic acid, stearic acid, isostearic acid, arachidic acid, behenic acid, oleic acid, linolenic acid, linoleic acid, oleostearic acid, arachidonic acid and erucic acid, and mixtures thereof.

Preferably, R'<sub>1</sub> is a branched, unsubstituted alkyl group of 4 to 14 carbon atoms and preferably of 8 to 10 carbon atoms, and R'<sub>2</sub> is a branched, unsubstituted alkyl group of 5 to 15 carbon atoms and preferably of 9 to 11 carbon atoms.

Mention may be made in particular, preferably, of C<sub>8</sub>-C<sub>48</sub> esters, optionally incorporating in their hydrocarbon-based chain one or more heteroatoms chosen from N and O and/or one or more carbonyl functions; and more particularly purcellin oil (cetostearyl octanoate), isononyl isononanoate, isopropyl myristate, isopropyl palmitate, 2-ethylhexyl palmitate, 2-octyldodecyl stearate, 2-octyldodecyl erucate, isostearyl isostearate, a C<sub>12</sub> to C<sub>15</sub> alkyl benzoate, hexyl laurate or diisopropyl adipate; and heptanoates, octanoates, decanoates or ricinoleates of alcohols or of polyalcohols, for example of fatty alcohols, for instance propylene glycol dioctanoate, and also isopropyl N-lauroyl sarcosinate (especially Eldew-205SL from Ajinomoto); hydroxylated esters, for instance isostearyl lactate or diisostearyl malate; and pentaerythritol esters; branched C<sub>8</sub>-C<sub>16</sub> esters, especially isohexyl neopentanoate.

2/ Hydrocarbon-based plant oils with a high triglyceride content, formed from fatty acid esters of glycerol in which the fatty acids may have varied chain lengths from C<sub>4</sub> to C<sub>24</sub>, these chains possibly being linear or branched, and saturated or unsaturated; these oils are especially wheatgerm oil, corn oil, sunflower oil, shea oil, castor oil, sweet almond oil, macadamia oil, apricot oil, soyabean oil, rapeseed oil, cotton seed oil, alfalfa oil, poppy seed oil, pumpkin oil, sesame seed oil, marrow oil, avocado oil, hazelnut oil, grapeseed oil, blackcurrant seed oil, evening primrose oil, millet oil, barley oil, quinoa oil, olive oil, rye oil, safflower oil, candlenut oil, passionflower oil, musk rose oil, jojoba oil, palm oil or beauty-leaf oil; or alternatively caprylic/capric acid triglycerides, for instance those sold by the

company Stearinerie Dubois or those sold under the names Miglyol 810<sup>®</sup>, 812<sup>®</sup> and 818<sup>®</sup> by the company Dynamit Nobel.

5 3/ Alcohols, and especially C<sub>6</sub>-C<sub>32</sub> and especially C<sub>12</sub>-C<sub>26</sub> monoalcohols, for instance oleyl alcohol, linoleyl alcohol, linolenyl alcohol, isostearyl alcohol, 2-hexyldecanol, 2-butyloctanol, 2-undecylpentadecanol and octyldodecanol;

10 4/ linear or branched, volatile or non-volatile hydrocarbon-based oils, of synthetic or mineral origin, which may be chosen from hydrocarbon-based oils containing from 5 to 100 carbon atoms, and especially petroleum jelly, polydecenes, hydrogenated polyisobutenes such as Parleam, squalane and perhydrosqualene, and mixtures thereof.

15 Mention may be made more particularly of linear, branched and/or cyclic C<sub>5</sub>-C<sub>48</sub> alkanes, and preferentially branched C<sub>8</sub>-C<sub>16</sub> alkanes, for instance C<sub>8</sub>-C<sub>16</sub> isoalkanes of petroleum origin (also known as isoparaffins); especially decane, heptane, dodecane and cyclohexane; and also isododecane, isodecane and isohexadecane.

20 5/ Volatile or non-volatile silicone oils; Volatile silicone oils that may be mentioned include linear or cyclic volatile silicone oils, especially those with a viscosity of less than 8 centistokes, and especially containing from 2 to 10 silicon atoms, these silicones optionally comprising alkyl or alkoxy groups containing from 1 to 22 carbon atoms; and in particular octamethylcyclotetrasiloxane, decamethylcyclopentasiloxane, 25 dodecamethylcyclohexasiloxane, heptamethylhexyltrisiloxane, heptamethyloctyltrisiloxane, hexamethyldisiloxane, octamethyltrisiloxane, decamethyltetrasiloxane, dodecamethylpentasiloxane and methylhexyldimethylsiloxane, and mixtures thereof.

30 The non-volatile silicone oils that may be used according to the invention may be polydimethylsiloxanes (PDMS), polydimethylsiloxanes comprising alkyl or alkoxy groups, which are pendant and/or at the end of a silicone chain, each group containing from 2 to 24 carbon atoms, phenyl silicones, for instance phenyl trimethicones, phenyl dimethicones, phenyltrimethylsiloxydiphenylsiloxanes, 35 diphenyl dimethicones, diphenylmethyldiphenyltrisiloxanes and 2-phenylethyl trimethylsiloxysilicates.

Preferentially, the physiologically acceptable medium of the composition according

to the invention comprises, in a liquid fatty phase, at least one oil and/or one solvent chosen, alone or as a mixture, from isododecane, Parleam, isononyl isononanoate, octyldodecanol, phenyl trimethicone, C<sub>12</sub>-C<sub>15</sub> alkyl benzoates, butyl and ethyl acetates, and/or D5 (decamethylcyclopentasiloxane).

5

The liquid fatty phase may also comprise additional oils and/or solvents, which may be chosen, alone or as a mixture, from:

- fluoro oils such as perfluoropolyethers, perfluoroalkanes, for instance perfluorodecalin, perfluorodamantanes, perfluoroalkyl phosphate monoesters, diesters and triesters and fluoro ester oils;
- oils of animal origin;
- C<sub>6</sub> to C<sub>40</sub> and especially C<sub>10</sub>-C<sub>40</sub> ethers; propylene glycol ethers that are liquid at room temperature, such as propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate or dipropylene glycol mono-n-butyl ether;
- C<sub>8</sub>-C<sub>32</sub> fatty acids, for instance oleic acid, linoleic acid or linolenic acid, and mixtures thereof;
- difunctional oils, comprising two functions chosen from ester and/or amide and containing from 6 to 30 carbon atoms, especially 8 to 28 carbon atoms and better still from 10 to 24 carbon atoms, and 4 heteroatoms chosen from O and N; preferably, the amide and ester functions being in the chain;
- ketones that are liquid at room temperature (25°C) such as methyl ethyl ketone, methyl isobutyl ketone, diisobutyl ketone, isophorone, cyclohexanone and acetone;
- aldehydes that are liquid at room temperature, such as benzaldehyde and acetaldehyde.

30

### **Silicone compound**

According to one preferred embodiment, especially in the case of makeup compositions, in particular for the skin and/or the lips, the composition according to the invention comprises at least one silicone compound having a viscosity of less than 10,000,000 cSt at 25°C. Such a compound is advantageously chosen from silicone gums, volatile silicone oils and non-volatile silicone oils.

35

According to one particular embodiment, the care and/or makeup composition for the skin and/or the lips comprises at least one silicone compound.

The presence of such a compound in the compositions according to the invention makes it possible to obtain compositions of which the deposit on keratin materials, and in particular on the skin and/or the lips, is not very tacky or not tacky at all.

Its presence also makes it possible to improve the properties of transfer resistance of the deposits, and/or of resistance to attacks, in particular to rubbing. The colour fastness of the deposits can also be improved (resistance to rubbing), as can the comfort and the cosmeticity of the deposit formed (softness, glidance to the touch of the deposit formed).

In particular, the silicone compound under consideration according to the invention may be a silicone oil having a viscosity of between 3 centistokes (cSt) ( $3 \times 10^{-6} \text{ m}^2/\text{s}$ ) and 800 000 centistokes (cSt) ( $800\,000 \times 10^{-6} \text{ m}^2/\text{s}$ ).

Preferably, the silicone compound under consideration according to the invention may be a non-volatile silicone oil having a viscosity of between 9 centistokes (cSt) ( $3 \times 10^{-6} \text{ m}^2/\text{s}$ ) and 600 000 centistokes (cSt) ( $600\,000 \times 10^{-6} \text{ m}^2/\text{s}$ ).

### **Silicone oils**

For the purpose of the present invention, the term "silicone oil" is intended to mean an oil comprising at least one silicon atom, and especially at least one Si-O group.

In particular, the volatile or non-volatile silicone oils that can be used in the invention preferably have a viscosity at 25°C of less than 800 000 cSt, preferably less than or equal to 600 000 cSt, preferably less than or equal to 500 000 cSt.

The viscosity of these silicone oils can be measured according to standard ASTM D-445.

Of course, a composition according to the invention or under consideration according to a process of the invention can contain a mixture of silicone oils only partly made up of such an oil.

The silicone oils that can be used in the compositions according to the invention may be volatile and/or non-volatile.

### **Volatile silicone oils**

According to a first embodiment, the compositions according to the invention comprise at least one volatile silicone oil.

The volatile silicone oil that can be used in the invention can be chosen from silicone oils having in particular a viscosity  $\leq 8$  centistokes (cSt) ( $8 \times 10^{-6} \text{ m}^2/\text{s}$ ).

In addition, the volatile silicone oil that can be used in the invention may be chosen preferably from silicone oils having a flash point ranging from 40°C to 102°C, preferably having a flash point of greater than 55°C and less than or equal to 95°C, and preferentially ranging from 65°C to 95°C.

5 By way of volatile silicone oils, mention may be made of:

- linear or cyclic volatile silicone oils, in particular those having a viscosity  $\leq 8$  centistokes (cSt) ( $8 \times 10^{-6}$  m<sup>2</sup>/s at 25°C) and having in particular from 2 to 10 silicon atoms, and in particular from 2 to 7 silicon atoms, these silicones optionally comprising alkyl or alkoxy groups having from 1 to 10 carbon atoms.

10 More particularly, the volatile silicone oils are noncyclic and are in particular chosen from:

- noncyclic linear silicones of formula (I):

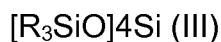


in which R, which may be identical or different, denotes:

15 - a saturated or unsaturated hydrocarbon-based radical having from 1 to 10 carbon atoms, preferably from 1 to 6 carbon atoms, optionally substituted with one or more fluorine atoms or with one or more hydroxyl groups, or

- a hydroxyl group, it being possible for one of the R radicals to be a phenyl group, n being an integer ranging from 0 to 8, preferably ranging from 2 to 6, and better still ranging from 3 to 5, the silicone compound of formula (I) containing at most 15 carbon atoms;

- branched silicones of formula (II) or (III) below:



25 in which R, which may be identical or different, denotes:

- a saturated or unsaturated hydrocarbon-based radical having from 1 to 10 carbon atoms, optionally substituted with one or more fluorine atoms or with one or more hydroxyl groups, or

- a hydroxyl group, it being possible for one of the R radicals to be a phenyl group, x being an integer ranging from 0 to 8, the silicone compound of formula (II) or (III) containing at most 15 carbon atoms.

Preferably, for the compounds of formulae (I), (II) and (III), the ratio between the number of carbon atoms and the number of silicon atoms is between 2.25 and 4.33.

35 The silicones of formulae (I) to (III) can be prepared according to known processes for synthesising silicone compounds.

Among the silicones of formula (I), mention may be made of:

- the following disiloxanes: hexamethyldisiloxane (surface tension = 15.9 mN/m), in particular sold under the name DC 200 Fluid 0.65 cSt by the company Dow Corning; 1,3-di-tert-butyl-1,1,3,3-tetramethyldisiloxane; 1,3-dipropyl-1,1,3,3-tetramethyldisiloxane; heptylpentamethyldisiloxane, 1,1,1-triethyl-3,3,3-trimethyldisiloxane; hexaethyldisiloxane; 1,1,3,3-tetramethyl-1,3-bis(2-methylpropyl)disiloxane; pentamethyloctyldisiloxane; 1,1,1-trimethyl-3,3,3-tris(1-methylethyl)disiloxane; 1-butyl-3-ethyl-1,1,3-trimethyl-3-propyldisiloxane; pentamethylpentyl disiloxane; 1-butyl-1,1,3,3-tetramethyl-3-(1-methylethyl)disiloxane; 1,1,3,3-tetramethyl-1,3-bis(1-methylpropyl)disiloxane; 1,1,3-triethyl-1,3,3-tripropyldisiloxane; (3,3-dimethylbutyl)pentamethyldisiloxane; (3-methylbutyl)pentamethyldisiloxane; (3-methylpentyl)pentamethyldisiloxane; 1,1,1-triethyl-3,3-dimethyl-3-propyldisiloxane; 1-(1,1-dimethylethyl)-1,1,3,3,3-pentamethyldisiloxane; 1,1,1-trimethyl-3,3,3-tripropyldisiloxane; 1,3-dimethyl-1,1,3,3-tetrakis(1-methylethyl)disiloxane; 1,1-dibutyl-1,3,3,3-tetramethyldisiloxane; 1,1,3,3-tetramethyl-1,3-bis(1-methylethyl)disiloxane; 1,1,1,3-tetramethyl-3,3-bis(1-methylethyl)disiloxane, 1,1,1,3-tetramethyl-3,3-dipropyldisiloxane; 1,1,3,3-tetramethyl-1,3-bis(3-methylbutyl)disiloxane; butylpentamethyldisiloxane; pentaethylmethyldisiloxane; 1,1,3,3-tetramethyl-1,3-dipentyldisiloxane; 1,3-dimethyl-1,1,3,3-tetrapropyldisiloxane; 1,1,1,3-tetraethyl-3,3-dimethyldisiloxane; 1,1,1-triethyl-3,3,3-tripropyldisiloxane; 1,3-dibutyl-1,1,3,3-tetramethyldisiloxane and hexylpentamethyldisiloxane;

- the following trisiloxanes: octamethyltrisiloxane (surface tension = 17.4 mN/m), in particular sold under the name DC 200 Fluid 1 cSt by the company Dow Corning; 3-pentyl-1,1,1,3,5,5,5-heptamethyltrisiloxane; 1-hexyl-1,1,3,3,5,5,5-heptamethyltrisiloxane; 1,1,1,3,3,5,5-heptamethyl-5-octyltrisiloxane; 1,1,1,3,5,5,5-heptamethyl-3-octyltrisiloxane, in particular sold under the name Silsoft 034 by the company OSI; 1,1,1,3,5,5,5-heptamethyl-3-hexyltrisiloxane (surface tension = 20.5 mN/m), in particular sold under the name DC 2-1731 by the company Dow Corning; 1,1,3,3,5,5-hexamethyl-1,5-dipropyltrisiloxane; 3-(1-ethylbutyl)-1,1,1,3,5,5,5-heptamethyltrisiloxane; 1,1,1,3,5,5,5-heptamethyl-3-(1-methylpentyl)trisiloxane; 1,5-diethyl-1,1,3,3,5,5-hexamethyltrisiloxane; 1,1,1,3,5,5,5-heptamethyl-3-(1-methylpropyl)trisiloxane; 3-(1,1-dimethylethyl)-1,1,1,3,5,5,5-heptamethyltrisiloxane; 1,1,1-5,5,5-hexamethyl-3,3-bis(1-methylethyl)trisiloxane; 1,1,1,3,3,5,5-hexamethyl-1,5-bis(1-methylpropyl)trisiloxane; 1,5-bis(1,1-dimethylethyl)-1,1,3,3,5,5-hexamethyltrisiloxane; 3-(3,3-dimethylbutyl)-1,1,1-3,5,5,5-heptamethyltrisiloxane; 1,1,1,3,5,5,5-heptamethyl-3-(3-methylbutyl)trisiloxane; 1,1,1,3,5,5,5-heptamethyl-3-(3-methylpentyl)trisiloxane, 1,1,1,3,5,5,5-heptamethyl-3-(2-methylpropyl)-

- trisiloxane; 1-butyl-1,1,3,3,5,5,5-heptamethyltrisiloxane; 1,1,1,3,5,5,5-heptamethyl-3-propyltrisiloxane; 3-isohexyl-1,1,1,3,5,5,5-heptamethyltrisiloxane; 1,3,5-triethyl-1,1,3,5,5-pentamethyltrisiloxane; 3-butyl-1,1,1,3,5,5,5-heptamethyltrisiloxane; 3-tert-pentyl-1,1,1,3,5,5,5-heptamethyltrisiloxane; 1,1,1,5,5,5-hexamethyl-3,3-dipropyltrisiloxane; 3,3-diethyl-1,1,1,5,5,5-hexamethyltrisiloxane; 1,5-dibutyl-1,1,3,3,5,5-hexamethyltrisiloxane; 1,1,1,5,5,5-hexaethyl-3,3-dimethyltrisiloxane; 3,3-dibutyl-1,1,1,5,5,5-hexamethyltrisiloxane; 3-ethyl-1,1,1,3,5,5,5-heptamethyltrisiloxane; 3-heptyl-1,1,1,3,5,5,5-heptamethyltrisiloxane and 1-ethyl-1,1,3,3,5,5,5-heptamethyltrisiloxane;
- 10 - the following tetrasiloxanes: decamethyltetrasiloxane (surface tension = 18 mN/m), in particular sold under the name DC 200 Fluid 1.5 cSt by the company Dow Corning; 1,1,3,3,5,5,7,7-octamethyl-1,7-dipropyltetrasiloxane; 1,1,1,3,3,5,7,7,7-nonamethyl-5-(1-methylethyl)tetrasiloxane, 1-butyl-1,1,3,3,5,5,7,7,7-nonamethyltetrasiloxane; 3,5-diethyl-1,1,1,3,5,7,7,7-octamethyl-15 tetrasiloxane; 1,3,5,7-tetraethyl-1,1,3,5,7,7-hexa-methyltetrasiloxane; 3,3,5,5-tetraethyl-1,1,1,7,7,7-hexamethyltetrasiloxane; 1,1,1,3,3,5,5,7,7-nonamethyl-7-phenyltetrasiloxane; 3,3-diethyl-1,1,1,5,5,7,7,7-octamethyltetrasiloxane; 1,1,1,3,3,5,7,7,7-nonamethyl-5-phenyltetrasiloxane;
- the following pentasiloxanes: dodecamethylpentasiloxane (surface tension = 18.7 mN/m), in particular sold under the name DC 200 Fluid 2 cSt by the company Dow Corning; 1,1,3,3,5,5,7,7,9,9-decamethyl-1,9-dipropylpentasiloxane; 3,3,5,5,7,7-hexaethyl-1,1,1,9,9,9-hexamethylpentasiloxane; 1,1,1,3,3,5,7,7,9,9,9-undeca-20 methyl-5-phenylpentasiloxane; 1-butyl-1,1,3,3,5,5,7,7,9,9,9-undecamethylpentasiloxane; 3,3-diethyl-1,1,1,5,5,7,7,9,9,9-decamethylpentasiloxane; 1,3,5,7,9-pentaethyl-1,1,3,5,7,9,9,9-heptamethylpentasiloxane; 3,5,7-triethyl-1,1,1,3,5,7,9,9,9-nonamethylpentasiloxane and 1,1,1-triethyl-3,3,5,5,7,7,9,9,9-nonamethyl-25 pentasiloxane;
- the following hexasiloxanes: 1-butyl-1,1,3,3,5,5,7,7-9,9,11,11,11-tridecamethylhexasiloxane; 3,5,7,9-tetraethyl-1,1,1,3,5,7,9,11,11,11-decamethylhexasiloxane and tetradecamethylhexasiloxane;
- hexadecamethylheptasiloxane;
- octadecamethyloctasiloxane;
- eicosomethylnonasiloxane.
- 35 Among the silicones of formula (II), mention may be made of:
- the following tetrasiloxanes: 2-[3,3,3-trimethyl-1,1-bis[(trimethylsilyl)oxy]disiloxanyl]ethyl;



- 1,1,1,5,5,5-hexamethyl-3-(2-methylpropyl)-3-[(trimethylsilyl)oxy]trisiloxane; 3-(1,1-dimethylethyl)-1,1,1,5,5,5-hexamethyl-3-[(trimethylsilyl)oxy]trisiloxane; 3-butyl-1,1,1,5,5,5-hexamethyl-3-[(trimethylsilyl)oxy]trisiloxane; 1,1,1,5,5,5-hexamethyl-3-propyl-3-[(trimethylsilyl)oxy]trisiloxane; 3-ethyl-1,1,1,5,5,5-hexamethyl-3-[(trimethylsilyl)oxy]trisiloxane; 1,1,1-triethyl-3,5,5,5-tetramethyl-3-(trimethylsiloxy)trisiloxane; 3-methyl-1,1,1,5,5,5-hexamethyl-3-[(trimethylsilyl)oxy]trisiloxane; 3-[(dimethylphenylsilyl)oxy]-1,1,1,3,5,5,5-heptamethyltrisiloxane; 1,1,1,5,5,5-hexamethyl-3-(2-methylpentyl)-3-[(trimethylsilyl)oxy]trisiloxane; 1,1,1,5,5,5-hexamethyl-3-(4-methylpentyl)-3-[(trimethylsilyl)oxy]trisiloxane; 3-hexyl-1,1,1,5,5,5-hexamethyl-3-[(trimethylsilyl)oxy]trisiloxane and 1,1,1,3,5,5,5-heptamethyl-3-[(trimethylsilyl)oxy]trisiloxane;
- the following pentasiloxanes: 1,1,1,3,5,5,7,7,7-nonamethyl-3-(trimethylsiloxy)tetrasiloxane and 1,1,1,3,3,7,7,7-octamethyl-5-phenyl-5-[(trimethylsilyl)oxy]tetrasiloxane;
- the following heptasiloxanes: 1,1,1,3,5,5,7,7,9,9,11,11,11-tridecamethyl-3-[(trimethylsilyl)oxy]hexasiloxane.

Among the silicones of formula (III), mention may be made of:

- 1,1,1,5,5,5-hexamethyl-3,3-bis(trimethylsiloxy)trisiloxane.
- Use may also be made of other volatile silicone oils chosen from:
- the following tetrasiloxanes: 2,2,8,8-tetramethyl-5-[(pentamethyldisiloxanyl)methyl]-3,7-dioxa-2,8-disilanonane; 2,2,5,8,8-pentamethyl-5-[(trimethylsilyl)methoxy]-4,6-dioxa-2,5,8-trisilanonane; 1,3-dimethyl-1,3-bis[(trimethylsilyl)methyl]-1,3-disiloxanediol; 3-ethyl-1,1,1,5,5,5-hexamethyl-3-[3-(trimethylsiloxy)propyl]trisiloxane and 1,1,1,5,5,5-hexamethyl-3-phenyl-3-[(trimethylsilyl)oxy] trisiloxane (Dow 556 Fluid);
- the following pentasiloxanes: 2,2,7,7,9,9,11,11,16,16-decamethyl-3,8,10,15-tetraoxa-2,7,9,11,16-pentasilheptadecane and silicic acid tetrakis[(trimethylsilyl)methyl] ester;
- the following hexasiloxanes: 3,5-diethyl-1,1,1,7,7,7-hexamethyl-3,5-bis[(trimethylsilyl)oxy]tetrasiloxane and 1,1,1,3,5,7,7,7-octamethyl-3,5-bis[(trimethylsilyl)oxy]tetrasiloxane;
- the heptasiloxane: 1,1,1,3,7,7,7-heptamethyl-3,5,5-tris[(trimethylsilyl)oxy]tetrasiloxane;
- the following octasiloxanes: 1,1,1,3,5,5,9,9,9-nonamethyl-3,7,7-tris[(trimethylsilyl)oxy]pentasiloxane; 1,1,1,3,5,7,9,9,9-nonamethyl-3,5,7-

tris[(trimethylsilyl)oxy]pentasiloxane and 1,1,1,7,7,7-hexamethyl-3,3,5,5-tetrakis[(trimethylsilyl)oxy]tetrasiloxane.

5 By way of volatile silicone oils, mention more particularly may be made of decamethylcyclopentasiloxane, in particular sold under the name DC-245 by the company Dow Corning, dodecamethylcyclohexasiloxane, in particular sold under the name DC-246 by the company Dow Corning, octamethyltrisiloxane, in particular sold under the name DC-200 Fluid 1 cSt by the company Dow Corning, decamethyltetrasiloxane, in particular sold under the name DC-200 Fluid 1.5 cSt  
10 by the company Dow Corning and DC-200 Fluid 5 cSt sold by the company Dow Corning, octamethylcyclotetrasiloxane, heptamethylhexyltrisiloxane, heptamethylethyltrisiloxane, heptamethyloctyltrisiloxane and dodecamethylpentasiloxane, and mixtures thereof.

15 It should be noted that, among the abovementioned oils, linear oils prove to be particularly advantageous.

#### Non-volatile silicone oils

According to a second embodiment, the compositions according to the invention comprise at least one non-volatile silicone oil.

20 The non-volatile silicone oil that can be used in the invention may be chosen from silicone oils having a viscosity at 25°C of greater than or equal to 9 centistokes (cSt) ( $9 \times 10^{-6} \text{ m}^2/\text{s}$ ) and less than 800 000 cSt, preferably between 50 and 600 000 cSt, preferably between 100 and 500 000 cSt. The viscosity of this silicone can be measured according to standard ASTM D-445.

25 Among these silicone oils, two types of oils can be distinguished according to whether or not they are phenyl oils.

By way of representation of these non-volatile linear silicone oils, mention may be made of polydimethylsiloxanes; alkyl dimethicones; vinylmethyl methicones; and also silicones modified with aliphatic, optionally fluorinated, groups or with  
30 functional groups such as hydroxyl, thiol and/or amine groups.

Thus, by way of non-phenyl, non-volatile silicone oils, mention may be made of:

- PDMSs comprising alkyl or alkoxy groups which are pendant and/or at the end of the silicone chain, said groups each having from 2 to 24 carbon atoms,
- PDMSs comprising aliphatic groups, or functional groups such as hydroxyl, thiol  
35 and/or amine groups,
- polyalkylmethylsiloxanes optionally substituted with a fluoro group, such as polymethyltrifluoropropyl dimethylsiloxanes,

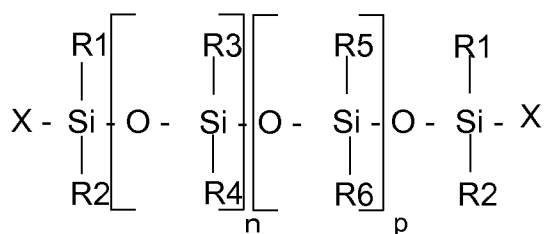
- polyalkylmethylsiloxanes substituted with functional groups such as hydroxyl, thio and/or amine groups,
- polysiloxanes modified with fatty acids, fatty alcohols or polyoxyalkylenes, and mixtures thereof.

5

According to one embodiment, a composition according to the invention contains at least one non-phenyl linear silicone oil.

The non-phenyl linear silicone oil may in particular be chosen from silicones of formula:

10



in which:

R1, R2, R5 and R6 are, together or separately, an alkyl radical having 1 to 6 carbon atoms,

15 R3 and R4 are, together or separately, an alkyl radical having from 1 to 6 carbon atoms, a vinyl radical, an amine radical or a hydroxyl radical,

X is an alkyl radical having from 1 to 6 carbon atoms, a hydroxyl radical or an amine radical,

n and p being integers chosen so as to have a fluid compound.

20

As non-volatile silicone oil that can be used according to the invention, mention may be made of those for which:

- the substituents R1 to R6 and X represent a methyl group, and p and n are such that the viscosity is 500,000 cst, such as the product sold under the name SE30 by the company General Electric, the product sold under the name AK 500000 by the company Wacker, the product sold under the name Mirasil DM 500,000 by the company Bluestar and the product sold under the name Dow Corning 200 Fluid 500,000 cst by the company Dow Corning;

25

- the substituents R1 to R6 and X represent a methyl group, and p and n are such that the viscosity is 60,000 cst, such as the product sold under the name Dow Corning 200 Fluid 60000 CS by the company Dow Corning and the product sold under the name Wacker Belsil DM 60,000 by the company Wacker;

30

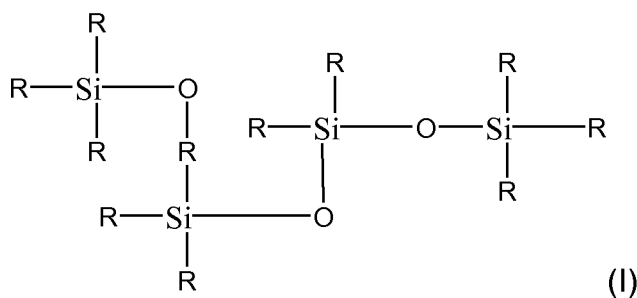
- the substituents R1 to R6 and X represent a methyl group, and p and n are such that the viscosity is 350 cst, such as the product sold under the name Dow Corning 200 Fluid 350 CS by the company Dow Corning;

- 5 - the substituents R1 to R6 represent a methyl group, the group X represents a hydroxyl group, and n and p are such that the viscosity is 700 cst, such as the product sold under the name Baysilone Fluid T0.7 by the company Momentive.

According to one embodiment variant, a composition according to the invention contains at least one phenyl silicone oil.

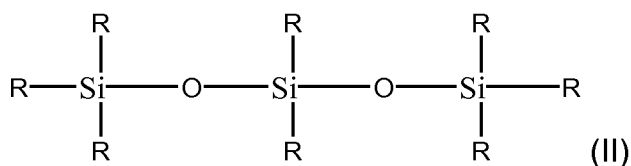
- 10 By way of representation of these non-volatile phenyl silicone oils, mention may be made of:

- the phenyl silicone oils corresponding to the following formula:



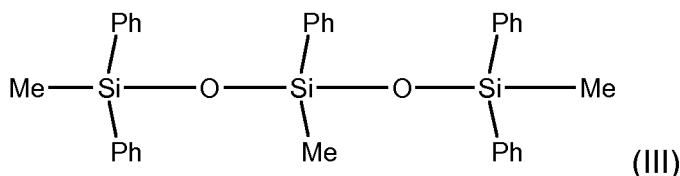
- 15 in which the R groups represent, independently of one another, a methyl or a phenyl, with the proviso that at least one R group represents a phenyl. Preferably in this formula, the phenyl silicone oil comprises at least three phenyl groups, for example at least four, at least five or at least six;

- the phenyl silicone oils corresponding to the following formula:



- in which the R groups represent, independently of one another, a methyl or a phenyl, with the proviso that at least one R group represents a phenyl. Preferably in this formula, said organopolysiloxane comprises at least three phenyl groups, for example at least four or at least five. Mixtures of the phenyl organopolysiloxanes described above may be used. Mention may, for example, be made of mixtures of triphenyl, tetraphenyl or pentaphenyl organopolysiloxanes;

- the phenyl silicone oils corresponding to the following formula:

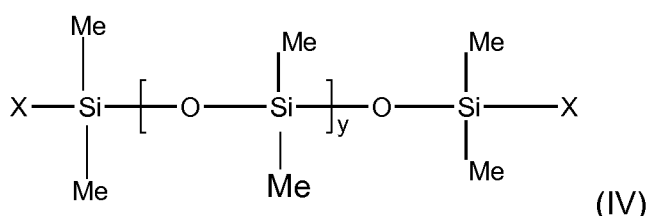


in which Me represents methyl, Ph represents phenyl. Such a phenyl silicone is in particular manufactured by Dow Corning under the reference PH-1555 HRI or else Down Corning 555 Cosmetic Fluid (chemical name: 1,3,5-trimethyl 1,1,3,5,5-pentaphenyl trisiloxane; INCI name: trimethyl pentaphenyl trisiloxane). The

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reference Dow Corning 554 Cosmetic Fluid may also be used;

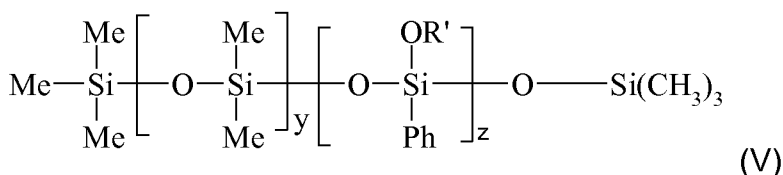
- the phenyl silicone oils corresponding to the following formula:



10

in which Me represents methyl, y is between 1 and 1000, and X represents  $-\text{CH}_2-\text{CH}(\text{CH}_3)(\text{Ph})$ ;

- the phenyl silicone oils corresponding to the following formula (V):



in which Me is methyl and Ph is phenyl, OR' represents an  $-\text{OSiMe}_3$  group and y is 0 or ranges between 1 and 1000, and z ranges between 1 and 1000, such that the compound (V) is a non-volatile oil.

15

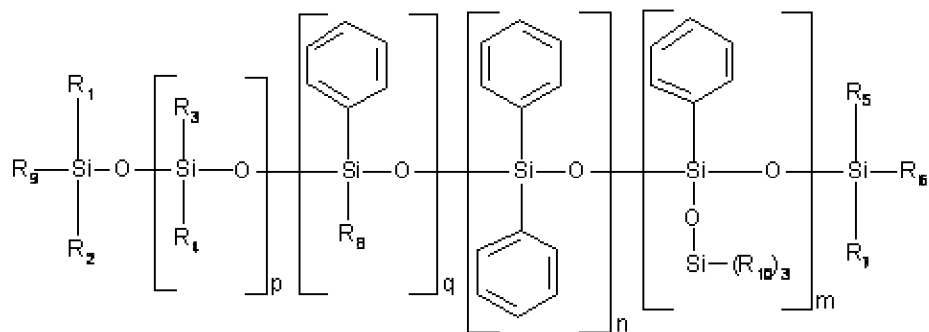
According to a first embodiment, y ranges between 1 and 1000. Use may, for example, be made of trimethyl siloxyphenyl dimethicone, in particular sold under the reference Belsil PDM 1000 by the company Wacker.

20

According to a second embodiment, y is equal to 0. Use may, for example, be made of phenyl trimethylsiloxy trisiloxane, in particular sold under the reference Dow Corning 556 Cosmetic Grade Fluid;

- the phenyl silicone oils corresponding to the following formula (VI), and mixtures thereof:

25



(VI)

in which:

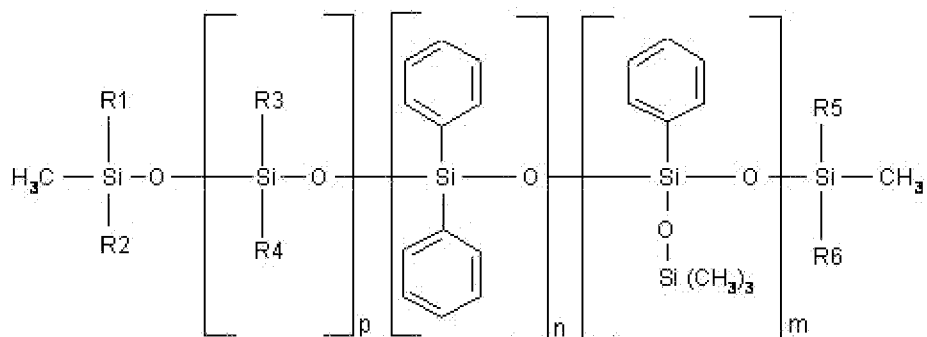
- R<sub>1</sub> to R<sub>10</sub>, independently of one another, are saturated or unsaturated, linear, cyclic or branched, C<sub>1</sub>-C<sub>30</sub> hydrocarbon-based radicals,

5 - m, n, p and q are, independently of one another, integers between 0 and 900, with the proviso that the sum 'm+n+q' is other than 0.

Preferably, the sum 'm+n+q' is between 1 and 100. Preferably, the sum 'm+n+p+q' is between 1 and 900, even better still between 1 and 800. Preferably, q is equal to 0;

10

- the phenyl silicone oils corresponding to the following formula (VII), and mixtures thereof:



(VII)

15 in which:

- R<sub>1</sub> to R<sub>6</sub>, independently of one another, are saturated or unsaturated, linear, cyclic or branched, C<sub>1</sub>-C<sub>30</sub> hydrocarbon-based radicals,

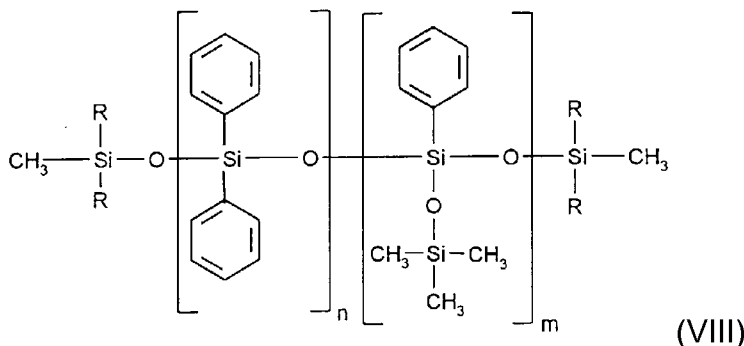
- m, n and p are, independently of one another, integers between 0 and 100, with the proviso that the sum 'n + m' is between 1 and 100.

20 Preferably, R<sub>1</sub> to R<sub>6</sub>, independently of one another, represent a saturated, linear or branched, C<sub>1</sub>-C<sub>30</sub>, in particular C<sub>1</sub>-C<sub>12</sub>, hydrocarbon-based radical, and in particular a methyl, ethyl, propyl or butyl radical.

In particular, R<sub>1</sub> to R<sub>6</sub> may be identical, and in addition may be a methyl radical.

Preferably, it is possible to have  $m=1$  or 2 or 3, and/or  $n=0$  and/or  $p=0$  or 1, in formula (VII);

- 5 - the phenyl silicone oils corresponding to formula (VIII), and mixtures thereof:



in which:

- R is a  $C_1$ - $C_{30}$  alkyl radical, an aryl radical or an aralkyl radical,
- n is an integer ranging from 0 to 100, and
- 10 - m is an integer ranging from 0 to 100, with the proviso that the sum  $n+m$  ranges from 1 to 100.

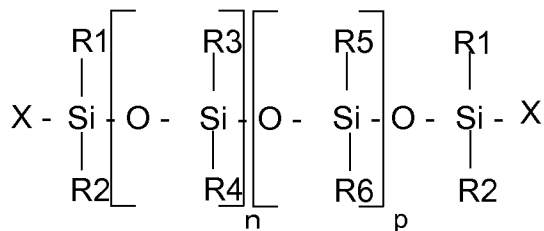
In particular, the R radicals of formula (VIII), and  $R_1$  to  $R_{10}$  defined above, can each represent a linear or branched, saturated or unsaturated, especially  $C_2$ - $C_{20}$ ,  
 15 in particular  $C_3$ - $C_{16}$  and more particularly  $C_4$ - $C_{10}$ , alkyl radical, or a  $C_6$ - $C_{14}$ , in particular  $C_{10}$ - $C_{13}$ , monocyclic or polycyclic aryl radical, or an aralkyl radical, the aryl and alkyl residues of which are as defined above.

Preferably, R of formula (VIII) and  $R_1$  to  $R_{10}$  can each represent a methyl, ethyl, propyl, isopropyl, decyl, dodecyl or octadecyl radical, or else a phenyl, tolyl, benzyl  
 20 or phenethyl radical.

According to one embodiment, use may be made of a phenyl silicone oil of formula (VIII) having a viscosity at  $25^\circ\text{C}$  of between 5 and  $1500\text{ mm}^2/\text{s}$  (i.e. 5 to 1500 cSt), preferably having a viscosity between 5 and  $1000\text{ mm}^2/\text{s}$  (i.e. 5 to 1000 cSt).

As phenyl silicone oil of formula (VIII), use may in particular be made of phenyl trimethicones, such as DC556 from Dow Corning (22.5 cSt) or the Silbione 70663V30 oil from Rhône Poulenc (28 cSt), or diphenyl dimethicones, such as the Belsil oils, in particular Belsil PDM1000 (1000 cSt), Belsil PDM 200 (200 cSt) and Belsil PDM 20 (20 cSt) from Wacker. The values between parentheses represent the viscosities at  $25^\circ\text{C}$ ;  
 25  
 30

- phenyl silicone oils corresponding to the following formula, and mixtures thereof:



(IX)

in which:

R1, R2, R5 and R6 are, together or separately, an alkyl radical having 1 to 6 carbon atoms,

5 R3 and R4 are, together or separately, an alkyl radical having from 1 to 6 carbon atoms, or an aryl radical,

X is an alkyl radical having from 1 to 6 carbon atoms, a hydroxyl radical or a vinyl radical,

10 n and p being chosen so as to give the oil a weight-average molecular weight of less than 200 000 g/mol, preferably less than 150 000 g/mol and more preferably less than 100 000 g/mol.

The phenyl silicones that are more particularly suitable for the invention are those corresponding to formulae (II) (and in particular formula (III)), and (V), above.

15

More particularly, the phenyl silicones are chosen more from phenyl trimethicones, phenyl dimethicones, phenyltrimethylsiloxydiphenylsiloxanes, diphenyl dimethicones, diphenylmethyldiphenyltrisiloxanes and 2-phenylethyltrimethylsiloxysilicates, and mixtures thereof.

20 Preferably, the weight-average molecular weight of the non-volatile phenyl silicone oil according to the invention ranges from 500 to 10 000 g/mol.

### **Silicone gum**

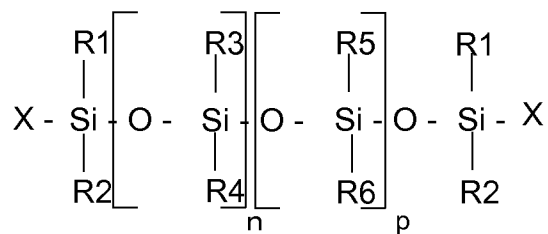
25 According to another embodiment variant, a composition according to the invention contains at least one silicone gum.

The silicone gum that can be used in the invention may be chosen from silicone gums having a viscosity at 25°C of greater than 800,000 centistokes (cSt)( $9 \times 10^{-6} \text{ m}^2/\text{s}$ ) and in particular between 800,000 and 10,000,000 cSt, preferably between 1,000,000 and 5,000,000 cSt, preferably between 1,000,000 and 2,500,000 cSt.

30 The viscosity of this silicone can be measured according to standard ASTM D-445. The molecular weight of the silicone gums is generally greater than 350,000 g/mol, between 350,000 and 800,000 g/mol, preferably from 450,000 to 700,000 g/mol.

The silicone gum may in particular be chosen from the silicones of formula:





in which:

- R1, R2, R5 and R6 are, together or separately, an alkyl radical having 1 to 6 carbon atoms,
- R3 and R4 are, together or separately, an alkyl radical having from 1 to 6 carbon atoms, a vinyl radical, an amine radical or a hydroxyl radical,
- X is an alkyl radical having from 1 to 6 carbon atoms, a hydroxyl radical or an amine radical,
- n and p being integers chosen such that the viscosity of the compound is greater than 800,000 cSt.

As silicone gum that can be used according to the invention, mention may be made of those for which:

- the substituents R1 to R6 represent a methyl group, the group X represents a methyl group, and n and p are such that the molecular weight of the polymer is 600 000 g/mol, such as the product sold under the name Mirasil C-DPDM by the company Bluestar;
- the substituents R1 to R6 represent a methyl group, the group X represents a hydroxyl group, and n and p are such that the molecular weight of the polymer is 600 000 g/mol, such as the product sold under the name SGM 36 by the company Dow Corning;
- dimethicones of the (polydimethylsiloxane)(methylvinylsiloxane) type, such as SE63 sold by GE Bayer Silicones, poly(dimethylsiloxane)(diphenyl)(methylvinylsiloxane) copolymers, and mixtures thereof.

Advantageously, a composition according to the invention may comprise from 0.1% to 60% by weight of silicone compound(s) according to the invention, relative to the total weight of the composition.

- In particular, it may comprise from 0.2% to 50% by weight of silicone compound(s) according to the invention, relative to the total weight of the composition.

More particularly, it may comprise from 0.5% to 40% by weight of silicone compound(s) according to the invention, relative to the total weight of the composition.

**Solid fatty substances**

A composition according to the invention may also comprise at least one solid fatty substance, in particular chosen from waxes and/or pasty fatty substances.

Preferably, the amount of pasty substance in the makeup and/or care composition according to the invention is between 0.5% and 50% by weight, in particular 1% to 40% by weight, or even 2% to 30% by weight, relative to the total weight of the composition.

**Waxes**

According to a first embodiment, the composition is free of wax.

According to a second embodiment, the composition comprises at least one wax.

According to this embodiment, the amount of wax(es) in the makeup and/or care composition according to the invention can preferably range from 0.1% to 70% by weight, relative to the total weight of the composition, preferably from 1% to 40% by weight, and better still from 5% to 30% by weight.

Preferably, in particular in the case of makeup compositions for the skin and/or the lips, the wax content is between 0.5% and 30% by weight, in particular 1% to 20% by weight, or even 2% to 15% by weight, relative to the total weight of the composition.

The term "wax" is intended to mean a lipophilic compound that is solid at ambient temperature (25°C), with a solid/liquid reversible change of state, having a melting point of greater than or equal to 30°C, which may be up to 200°C. The waxes may be chosen from waxes of animal, plant, mineral or synthetic origin and mixtures thereof. Mention may in particular be made of hydrocarbon-based waxes, for instance beeswax, lanolin wax and Chinese insect waxes; rice bran wax, carnauba wax, candelilla wax, ouricury wax, esparto wax, berry wax, shellac wax, Japan wax and sumach wax; montan wax, orange wax and lemon wax, microcrystalline waxes, paraffins and ozokerite; polyethylene waxes, waxes obtained by Fischer-Tropsch synthesis and waxy copolymers, and also esters thereof. Mention may also be made of waxes obtained by catalytic hydrogenation of animal or plant oils having linear or branched C<sub>8</sub>-C<sub>32</sub> fatty chains. Among these, mention may in particular be made of hydrogenated sunflower oil, hydrogenated castor oil, hydrogenated coconut oil, hydrogenated lanolin oil and bis(1,1,1-trimethylolpropane) tetrastearate. Mention may also be made of silicone waxes and of fluoro waxes. Use may also be made of waxes obtained by hydrogenation of castor oil esterified with cetyl alcohol.

Advantageously, a composition according to the invention may comprise at least one wax which is in particular hydrocarbon-based.

**Pasty fatty substances**

According to a first embodiment, the composition is free of pasty fatty substances.

According to a second embodiment, the composition comprises at least one pasty fatty substance. According to this embodiment, the amount of pasty fatty substance in the makeup and/or care composition according to the invention is preferably between 0.5% and 30% by weight, in particular 1% to 20% by weight, or even 2% to 15% by weight, relative to the total weight of the composition.

The term "pasty fatty substance" is intended to mean a lipophilic fatty compound with reversible solid/liquid change of state and comprising a liquid fraction and a solid fraction at a temperature of 23°C. The pasty compound preferably has a hardness at 20°C ranging from 0.001 to 0.5 MPa, preferably from 0.002 to 0.4 MPa. The pasty compound is preferably chosen from synthetic compounds and compounds of plant origin. A pasty compound can be obtained by synthesis from starting products of plant origin. Mention may in particular be made, alone or as a mixture, of:

- lanolin and derivatives thereof, such as lanolin alcohol, oxyethylenated lanolins, acetylated lanolin, lanolin esters such as isopropyl lanolate, or oxypropylenated lanolins,
- polymeric or non-polymeric silicone compounds having a viscosity of greater than 10,000,000 cSt at 25°C, for instance high-molecular-weight polydimethylsiloxanes, polydimethylsiloxanes with side chains of the alkyl or alkoxy type having from 8 to 24 carbon atoms, in particular stearyl dimethicones,
- polymeric or non-polymeric fluoro compounds,
- vinyl polymers, in particular olefin homopolymers; olefin copolymers; hydrogenated diene homopolymers and copolymers; linear or branched homopolymer or copolymer oligomers of alkyl (meth)acrylates preferably containing a C<sub>8</sub>-C<sub>30</sub> alkyl group; homopolymer and copolymer oligomers of vinyl esters containing C<sub>8</sub>-C<sub>30</sub> alkyl groups; homopolymer and copolymer oligomers of vinyl ethers containing C<sub>8</sub>-C<sub>30</sub> alkyl groups,
- liposoluble polyethers resulting from polyetherification between one or more C<sub>2</sub>-C<sub>100</sub>, preferably C<sub>2</sub>-C<sub>50</sub>, diols; and in particular copolymers of ethylene oxide and/or of propylene oxide with C<sub>6</sub>-C<sub>30</sub> long-chain alkylene oxides, more preferably such that the weight ratio of the ethylene oxide and/or propylene oxide to the alkylene oxides in the copolymer is from 5:95 to 70:30,
- polyol ethers chosen from ethers of pentaerythritol and of polyalkylene glycol, ethers of fatty alcohol and of sugar, and mixtures thereof, the ether of pentaerythritol and of polyethylene glycol comprising 5 oxyethylene (5 OE) units (CTFA name: PPG-5 pentaerythrityl ether), and the ether of pentaerythritol and of

polypropylene glycol comprising 5 oxypropylene (5 OP) units (CTFA name: PPG-5 pentaerythrityl ether), and mixtures thereof,

- esters and polyesters; and in particular (i) esters of a glycerol oligomer, especially diglycerol esters, in particular condensates of adipic acid and of glycerol, for which some of the hydroxyl groups of the glycerols have reacted with a mixture of fatty acids such as stearic acid, capric acid, stearic acid and isostearic acid, and 12-hydroxystearic acid; (ii) phytosterol esters, (iii) pentaerythritol esters; (iv) esters formed from at least one alcohol, at least one of the alcohols being a Guerbet alcohol, and from a diacid dimer formed from at least one unsaturated fatty acid; (v) non-crosslinked polyesters resulting from polycondensation between a linear or branched C<sub>4</sub>-C<sub>50</sub> dicarboxylic acid or polycarboxylic acid and a C<sub>2</sub>-C<sub>50</sub> diol or polyol, (vi) polyesters which result from esterification, with a polycarboxylic acid, of an ester of an aliphatic hydroxycarboxylic acid; (vii) aliphatic esters of an ester resulting from the esterification of an aliphatic hydroxycarboxylic acid ester with an aliphatic carboxylic acid containing in particular 4 to 30 carbon atoms. The aliphatic hydroxycarboxylic acid ester is advantageously derived from a hydroxylated aliphatic carboxylic acid containing 2 to 40 carbon atoms and 1 to 20 hydroxyl groups; (viii) aliphatic esters of an ester, chosen from the ester resulting from the esterification reaction of hydrogenated castor oil with isostearic acid (hydrogenated castor oil monoisostearate, diisostearate or triisostearate).

The pasty compound may also be of plant origin. Mention may in particular be made of isomerised jojoba oil, such as trans-isomerised, partially hydrogenated jojoba oil; orange wax, shea butter, partially hydrogenated olive oil, cocoa butter and mango oil.

#### Dyestuffs

The composition according to the invention may also comprise one or more dyestuffs chosen from pulverulent compounds, for instance pigments, pearlescent agents and glitter flakes, and/or liposoluble or water-soluble dyes. The dyestuffs, in particular pulverulent dyestuffs, may be present in the composition in a content of from 0.01% to 50% by weight, relative to the weight of the composition, preferably from 0.1% to 40% by weight, or even from 1% to 30% by weight.

The term "pigments" should be understood to mean white or coloured, mineral or organic particles of any shape, which are insoluble in the physiological medium, and which are intended to colour the composition. The term "pearlescent agents" should be understood to mean iridescent particles of any shape, in particular produced by certain molluscs in their shell, or alternatively synthesised.

The pigments may be white or coloured, mineral and/or organic, and interference or non-interference. Among the mineral pigments, mention may be made of titanium dioxide, optionally surface-treated, zirconium oxide or cerium oxide, and also iron oxide, chromium oxide, manganese violet, ultramarine blue, chromium hydrate and ferric blue. Among the organic pigments, mention may be made of carbon black, pigments of D & C type, and lakes based on cochineal carmine, or on barium, strontium, calcium or aluminium.

The pearlescent pigments may be chosen from white pearlescent pigments such as mica coated with titanium or with bismuth oxychloride, coloured pearlescent pigments such as titanium mica with iron oxides, titanium mica in particular with ferric blue or with chromium oxide, titanium mica with an organic pigment of the abovementioned type, and also pearlescent pigments based on bismuth oxychloride.

The water-soluble dyes are, for example, beetroot juice and methylene blue and can represent 0.01% to 6% of the total weight of the composition.

Preferably, in particular in the case of a makeup composition, the composition comprises at least one dyestuff.

The dyestuff is in particular chosen from organic or inorganic dyestuffs, in particular of the type of pigments or pearlescent agents conventionally used in cosmetic compositions, liposoluble or water-soluble dyes, materials with a specific optical effect, and mixtures thereof.

Preferably, the amount of dyestuff(s) in a composition according to the invention, in particular in the case of a makeup composition, is between 0.01% and 40% by weight, in particular 0.1% and 30% by weight, or even 1% and 20% by weight, of the total weight of the composition.

### **Fillers**

According to another particular embodiment, a composition according to the invention, in particular a care and/or makeup composition for the skin and/or the lips, comprises at least one organic or inorganic filler. Preferably, it will be a sebum-absorbing filler in the case of a makeup composition for the skin or a silicone filler, in particular in the case of a makeup composition for the lips. The presence of such a filler makes it possible in particular to reduce the tack of the deposit when it is applied and while wearing it.

This particular embodiment can in particular make it possible to obtain compositions, in particular makeup compositions, of which the deposit on keratin materials, and in particular the lips and/or the skin, is uniform and/or not very tacky

or not at all tacky. Such a deposit can in particular provide a feeling of comfort while being worn (softness, property of glidance of the deposit formed).

In addition, such a composition may have properties of transfer resistance and also of colour fastness of the deposit (no fragility or fragmentation of the deposit, which remains uniform, and resistance to rubbing), and of staying power with respect to grease.

As specified above, a composition according to the invention may also comprise at least one organic or inorganic filler.

Thus, a composition may comprise from 0.01% to 35% by weight, preferably 0.1% to 20% by weight of filler(s), relative to its total weight.

By way of illustration of these fillers, mention may be made of talc, mica, silica, kaolin, calcium carbonate, barium sulphate, nylon powders (in particular Orgasol) and polyethylene powders, Teflon, starch, boron nitride, copolymer microspheres such as Expancel (Nobel Industrie); and also mixtures thereof.

According to one embodiment variant, a composition according to the invention contains at least one filler capable of absorbing an oil.

In particular, a composition according to the invention comprises at least one filler which has a capacity to absorb and/or adsorb an oil or a liquid fatty substance such as, for example, sebum (of the skin).

This oil-absorbing filler may also advantageously have a BET specific surface area greater than or equal to 300 m<sup>2</sup>/g, preferably greater than 500 m<sup>2</sup>/g, and preferentially greater than 600 m<sup>2</sup>/g, and in particular less than 1500 m<sup>2</sup>/g.

The "BET specific surface area" is determined according to the BET (Brunauer - Emmet - Teller) method described in "The Journal of the American Chemical Society", vol. 60, page 309, February 1938 and corresponding to international standard ISO 5794/1 (annex D). The BET specific surface area corresponds to the total specific surface area (therefore including micropores) of the powder.

The filler under consideration according to the invention is thus characterised in that it has an oil uptake of greater than or equal to 1 ml/g, in particular ranging from 1 ml/g to 20 ml/g, or even ranging from 1.5 ml/g to 15 ml/g. Preferably, it has an oil uptake of greater than or equal to 2 ml/g, in particular ranging from 2 ml/g to 20 ml/g, or even ranging from 2 ml/g to 15 ml/g.

This oil uptake, which corresponds to the amount of oil absorbed and/or adsorbed by the filler, can be characterised by measuring the wet point according to the method described hereinafter.

Method for measuring oil uptake of a pulverulent material:

The oil uptake of a powder is measured according to the method for determining oil uptake of a powder described in standard NF T 30-022. It corresponds to the amount of oil adsorbed onto the available surface of the pulverulent material by measurement of the wet point.

- 5 An amount  $m$  (in grams) of powder of between approximately 0.5 g and 5 g (the amount depends on the density of the powder) is placed on a glass plate and then isononyl isononanoate is added dropwise.

After the addition of 4 to 5 drops of isononyl isononanoate, the isononyl isononanoate is incorporated into the filler using a spatula and isononyl  
10 isononanoate continues to be added until the formation of conglomerates of isononyl isononanoate and of powder. From this moment on, isononyl isononanoate is added one drop at a time and the mixture is then triturated with the spatula. The addition of isononyl isononanoate is stopped when a smooth firm  
15 paste is obtained. It should be possible to spread this paste over the glass plate without there being any cracks or any formation of lumps. The volume  $V_s$  (expressed in ml) of isononyl isononanoate used is then noted.

The oil uptake corresponds to the  $V_s/m$  ratio.

This oil-absorbing filler may be a mineral powder or an organic powder; it may be  
20 chosen from silica, polyamide (nylon®) powders, powders of acrylic polymers, in particular of polymethyl methacrylate, or of polymethyl methacrylate/ethylene glycol dimethacrylate, of polyallyl methacrylate/ethylene glycol dimethacrylate, of ethylene glycol dimethacrylate/lauryl methacrylate copolymer; silicone elastomer  
25 powders, in particular obtained by polymerisation of organopolysiloxane having at least two hydrogen atoms each bonded to a silicon atom and of an organopolysiloxane comprising at least two ethylenically unsaturated groups (in particular two vinyl groups) in the presence of a platinum catalyst.

The oil-absorbing filler may be a powder coated with a hydrophobic treatment agent.

30

Examples of fillers having an oil uptake of greater than or equal to 1.5 ml/g are described below, with their oil uptake value measured according to the protocol defined above.

- 35 As silica powders, mention may be made of:

- porous silica microspheres, in particular those sold under the name Sunsphere® H53, Sunsphere® H33 (oil uptake equal to 3.70 ml/g) by the company Asahi

Glass; MSS-500-3H by the company Kobo; Silica Beads SB-700 by the company Myoshi;

- polydimethylsiloxane-coated amorphous silica microspheres, in particular those sold under the name SA Sunsphere® H 33 (oil uptake equal to 2.43 ml/g);
  - 5 - silica silylate powders, in particular those sold under the name Dow Corning VM-2270 Aerogel Fine Particles by the company Dow Corning (oil uptake equal to 10.40 ml/g);
  - hollow amorphous silica particles, in particular those sold under the name Silica Shells by the company Kobo (oil uptake equal to 5.50 ml/g);
  - 10 - precipitated silica powders surface-treated with a mineral wax, such as precipitated silica treated with a polyethylene wax, and in particular those sold under the name Acematt OR 412 by the company Evonik Degussa (oil uptake equal to 3.98 ml/g).
- 15 As acrylic polymer powders, mention may be made of:
- porous spheres of polymethyl methacrylate/ethylene glycol dimethacrylate, sold under the name Microsponge 5640 by the company Cardinal Health technologies (oil uptake equal to 1.55 ml/g), Ganzpearl® GMP-0820 by the company Ganz Chemical;
  - 20 - powders of ethylene glycol dimethacrylate/lauryl methacrylate copolymer, in particular those sold under the name Polytrap® 6603 from the company Dow Corning (oil uptake equal to 6.56 ml/g),
  - polymethyl methacrylate powders sold under the name Covabead® LH85 by the company Wackherr;
  - 25 - powders of polyallyl methacrylate/ethylene glycol dimethacrylate sold under the name Poly-Pore® L200, Poly-Pore® E200 by the company Amcol.

As polyamide powders, mention may be made of:

- the nylon powder sold under the name Orgasol® 4000 by the company Atochem;
- 30 - nylon-6 powder, in particular the product sold under the name Pomp610 by the company Ube Industries (oil uptake equal to 2.02 ml/g).

As perlite powder mention may in particular be made of the product sold under the name Optimat 1430 OR by the company World Minerals (oil uptake equal to 2.4

35 ml/g).



As magnesium carbonate powder, mention may in particular be made of the product sold under the name Tipo Carbomagel by the company Buschle & Lepper (oil uptake equal to 2.14 ml/g).

- 5 The oil-absorbing filler which is particularly preferred is a silica powder and more particularly a silica powder having an oil uptake at least equal to 3.70 ml/g, and in particular those sold under the name Sunsphere® H 33 by the company Asahi Glass, and under the name Dow Corning VM-2270 Aerogel Fine Particles by the company Dow Corning.

10

The filler(s) in particular capable of absorbing an oil may be present in a composition according to the invention in a content ranging from 0.5% to 40% by weight, preferably from 1% to 20% by weight, and better still from 1% to 15% by weight, relative to the total weight of the composition.

- 15 A composition according to the invention may use at least one filler and at least one supramolecular polymer in a polymer(s)/oil-absorbing filler(s) weight ratio of greater than 1, preferably greater than 1.5, and even better still greater than 2. According to one embodiment variant, a composition according to the invention contains at least one filler having an oil uptake of greater than or equal to 1.5 ml/g.

20

#### Silicone filler

The compositions according to the invention may comprise at least one silicone filler.

- 25 The silicone filler may be chosen from silicone-resin-coated organopolysiloxane powders and polymethylsilsesquioxane powders, and mixtures thereof.

The organopolysiloxane powder may in particular be coated with silsesquioxane resin, as described, for example, in patent US 5 538 793. Such elastomer powders are sold under the names KSP-100, KSP-101, KSP-102, KSP-103, KSP-104 and KSP-105 by the company Shin Etsu, and have the INCI name: vinyl  
30 dimethicone/methicone silsesquioxane crosspolymer.

As polymethylsilsesquioxane powder, mention may in particular be made of silicone resin microbeads such as those sold under the name Tospearl by the company Momentive Performance Materials, and in particular under the reference Tospearl 145 A; and mixtures thereof.

- 35 In particular, the composition according to the invention may comprise a silicone filler chosen from silicone-resin-coated organopolysiloxane powders and polymethylsilsesquioxane powders.

**Silicone elastomer**

According to another embodiment variant, a composition according to the invention, in particular a makeup composition for the skin and/or the lips, may comprise at least one silicone elastomer, otherwise known as organopolysiloxane elastomer.

The term "organopolysiloxane elastomer" is intended to mean a supple, deformable organopolysiloxane having viscoelastic properties and in particular the consistency of a sponge or of a supple sphere. Its modulus of elasticity is such that this material withstands deformation and has a limited capacity for extension and contraction. This material is capable of regaining its original shape after having been stretched.

It is more particularly a crosslinked organopolysiloxane elastomer.

Preferably, the organopolysiloxane elastomer is obtained by crosslinking addition reaction (A) of diorganopolysiloxane containing at least two hydrogens each bonded to a silicon, and (B) of diorganosiloxane having at least two ethylenically unsaturated groups bonded to silicon, in particular in the presence (C) of a platinum catalyst, as described, for example, in application EP-A-295886.

In particular, the organopolysiloxane elastomer can be obtained by reaction of dimethylpolysiloxane containing dimethylvinylsiloxy end groups and of methylhydrogenopolysiloxane containing trimethylsiloxy end groups, in the presence of a platinum catalyst.

Compound (A) may in particular be chosen from methylhydrogenopolysiloxanes containing trimethylsiloxy end groups, dimethylsiloxane-methylhydrogenosiloxane copolymers containing trimethylsiloxy end groups and dimethylsiloxane-methylhydrogenosiloxane cyclic copolymers.

The organopolysiloxanes (B) may in particular be chosen from methylvinylpolysiloxanes, methylvinylsiloxane-dimethylsiloxane copolymers, dimethylpolysiloxanes containing dimethylvinylsiloxy end groups, dimethylsiloxane-methylphenylsiloxane copolymers containing dimethylvinylsiloxy end groups, dimethylsiloxane-diphenylsiloxane-methylvinylsiloxane copolymers containing dimethylvinylsiloxy end groups, dimethylsiloxane-methylvinylsiloxane copolymers containing trimethylsiloxy end groups, dimethylsiloxane-methylphenylsiloxane-methylvinylsiloxane copolymers containing trimethylsiloxy end groups, methyl(3,3,3-trifluoropropyl)polysiloxanes containing dimethylvinylsiloxy end groups, and dimethylsiloxane-methyl(3,3,3-trifluoropropyl)siloxane copolymers containing dimethylvinylsiloxy end groups.

It is advantageous for compound (A) to be added in an amount such that the molecular ratio between the total amount of hydrogen atoms bonded to silicon

atoms in compound (A) and the total amount of all the ethylenically unsaturated groups in compound (B) is within the range of from 1.5/1 to 20/1.

Compound (C) is the catalyst for the crosslinking reaction, and is in particular chloroplatinic acid, chloroplatinic acid-olefin complexes, chloroplatinic acid-alkenylsiloxane complexes, chloroplatinic acid-diketone complexes, platinum black or platinum on a support.

The catalyst C is preferably added at from 0.1 to 1000 parts by weight, better still 1 to 100 parts by weight, as plain platinum metal per 1000 parts by weight of the total amount of compounds (A) and (B).

The elastomer is advantageously a non-emulsifying elastomer.

The term "non-emulsifying" defines organopolysiloxane elastomers that do not contain any hydrophilic chains, and in particular that do not contain any polyoxyalkylene units (especially polyoxyethylene or polyoxypropylene), or any polyglyceryl units.

The organopolysiloxane elastomer particles are conveyed in the form of a gel consisting of an elastomeric organopolysiloxane included in at least one hydrocarbon-based oil and/or one silicone oil. In these gels, the organopolysiloxane particles are often non-spherical particles.

Non-emulsifying elastomers are in particular described in patents EP 242 219, EP 285 886 and EP 765 656 and in application JP-A-61-194009, the content of which is incorporated by way of reference.

Spherical non-emulsifying elastomers that may be used include those sold under the names DC 9040, DC 9041, DC 9509, DC 9505 and DC 9506 by the company Dow Corning.

Use may also be made, in the compositions according to the invention, of organopolysiloxane elastomers with an MQ group, such as those sold by the company Wacker under the names Belsil RG100, Belsil RPG33 and preferentially RG80. The elastomer may also be an emulsifying elastomer.

The term "emulsifying organopolysiloxane elastomer" is intended to mean an organopolysiloxane elastomer comprising at least one hydrophilic chain, such as polyoxyalkylenated organopolysiloxane elastomers and polyglycerolated silicone elastomers.

The emulsifying organopolysiloxane elastomer may be chosen from polyoxyalkylenated organopolysiloxane elastomers.

The polyoxyalkylenated organopolysiloxane elastomer is a crosslinked organopolysiloxane elastomer which can be obtained by means of a crosslinking addition reaction of diorganopolysiloxane containing at least one hydrogen bonded to silicon and of a polyoxyalkylene containing at least two ethylenically unsaturated

groups. Advantageously, the polyoxyalkylenated organopolysiloxane elastomers may be formed from divinyl compounds, in particular polyoxyalkylenes containing at least two vinyl groups, which react with Si-H bonds of a polysiloxane.

Polyoxyalkenylated elastomers are in particular described in patents US 5 236 986, US 5 412 004, US 5 837 793 and US 5 811 487, the content of which is incorporated by way of reference.

Polyoxyalkylenated organopolysiloxane elastomers that can be used include those sold under the names KSG-21, KSG-20, KSG-30, KSG-31, KSG-32, KSG-33, KSG-210, KSG-310, KSG-320, KSG-330 and KSG-340 by the company Shin Etsu, and DC9010 and DC9011 by the company Dow Corning.

The emulsifying organopolysiloxane elastomer may also be chosen from polyglycerolated organopolysiloxane elastomers.

The polyglycerolated organopolysiloxane elastomer according to the invention is an organopolysiloxane elastomer which can be obtained by means of a crosslinking addition reaction of diorganopolysiloxane containing at least one hydrogen bonded to silicon and of polyglycerolated compounds having ethylenically unsaturated groups, in particular in the presence of a platinum catalyst.

The polyglycerolated organopolysiloxane elastomer according to the invention is conveyed in the form of a gel in at least one hydrocarbon-based oil and/or one silicone oil. In these gels, the polyglycerolated elastomer is often in the form of non-spherical particles.

Polyglycerolated organopolysiloxane elastomers that may be used include those sold under the names KSG-710, KSG-810, KSG-820, KSG-830 and KSG-840 by the company Shin Etsu.

Non-emulsifying elastomers that can more particularly be used include those sold under the names KSG-6, KSG-15, KSG-16, KSG-18, KSG-41, KSG-42, KSG-43 and KSG-44 by the company Shin Etsu, DC9040 and DC9041 by the company Dow Corning and SFE 839 by the company General Electric.

Emulsifying elastomers that can more particularly be used include those sold under the names KSG-31, KSG-32, KSG-33, KSG-210 and KSG-710 by the company Shin-Etsu.

Advantageously, the organopolysiloxane elastomer under consideration according to the invention is chosen from spherical, non-emulsifying organopolysiloxane elastomers, polyglycerolated organopolysiloxane elastomers and polyoxyalkylenated organopolysiloxane elastomers.

It is more particularly a polyoxyalkylenated organopolysiloxane elastomer.

The composition according to the invention may comprise an organopolysiloxane elastomer, alone or as a mixture, in a content ranging from 0.1% to 20% by weight, preferably from 0.2% to 15% by weight, and even more preferably from 0.5% to 12% by weight.

5

The composition may also comprise other ingredients commonly used in cosmetic compositions. Such ingredients may be chosen from water, hydrophilic solvents, antioxidants, fragrances, essential oils, preservatives, cosmetic active agents, moisturisers, vitamins, ceramides, sunscreens, surfactants, gelling agents, thickeners, spreading agents, wetting agents, dispersants, antifoams, neutralising agents, stabilisers, polymers and in particular film-forming polymers, and mixtures thereof. Of course, those skilled in the art will take care to select this or these optional additional ingredient(s) and the amount thereof in such a way that the advantageous properties of the composition are not, or not substantially, impaired by the addition envisaged.

15

In particular, by way of film-forming polymers, use may especially be made of a film-forming polymer in particular chosen from polyamide silicone block polymers, block ethylenic polymers, vinyl polymers comprising at least one carbosiloxane dendrimer derivative, copolymers comprising carboxylate groups and polydimethylsiloxane groups, silicone resins and lipodispersible polymers in the form of a non-aqueous dispersion of particles of polymers and mixtures thereof.

20

Preferably, the film-forming polymer may be chosen from the group comprising:

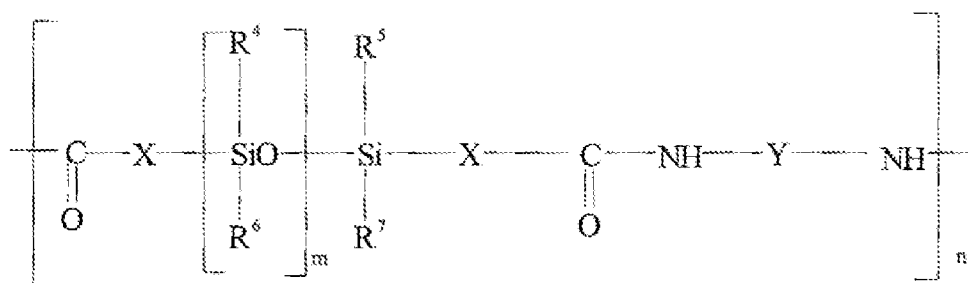
- a block ethylenic copolymer (also called block ethylenic polymer), containing at least one first block having a glass transition temperature ( $T_g$ ) of greater than or equal to 40°C and being totally or partially derived from one or more first monomers, which are such that the homopolymer prepared from these monomers has a glass transition temperature of greater than or equal to 40°C, and at least one second block having a glass transition temperature of less than or equal to 20°C and being totally or partially derived from one or more second monomers, which are such that the homopolymer prepared from these monomers has a glass transition temperature of less than or equal to 20°C, said first block and said second block being connected to one another via a random intermediate segment comprising at least one of said first constituent monomers of the first block and at least one of said second constituent monomers of the second block, and said block copolymer having a polydispersity index  $I$  of greater than 2, as described in FR 0953625, incorporated by way of reference,

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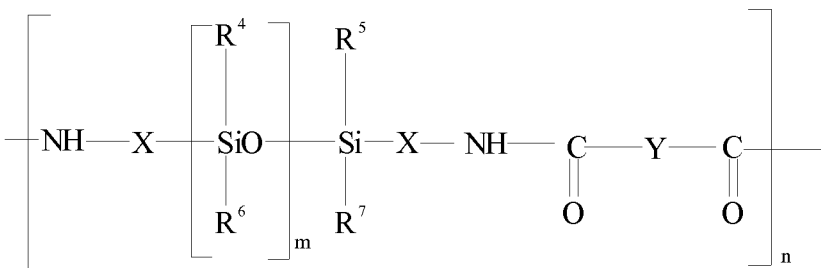
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- a vinyl polymer comprising at least one unit derived from a carbosiloxane dendrimer, as described in applications WO03/045337 and EP 963 751 from the company Dow Corning,
- a dispersion of particles of acrylic or vinyl radical homopolymer or copolymer, dispersed in said liquid fatty phase, as described in application WO 04/055081,
- polyamide silicone block copolymers (also known as silicone polyamides) comprising at least one unit of formula (III) or (IV):



(III)

10 or



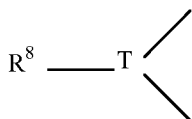
(IV)

in which:

- 1)  $\text{R}^4$ ,  $\text{R}^5$ ,  $\text{R}^6$  and  $\text{R}^7$ , which may be identical or different, represent a group chosen from:
  - linear, branched or cyclic, saturated or unsaturated,  $\text{C}_1$  to  $\text{C}_{40}$  hydrocarbon-based groups which can contain, in their chain, one or more oxygen, sulphur and/or nitrogen atoms, and which can be partially or totally substituted with fluorine atoms,
  - $\text{C}_6$  to  $\text{C}_{10}$  aryl groups, optionally substituted with one or more  $\text{C}_1$  to  $\text{C}_4$  alkyl groups,
  - polyorganosiloxane chains optionally containing one or more oxygen, sulphur and/or nitrogen atoms,
- 2) the X, which may be identical or different, represent a linear or branched  $\text{C}_1$  to  $\text{C}_{30}$  alkylenediyl group, which can contain, in its chain, one or more oxygen and/or nitrogen atoms,

3) Y is a C<sub>1</sub>-C<sub>50</sub>, saturated or unsaturated, arylalkylene, alkylarylene, cycloalkylene, arylene or linear or branched alkylene divalent group which can comprise one or more oxygen, sulphur and/or nitrogen atoms, and/or can bear, as substituent, one of the following atoms or groups of atoms: fluorine, hydroxyl, C<sub>3</sub> to C<sub>8</sub> cycloalkyl, C<sub>1</sub> to C<sub>40</sub> alkyl, C<sub>5</sub> to C<sub>10</sub> aryl, phenyl optionally substituted with 1 to 3 C<sub>1</sub> to C<sub>3</sub> alkyl groups, C<sub>1</sub> to C<sub>3</sub> hydroxyalkyl and C<sub>1</sub> to C<sub>6</sub> aminoalkyl, or

4) Y represents a group corresponding to the formula:



in which:

- T represents a linear or branched, saturated or unsaturated, C<sub>3</sub> to C<sub>24</sub> trivalent or tetravalent hydrocarbon-based group optionally substituted with a polyorganosiloxane chain, and which can contain one or more atoms chosen from O, N and S, or T represents a trivalent atom chosen from N, P and Al, and

- R<sup>8</sup> represents a linear or branched C<sub>1</sub> to C<sub>50</sub> alkyl group, or a polyorganosiloxane chain, which can comprise one or more ester, amide, urethane, thiocarbamate, urea, thiourea and/or sulphonamide groups, which may possibly be linked to another chain of the polymer,

n is an integer ranging from 2 to 500, preferably from 2 to 200, and m is an integer ranging from 50 to 1000, preferably from 50 to 700 and even better still from 50 to 200; as described in application PCT/FR2009/052388, incorporated by way of reference,

- silicone resins, in particular chosen from polymethylsilsesquioxanes, siloxysilicate resins, in particular trimethylsiloxysilicate resins, as described in application FR0954344, incorporated by way of reference,

- a copolymer comprising carboxylate groups and polydimethylsiloxane groups, in particular chosen from copolymers of acrylic acid and of stearyl acrylate comprising polydimethylsiloxane grafts, copolymers of stearyl methacrylate comprising polydimethylsiloxane grafts, copolymers of acrylic acid and of stearyl methacrylate comprising polydimethylsiloxane grafts, copolymers of methyl methacrylate, of butyl methacrylate, of 2-ethylhexyl acrylate and of stearyl methacrylate comprising polydimethylsiloxane grafts,

- and mixtures thereof.

The presence of a film-forming polymer in the compositions according to the invention may in particular make it possible to improve the grease resistance (staying power with respect to grease) of the deposits formed with these

compositions on keratin materials, in particular such as the skin and/or the lips, improve the staying power of the deposit, in particular resistance to rubbing, and make it possible to obtain a deposit which is not very tacky or not at all tacky.

- 5 The compositions according to the invention may be in any form which is acceptable and customary for a cosmetic composition. They may therefore be in the form of a suspension, a dispersion, in particular of oil in water by virtue of vesicles, or water in oil; an aqueous, organic or oily solution which is optionally thickened or even gelled; an oil-in-water, water-in-oil or multiple emulsion; a gel, in  
10 particular an aqueous, oily or emulsified gel; a foam; a dispersion of vesicles, in particular lipid vesicles; a two-phase or multiphase lotion; a spray; a lotion, a cream, an ointment, a soft paste, a salve, a solid which has been cast or moulded, in particular as a stick or in a dish, or a compacted solid. Those skilled in the art may select the appropriate galenical form, and also the method for preparing it, on  
15 the basis of their general knowledge, taking into account firstly the nature of the constituents used, in particular their solubility in the support, and secondly the intended use of the composition.

#### Aqueous phase

- 20 A composition according to the invention may also comprise an aqueous phase, which may represent 1% to 80% by weight, in particular 2% to 70% by weight, or even 3% to 60% by weight, of the total weight of the composition. This aqueous phase may consist essentially of water, or may comprise a mixture of water and of a water-miscible solvent (miscibility in water greater than 50% by weight at 25°C)  
25 in particular chosen from monoalcohols containing 1 to 5 carbon atoms, such as ethanol or isopropanol, glycols containing 2 to 8 carbon atoms, such as propylene glycol, ethylene glycol, 1,3-butylene glycol or dipropylene glycol, C<sub>3</sub>-C<sub>4</sub> ketones, C<sub>2</sub>-C<sub>4</sub> aldehydes, and mixtures thereof.

- However, as specified above, the compositions according to the invention are  
30 advantageously anhydrous.

- According to one particular embodiment, in particular in the case of a composition dedicated to lip or facial care and/or makeup, the composition used according to the invention is anhydrous or contains less than 3% by weight of water, preferably less than 1% by weight of water, relative to the total weight of the composition. In  
35 the case of a makeup composition for the lips, the composition is preferably anhydrous.



The term "anhydrous" is intended to mean in particular that water is preferably not intentionally added to the composition, but may be present in trace amounts in the various compounds used in the composition.

- 5 The compositions according to the invention can be used for caring for or making up keratin materials such as the skin, the eyelashes, the eyebrows, the nails, the lips, the hair, and more particularly for making up the lips, the hair, the eyelashes and/or the face.

They can therefore be in the form of a care and/or makeup product for the skin of  
10 the body or of the face, the lips, the eyelashes, the eyebrows, the hair or the nails; of an antisen or self-tanning product; or of a hair product; they are advantageously in the form of a makeup composition, in particular a mascara, eyeliner, lipstick, lip gloss, face powder, eyeshadow, foundation, nail varnish or hair mascara composition.

- 15 In particular, in the case of a lipstick, the composition may be in liquid (gloss) or solid form, for example such as a lipstick in the form of a stick or cast in a dish. Generally, the compositions according to the invention may be in solid or liquid form at 20°C.

For the purpose of the invention, the term "solid" characterises the state of the  
20 composition at a temperature of 20°C. In particular, a solid composition according to the invention has, at a temperature of 20°C and at atmospheric pressure (760 mmHg), a hardness of greater than 30 Nm<sup>-1</sup>, preferably greater than 40 Nm<sup>-1</sup>.

Protocol for measuring the hardness:

- 25 The hardness of a composition, in particular such as a stick of a lipstick, is measured according to the following protocol:

The stick is stored at 20°C for 24 hours before measuring the hardness.

The hardness may be measured at 20°C via the "cheese wire" method, which consists in transversely cutting a wand of product, which is preferably a circular  
30 cylinder, by means of a rigid tungsten wire 250 µm in diameter, by moving the wire relative to the stick at a speed of 100 mm/min.

The hardness of the samples of compositions of the invention, expressed in Nm<sup>-1</sup>, is measured by means of a DFGS2 dynamometer sold by the company Indelco-Chatillon.

- 35 The measurement is reproduced three times and then averaged. The average of the three values read using the dynamometer mentioned above, denoted Y, is given in grams. This average is converted to newtons and then divided by L which

represents the longest distance through which the wire passes. In the case of a cylindrical wand, L is equal to the diameter (in metres).

The hardness is converted into  $\text{Nm}^{-1}$  by means of the equation below:

$$(Y \times 10^{-3} \times 9.8)/L$$

5

For a measurement at a different temperature, the stick is stored for 24 hours at this new temperature before the measurement.

According to this method of measurement, a solid composition according to the invention has a hardness at 20°C of greater than or equal to  $30 \text{ Nm}^{-1}$ , preferably greater than  $40 \text{ Nm}^{-1}$ , preferably greater than  $50 \text{ Nm}^{-1}$ .

10

Preferably, the composition according to the invention has in particular a hardness at 20°C of less than  $500 \text{ Nm}^{-1}$ , in particular less than  $400 \text{ Nm}^{-1}$ , preferably less than  $300 \text{ Nm}^{-1}$ .

15

In particular, a composition of which the hardness is greater than  $30 \text{ Nm}^{-1}$  is a "solid" composition at 20°C and at atmospheric pressure (760 mmHg).

The compositions according to the invention find a most particular use in the field of lipsticks and foundations, compositions which are particularly sensitive to grease (sebum and food grease).

20

A composition according to the invention may be in the form of a makeup composition for the skin and/or the lips, in particular for the skin of the face or of the body; it may be a product for the complexion, such as a foundation, a face powder or an eyeshadow; a lip product, such as a lipstick or a lipcare product; a concealer product; a blusher, an eyeliner; a lip or eye pencil; a body makeup product; a gloss (lip gloss).

25

According to a first advantageous embodiment of the invention, the composition according to the invention is dedicated to making up the skin and it is then more particularly a foundation, a face powder or an eyeshadow, or a body makeup product.

30

According to a second advantageous embodiment of the invention, the composition according to the invention is dedicated to making up the lips, and it is then more particularly a lipstick (in stick form) or a lip gloss (liquid lipstick).

35

A subject of the invention is also a cosmetic treatment process for keratin materials, in particular the skin of the body or of the face, the lips, the nails, the eyelashes and/or the hair, comprising the application to said materials of a cosmetic composition as defined above.

According to one particular aspect, the invention relates to a process for making up and/or caring for the skin and/or the lips, comprising at least the application, to said skin and/or said lips, of a composition as defined above.

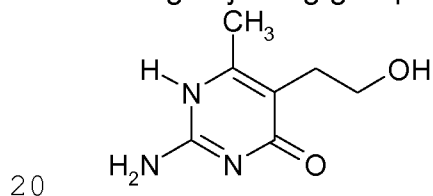
5 This process according to the invention makes it possible in particular to care for or make up said keratin materials, in particular the lips, the hair, the face and/or the eyelashes, by application of a composition, in particular a lipstick, foundation, eyelash mascara or hair mascara composition, according to the invention.

10 The present invention is illustrated, in a nonlimiting manner, in greater detail in the following examples.

### **Example 1: Ureidopyrimidone-functionalised PDMS**

15 In a 1 litre reactor, 296 g of silicone polymer of reference KF6002 from the company Shin Etsu and 49.3 g of isophorone diisocyanate are mixed together at 20°C, under an inert atmosphere. The reaction medium is heated to 40°C and then the catalyst (dibutyltin dilaurate, 25 microlitres) is added. The heating is maintained for 45 minutes.

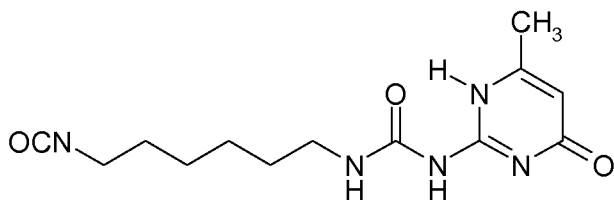
14.9 g of joining group of structure below (SupraPolix):



predispersed in propylene carbonate (140 ml) are added, and then 280 ml of butyl acetate are added. The reaction medium is heated at 140°C for 1 h. The isocyanates are neutralised by adding ethanol at 70°C for 3 hours, and then  
25 overnight at ambient temperature. The reaction medium is diluted in 1300 ml of methyl tetrahydrofuran, followed by a filtration under a slight vacuum (800 mbar). Evaporation of the solvent is followed by stripping with isododecane. The desired polymer at 20% of dry extract, characterised by GPC, is obtained.

### **Example 2**

30 20.93 g of silicone polymer (DMS A21) are dissolved in 100 ml of ethyl acetate, under argon, and then 0.478 g of compound below is added:



The mixture is heated at 70°C, under argon, for 5 hours, with the disappearance of the isocyanates being verified.

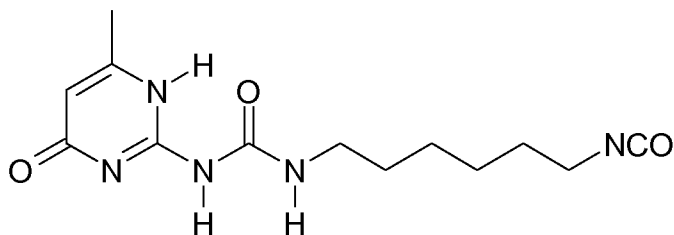
The desired polymer, characterised by GPC, is obtained.

5

### **Example 3: Synthesis of a polyalkene-based polymer (polymer 1)**

100 g of dihydroxylated hydrogenated 1,2-polybutadiene polymer (GI3000 from the company Nisso) are dried at 80°C, under reduced pressure, overnight. This polymer is dissolved in 400 ml of anhydrous toluene. 25 µl of catalyst (dibutyltin dilaurate) are added and the mixture is heated at 80°C, with stirring, until a homogeneous solution is obtained. 15 g of isocyanate-functionalised molecule having the following structure:

10



15

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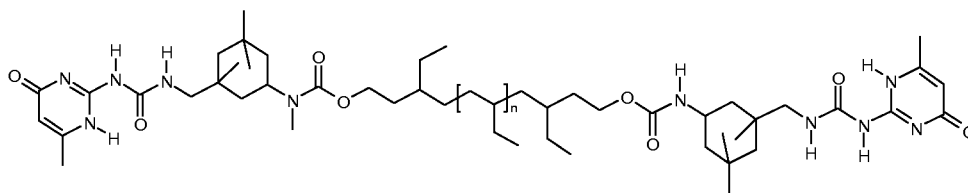
in solution in 300 ml of anhydrous toluene are added, under a controlled atmosphere at 40°C. The reaction mixture is heated to 100°C and stirred at this temperature for 4 hours. The reaction is monitored by infrared spectroscopy, with monitoring of the complete disappearance of the peak characteristic of the isocyanates at 2260 cm<sup>-1</sup>. At the end of the reaction, 100 ml of ethanol are added in order to eliminate all traces of residual isocyanate, and then the mixture is filtered after having added isododecane so as to make the solution less viscous. The polymer solution is then directly stripped with isododecane.

25

A solution of the final polymer in isododecane, at 21% of dry extract, is obtained; the polymer is characterised by GPC (Mn = 6400 and polydispersity index = 1.85) and <sup>1</sup>H NMR (spectrum in accordance with what is expected).

### **Example 4: Synthesis of a polyalkene-based polymer (polymer 2)**

#### **Synthesis of the ureidopyrimidone-difunctionalised GI2000 polymer**



106.1 g of dihydroxylated hydrogenated 1,2-polybutadiene polymer (GI2000 from Nisso, Mn=3300 measured by GPC according to the protocol previously described) are heated in the presence of 22 mg of catalyst (dibutyltin dilaurate) at 80°C, under reduced pressure, for 2 hours. The temperature of the mixture is reduced to 20°C, under argon, followed by the addition of 10 ml of isododecane and 19.3 g of isophorone diisocyanate (IPDI). The mixture is stirred for 16 hours at 20°C, under a controlled atmosphere, and is then heated to 120°C, followed by the addition of 25 ml of propylene carbonate. 12 g of 6-methyl isocytosine are added, resulting in a homogeneous white suspension. This suspension is heated to 140°C and is stirred at this temperature for 6 hours. The reaction is monitored by infrared spectroscopy, until complete disappearance of the peak characteristic of the isocyanates (2250 cm<sup>-1</sup>). The mixture is then brought back down to 30°C, and 400 ml of heptane, 200 ml of THF and 50 ml of ethanol are added thereto, before filtration through celite. The mixture is then stripped with isododecane. In the end, a solution of the polymer in isododecane, at 25% of dry extract, is obtained; the polymer is characterised by GPC (Mn = 7000 and polydispersity index = 2.05).

### **Example 5: Synthesis of a polyalkene-based polymer (polymer 3)**

99 g of dihydroxylated hydrogenated 1,2-polybutadiene polymer (GI3000 from Nisso) are heated in the presence of 22 mg of catalyst (dibutyltin dilaurate) at 80°C, under reduced pressure, for 2 hours. The temperature of the mixture is brought down to 20°C, under argon, followed by the addition of 30 ml of isododecane and 11 g of isophorone diisocyanate (IPDI). The mixture is stirred for 16 hours at 20°C under a controlled atmosphere, and is then heated to 120°C, followed by the addition of 25 ml of propylene carbonate. 8.1 g of 6-methyl isocytosine are added, resulting in a homogeneous white suspension. This suspension is heated to 140°C and is stirred at this temperature for 6 hours. The reaction is monitored by infrared spectroscopy, until complete disappearance of the peak characteristic of the isocyanates (2250 cm<sup>-1</sup>). The mixture is then brought back down to 30°C, and 1 litre of heptane is added thereto, before filtration through celite. The mixture is then stripped with isododecane.

In the end, a solution of the polymer in isododecane, at 20% of dry extract, is obtained; the polymer is characterised by GPC ( $M_n = 4200$  and polydispersity index = 2.34).

5     **Example 6: Synthesis of a polyalkene-based polymer (polymer 4)**

89 g of dihydroxylated hydrogenated 1,2-polybutadiene polymer (GI3000 from Nisso) are heated in the presence of 22 mg of catalyst (dibutyltin dilaurate) at 80°C, under reduced pressure, for 2 hours. The temperature of the mixture is brought down to 20°C, under argon, followed by the addition of 60 ml of  
10   isododecane and 11.6 g of 4,4'-dicyclohexylmethane diisocyanate. The mixture is stirred for 16 hours at 20°C, under a controlled atmosphere, and is then heated to 120°C, followed by the addition of 40 ml of propylene carbonate. 6.64 g of 6-methyl isocytosine are added, resulting in a homogeneous white suspension. This suspension is heated to 140°C and is stirred at this temperature for 8 hours. The  
15   reaction is monitored by infrared spectroscopy, until complete disappearance of the peak characteristic of the isocyanates ( $2250\text{ cm}^{-1}$ ). The mixture is then brought back down to 30°C and 250 ml of isododecane and 500 ml of heptane are added thereto, before filtration through celite. The mixture is then stripped with isododecane.

20   In the end, a solution of the polymer in isododecane, at 22% of dry extract, is obtained; the polymer is characterised by GPC ( $M_n = 10700$  and polydispersity index = 2.26).

**Example 7: Synthesis of a polyalkene-based polymer (polymer 5)**

25   143.1 g of dihydroxylated hydrogenated 1,2-polybutadiene polymer (GI2000 from Nisso) are heated in the presence of 33 mg of catalyst (dibutyltin dilaurate) at 80°C, under reduced pressure, for 2 hours. The temperature of the mixture is brought down to 20°C, under argon, followed by the addition of 85 ml of isododecane and 30.8 g of 4,4'-dicyclohexylmethane diisocyanate. The mixture is  
30   stirred for 16 hours at 20°C, under a controlled atmosphere, and is then heated to 120°C, followed by the addition of 70 ml of propylene carbonate. 22.6 g of 6-methyl isocytosine are added, resulting in a homogeneous white suspension. This suspension is heated to 140°C and is stirred at this temperature for 8 hours. The reaction is monitored by infrared spectroscopy, until complete disappearance of  
35   the peak characteristic of the isocyanates ( $2250\text{ cm}^{-1}$ ). The mixture is then brought back down to 20°C, and 700 ml of isododecane and 500 ml of heptane are added thereto, before filtration through celite. The mixture is then stripped with isododecane.

In the end, a solution of the polymer in isododecane, at 20% of dry extract, is obtained; the polymer is characterised by GPC ( $M_n = 8400$  and polydispersity index = 2.00).

## 5 **Example 8**

### A/ Gloss measured using a glossmeter on a dry deposit of polymer

A coat 200  $\mu\text{m}$  thick of the compound/mixture to be tested, at 10% in isododecane, is spread onto a PA-2810 Byko-Chart contrast card using an automatic spreader. The coat covers at least the black background of the card. The deposit is left to dry  
10 for 24 hours at a temperature of 23°C, and then the gloss at 20° is measured on the black background using a Byk Gardner Micro-Tri-Gloss glossmeter. A measurement at 20° higher than 50 is equivalent to a gloss considered to be acceptable, and if the measurement is greater than 60, the gloss is considered to be very satisfactory.

15

### B/ Measurement of wear resistance

A coat 200  $\mu\text{m}$  thick of the compound/mixture to be tested, at 10% in isododecane, is spread onto a PA-2810 Byko-Chart contrast card using an automatic spreader. The coat covers at least the black background of the card. The deposit is left to dry  
20 for 24 hours at a temperature of 23°C. The wear resistance of the film formed is evaluated using a tribometer of pin-on-disc type; the substrate+film sample is moved and is in contact with a rubbing device which is a steel ball between 5 and 10 mm in diameter. The load is between 0.25 and 3 N, and the movement speed is between 10 and 50 mm/s. The number of passes of the rubbing device, in the  
25 same place, necessary in order to completely wear the film is measured. The higher this number, the greater the wear resistance of the film.

The following results are obtained:

	Gloss at 20°C	Wear resistance
Polymer 2 (ex.4)	60	between 50 and 100 revolutions
PDMS of Example 1	70	less than 10 revolutions
Polymer 2 (ex.4) + PDMS (ex.1): 90/10 by weight	50	greater than 200 revolutions

30 It is therefore possible to improve the wear resistance of the film-forming polymer by mixing it with a silicone polymer which, however, exhibits no wear resistance

(<10 revolutions), while at the same time keeping a gloss close to that of the film-forming agent.

### **Example 9**

- 5 A foundation formula according to the invention (formula 1) and a comparative foundation formula outside the invention (formula 2) were prepared, comprising, as % by weight (AM = active material or dry matter of polymer):

		Formula 1 (% by weight)	Formula 2 (% by weight)
A1	Solution of ureidopyrimidone-difunctionalised GI2000 supra-molecular polymer at 25% in isododecane, as prepared in Example 4	43.2% (10.8% AM)	48% (12% AM)
	Functionalised PDMS of Example 1 at 21% in isododecane	5.7% (1.2% AM)	-
	Isododecane	qs 100%	qs 100%
A2	Isododecane	2.5%	2.5%
	Pigments	10%	10%
B	Amorphous silica microspheres (Miyoshi Kasei, Sunsphere H-33, AGC Si-Tech)	2%	2%

- 10 The constituents of phase A2 were weighed out. The mixture was passed through a three-roll mill. The constituents of phase A1 were weighed out into the main beaker and placed in a Rayneri mixer. Phase A2 was then added. After mixing for 10 minutes, phase B was incorporated.

### 15 **A/ Transfer resistance**

Each of the resulting formulations is then evaluated in terms of transfer resistance according to the protocol described hereinafter.

- The forearm is subjected to makeup removal with a non-greasy makeup remover (of the Effacil type from Lancôme) and then with a piece of cotton wool soaked in water. After 5 minutes, a foundation formula is applied with the finger to the forearm. The amount applied is 0.05 g on an area of 5 cm by 5 cm.

- Ten minutes after application, a paper handkerchief is passed over the forearm 5 times; for this, the handkerchief is folded into four and is placed on the skin with quite a strong pressure, at one of the ends of the foundation, and is then moved over the forearm quite slowly towards the other end. The amount of foundation having transferred onto the paper handkerchief is then evaluated in the following way: it is considered that:



- + no colour on the handkerchief (very good transfer resistance property)
- ++ the handkerchief is very slightly coloured (good transfer resistance property)
- +++ the handkerchief is slightly coloured
- 5 +++++ the handkerchief is coloured

The following results are obtained:

	Formula 1 (invention)	Formula 2 (comparative)
Evaluation of transfer	++	++++

- 10 It is noted that the composition according to the invention shows a significantly reduced capacity for transfer compared with the comparative composition. Furthermore, the composition according to the invention results in a decrease in tack after application (during the drying phase).

#### 15 B/ Tack

The tacky nature is evaluated by applying the finger to the forearm one minute after the end of application of the composition.

For the measurements carried out, it is considered that:

- + no tack during drying
- 20 ++ slight tacky effect during drying
- +++ medium tacky effect during drying
- ++++ high tacky effect during drying
- +++++ very high tacky effect during drying

- 25 The following results are obtained:

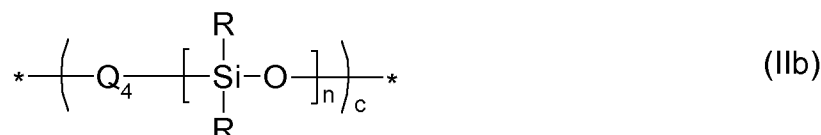
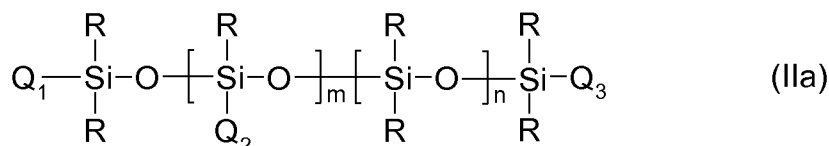
	Formula 1 (invention)	Formula 2 (comparative)
Evaluation of tack	++	++++

- 30 It is noted that the composition according to the invention shows a significantly lower capacity to be tacky during drying compared with the comparative composition. Furthermore, the composition according to the invention has a reduced sensitivity to grease.

## CLAIMS

1. Cosmetic composition comprising, in a cosmetically acceptable medium:

- 5 a) at least one polysiloxane bearing a joining group, corresponding to one of the following formulae (IIa) and (IIb):

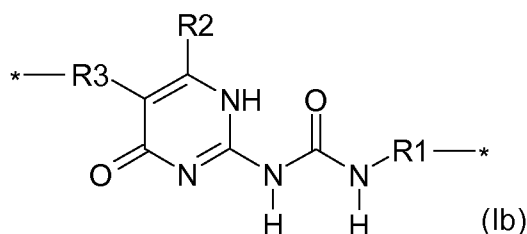
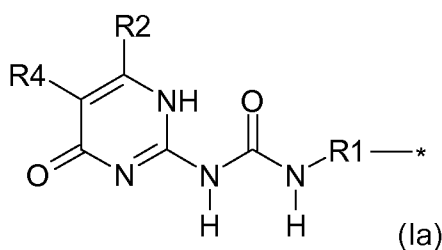


in which:

- 10 - the R radicals, which may be identical or different, represent a linear, branched and/or cyclic, saturated or unsaturated, optionally aromatic, C<sub>1</sub>-C<sub>20</sub> monovalent hydrocarbon-based (in particular alkyl) group which may contain one or more heteroatoms chosen from O, S and N;
- 15 - the Q<sub>1</sub>, Q<sub>2</sub> and Q<sub>3</sub> radicals, which may be identical or different, and which are monovalent, represent either an R radical as defined above; or a joining group capable of forming at least 3 H (hydrogen) bonds, preferably at least 4 H bonds, and even better still 4 H bonds; it being understood that at least one of the Q<sub>1</sub> to Q<sub>3</sub> radicals is other than R in formula (IIa);
- 20 - the divalent Q<sub>4</sub> radical represents a joining group capable of forming at least 3 H (hydrogen) bonds, preferably at least 4 H bonds, and even better still 4 H bonds;
- n is an integer between 2 and 1000;
- 25 - m is an integer between 0 and 300;
- c is an integer between 1 and 300;
- and m, n and c being such that the number-average molecular weight (M<sub>n</sub>) of the functionalised polysiloxane (IIa) or (IIb) is between 500 and 100 000; and
- 30 b) at least one polyalkene-based supramolecular polymer capable of resulting from the reaction, in particular from the condensation, of at least one polyalkene polymer functionalised with at least one reactive

function, with at least one joining group functionalised with at least one reactive group capable of reacting with the reactive group(s) borne by the functionalised polyalkene polymer, said joining group being capable of forming at least 3 H (hydrogen) bonds, preferably at least 4 H bonds, preferentially 4 H bonds.

2. Composition according to Claim 1, in which m, n and c are chosen such that the number-average molecular weight of the functionalised polysiloxane (IIa) or (IIb) is between 500 and 100 000, in particular between 1000 and 50 000, or even between 2000 and 25 000, even better still between 3000 and 15 000.
3. Composition according to either of the preceding claims, in which:
  - m is between 1 and 50, or even 2 and 20, even better still 3 and 15; and/or
  - n is between 3 and 700, in particular 5 and 400, or even 10 and 200, even better still 20 and 100; and/or
  - c is between 2 and 150, better still between 3 and 80, even better still between 4 and 20; and/or
  - the R radical is a linear C<sub>1</sub>-C<sub>20</sub>, in particular C<sub>1</sub>-C<sub>12</sub>, alkyl group; a branched C<sub>3</sub>-C<sub>20</sub>, in particular C<sub>3</sub>-C<sub>12</sub>, alkyl group; a C<sub>4</sub>-C<sub>20</sub>, in particular C<sub>4</sub>-C<sub>10</sub>, cycloalkyl group; a C<sub>4</sub>-C<sub>20</sub>, in particular C<sub>4</sub>-C<sub>10</sub>, aryl group; a C<sub>5</sub>-C<sub>20</sub>, in particular C<sub>5</sub>-C<sub>10</sub>, arylalkyl group; these groups being optionally substituted with an NH<sub>2</sub> and/or OH function; preferentially, R is a methyl radical.
4. Composition according to one of the preceding claims, in which the joining groups Q<sub>1</sub> to Q<sub>4</sub> comprise at least one monovalent unit of formula (Ia) and/or at least one divalent unit of formula (Ib):



in which:

- R1 and R3, which may be identical or different, represent a divalent carbon-based radical chosen from (i) a linear or branched C<sub>1</sub>-C<sub>32</sub> alkyl

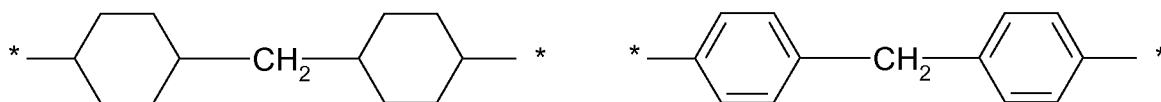
group, (ii) a C<sub>4</sub>-C<sub>16</sub> cycloalkyl group and (iii) a C<sub>4</sub>-C<sub>16</sub> aryl group; said groups optionally comprising 1 to 8 heteroatoms chosen from O, N, S, F, Si and P; and/or said groups being optionally substituted with an ester or amide function or with a C<sub>1</sub>-C<sub>12</sub> alkyl radical; or a mixture of these groups;

- R<sub>2</sub> and R<sub>4</sub>, independently of one another, represent a hydrogen atom or a linear, branched or cyclic, saturated or unsaturated, optionally aromatic, C<sub>1</sub>-C<sub>32</sub> carbon-based, in particular hydrocarbon-based (alkyl), radical which can comprise one or more heteroatoms chosen from O, N, S, F, Si and P.

5. Composition according to Claim 4, in which:

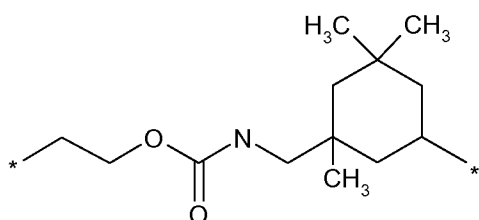
a) the R<sub>1</sub> radical is:

- a linear or branched, C<sub>2</sub>-C<sub>12</sub> divalent alkylene group, in particular a 1,2-ethylene, 1,6-hexylene, 1,4-butylene, 1,6-(2,4,4-trimethylhexylene), 1,4-(4-methylpentylene), 1,5-(5-methylhexylene), 1,6-(6-methylheptylene), 1,5-(2,2,5-trimethylhexylene) or 1,7-(3,7-dimethyloctylene) group;
- a C<sub>4</sub>-C<sub>12</sub> divalent cycloalkylene or arylene group, in particular chosen from the following radicals: -isophorone-, tolylene, 2-methyl-1,3-phenylene, 4-methyl-1,3-phenylene, 4,4'-methylenebiscyclohexylene, 4,4-bisphenylenemethylene; or having the structure:



and/or

- b) R<sub>2</sub> represents H, CH<sub>3</sub>, ethyl, C<sub>13</sub>H<sub>27</sub>, C<sub>7</sub>H<sub>15</sub>, phenyl, isopropyl, isobutyl, n-butyl, tert-butyl, n-propyl, or else -CH(C<sub>2</sub>H<sub>5</sub>)(C<sub>4</sub>H<sub>9</sub>); and/or
- c) R<sub>4</sub> = H; and/or
- d) R<sub>3</sub> has the structure:



6. Composition according to Claim 4, in which:

a) in formula (Ia),

R1 = -isophorone-, R2 = methyl and R4 = H, or

R1 =  $-(CH_2)_6-$ , R2 = methyl and R4 = H, or

R1 =  $-(CH_2)_6-$ , R2 = isopropyl and R4 = H, or

5 R1 = 4,4'-methylenebiscyclohexylene, R2 = methyl and R4 = H,

b) in formula (Ib), R1 = -isophorone-, R2 = methyl and R3 =  $-(CH_2)_2OCO-NH$ -isophorone-.

7. Composition according to one of the preceding claims, in which the polysiloxane of formula (IIa) or (IIb) results from the reaction, in particular from the polycondensation, of at least one polysiloxane bearing at least one reactive function, for example OH or  $NH_2$ , with at least one joining group bearing at least one reactive function capable of reacting with the reactive function(s) of the polysiloxane.

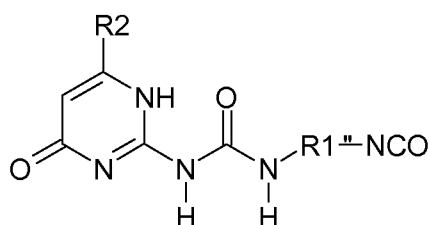
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8. Composition according to Claim 7, in which the polysiloxane bearing a reactive function is chosen from:

- telechelic polysiloxanes (reactive functions at the end of the chain), such as those bearing hydride, amino or OH functions;
- 20 - polysiloxanes comprising pendant reactive functions, such as those bearing hydride, amino or OH functions;
- polysiloxanes having at least one reactive function at the end of the chain and at least one pendant reactive function, such as those bearing a hydride, amino or alkoxy function.

25

9. Composition according to Claim 7, in which the joining group bearing a reactive function is of formula:



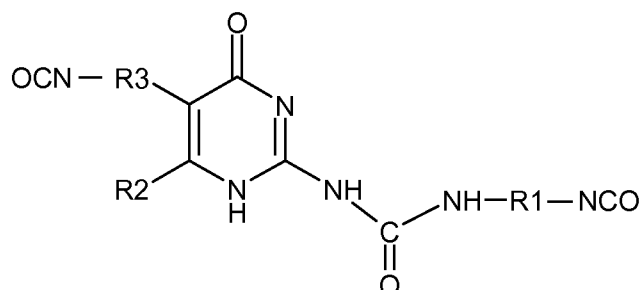
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in which:

- R1 represents -isophorone-,  $-(CH_2)_6-$ ,  $-CH_2CH(CH_3)-CH_2-C(CH_3)_2-CH_2-CH_2-$ , 4,4'-methylenebiscyclohexylene or 2-methyl-1,3-phenylene; and/or
- R2 represents H,  $CH_3$ , ethyl,  $C_{13}H_{27}$ ,  $C_7H_{15}$ , phenyl, isopropyl, isobutyl, n-butyl, tert-butyl, n-propyl, or else  $-CH(C_2H_5)(C_4H_9)$ ;

35

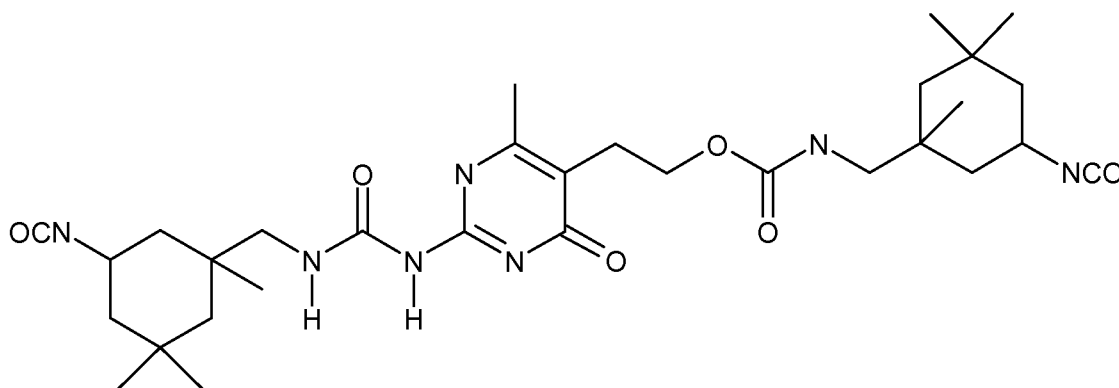
or else the joining group bearing two reactive functions is of formula:



in which:

- 5
- R1 represents -isophorone-,  $-(CH_2)_2$ -,  $-(CH_2)_6$ -,  $-CH_2CH(CH_3)-CH_2-C(CH_3)_2-CH_2-CH_2$ , 4,4'-methylenebiscyclohexylene, 2-methyl-1,3-phenylene; and/or
  - R2 represents H, CH<sub>3</sub>, ethyl, C<sub>13</sub>H<sub>27</sub>, C<sub>7</sub>H<sub>15</sub>, phenyl, isopropyl, isobutyl, n-butyl, tert-butyl, n-propyl, or else  $-CH(C_2H_5)(C_4H_9)$ ; and/or
  - 10 - R3 represents a divalent radical  $-R'3-O-C(O)-NH-R'4-$  in which R'3 and R'4, which may be identical or different, represent a divalent carbon-based radical chosen from a linear or branched C<sub>1</sub>-C<sub>30</sub> alkyl group or a C<sub>4</sub>-C<sub>12</sub> cycloalkyl group or a C<sub>4</sub>-C<sub>12</sub> aryl group; or mixtures thereof; and in particular R'3 represents a C<sub>1</sub>-C<sub>4</sub> alkylene, in particular 1,2-ethylene,
  - 15 and R'4 represents the divalent radical derived from isophorone.

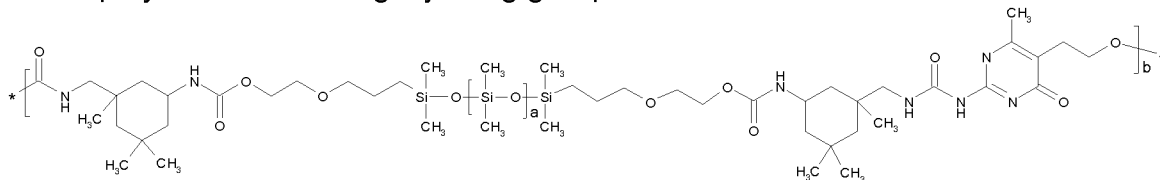
10. Composition according to Claim 7, in which the joining group is of formula:



20 11. Composition according to one of the preceding claims, in which the polysiloxane bearing a joining group has a number-average molecular weight (Mn) of between 500 and 100 000, in particular between 1000 and 50 000, or even between 2000 and 25 000, even better still between 3000 and 15 000.

25

12. Composition according to one of the preceding claims, in which the polysiloxane bearing a joining group is of formula below:



13. Composition according to Claim 12, in which:
- a is between 2 and 1000, better still 3 and 700, in particular 5 and 400, or even 10 and 200, even better still 20 and 100; and/or
  - b is between 1 and 300, better still 2 and 150, better still between 3 and 80, even better still between 4 and 20.

14. Composition according to one of the preceding claims, in which the polysiloxane comprising a joining group, alone or as a mixture, is present in a proportion of from 0.1% to 50% by weight, preferably from 0.2% to 40% by weight, preferentially from 0.5% to 15% by weight, or even 1% to 10% by weight, relative to the total weight of the composition.

15. Composition according to one of the preceding claims, in which the functionalised polyalkene polymer is of formula HX-P-X'H in which:

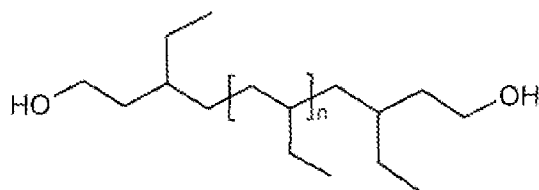
- XH and X'H are reactive functions, with X and X', which may be identical or different, chosen from O, S, NH, NCO or NR<sub>a</sub>, R<sub>a</sub> representing a C<sub>1</sub>-C<sub>6</sub> alkyl group; preferably, X and/or X' denote O; preferentially, X and X' denote O;
- P represents a homopolymer or a copolymer which can be obtained by polymerisation of one or more linear, cyclic and/or branched, monounsaturated or polyunsaturated, C<sub>2</sub>-C<sub>10</sub>, preferably C<sub>2</sub>-C<sub>4</sub>, alkenes; P preferably represents a homopolymer or a copolymer which can be obtained by polymerisation of one or more monounsaturated, linear or branched C<sub>2</sub>-C<sub>4</sub> alkenes.

16. Composition according to Claim 15, in which P represents a polymer chosen from a polyethylene, a polybutylene, a polybutadiene (such as a 1,4-polybutadiene or a 1,2-polybutadiene), a polyisoprene, a poly(1,3-pentadiene), a polyisobutylene, and copolymers thereof, and in particular a poly(ethylene/butylene).

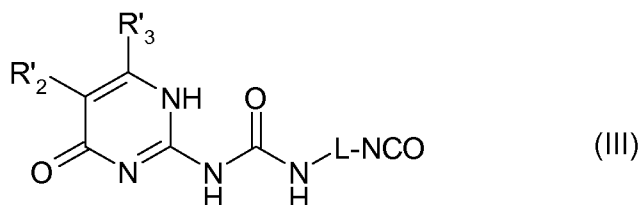
17. Composition according to one of the preceding claims, in which the

functionalised polyalkene polymer has a number-average molecular weight (Mn) of between 1000 and 8000, in particular between 1000 and 5000, or even between 1500 and 4500, and even better still between 2000 and 4000.

18. Composition according to one of the preceding claims, in which the functionalised polyalkene polymer is chosen from polydienes, preferably hydrogenated polydienes, comprising hydroxyl functions, preferably comprising hydroxyl ends, and polyolefins comprising hydroxyl ends, and in particular from homopolymers and copolymers of polybutadiene, of polyisoprene and of poly(1,3-pentadiene).
19. Composition according to one of the preceding claims, in which the functionalised polyalkene polymer is a dihydroxylated hydrogenated 1,2-polybutadiene homopolymer, in particular those represented schematically by the following formula:



- with n preferably between 14 and 105, better still between 20 and 85.
20. Composition according to one of the preceding claims, in which the functionalised joining group capable of reacting with the functionalised polyalkene polymer is of formula (III):



in which:

- L is a single bond or a linear, cyclic and/or branched, saturated or unsaturated, or even aromatic, C<sub>1</sub>-C<sub>20</sub> divalent carbon-based (alkylene) group, optionally comprising 1 to 4 N and/or O heteroatoms;
- R'<sub>2</sub> represents a single bond, a divalent group of C<sub>1</sub>-C<sub>6</sub> alkylene type, or a



monovalent group chosen from a hydrogen atom or a linear, branched and/or cyclic, saturated or unsaturated, optionally aromatic, C<sub>1</sub>-C<sub>30</sub> monovalent hydrocarbon-based group which can contain one or more heteroatoms such as O, S or N;

5 - R'<sub>3</sub> represents a hydrogen atom or a linear, branched and/or cyclic, saturated or unsaturated, optionally aromatic, C<sub>1</sub>-C<sub>30</sub> monovalent hydrocarbon-based group which can contain one or more heteroatoms such as O, S or N.

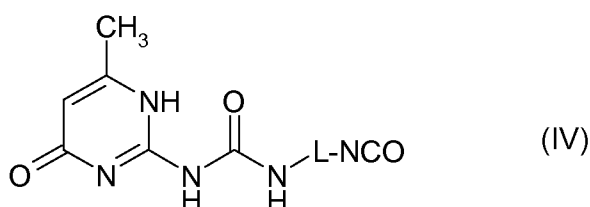
10 21. Composition according to Claim 20, in which, in formula (III):

- L is a phenylene; 1,4-nitrophenyl; 1,2-ethylene; 1,6-hexylene; 1,4-butylene; 1,6-(2,4,4-trimethylhexylene); 1,4-(4-methylpentylene); 1,5-(5-methylhexylene); 1,6-(6-methylheptylene); 1,5-(2,2,5-trimethylhexylene); 1,7-(3,7-dimethyl-octylene); -isophorone-; 4,4'-methylenebiscyclohexylene; tolylene; 2-methyl-1,3-phenylene; 4-methyl-1,3-phenylene; or 4,4-bisphenylenemethylene group; preferably, L is -isophorone-; -(CH<sub>2</sub>)<sub>2</sub>-; -(CH<sub>2</sub>)<sub>6</sub>-; -CH<sub>2</sub>CH(CH<sub>3</sub>)-CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-; 4,4'-methylenebiscyclohexylene or 2-methyl-1,3-phenylene; and better still isophorone; and/or

20 -R'<sub>2</sub> is a single bond, H, a C<sub>1</sub>-C<sub>30</sub> alkyl group; a C<sub>4</sub>-C<sub>12</sub> cycloalkyl group; a C<sub>4</sub>-C<sub>12</sub> aryl group; a (C<sub>4</sub>-C<sub>12</sub>)aryl(C<sub>1</sub>-C<sub>12</sub>)alkyl group; these groups being optionally substituted with an amino, thio and/or hydroxyl function; preferentially, R'<sub>2</sub> represents H, CH<sub>3</sub>, CH<sub>2</sub>OH, (CH<sub>2</sub>)<sub>2</sub>-OH, C<sub>13</sub>H<sub>27</sub>, C<sub>7</sub>H<sub>15</sub> or phenyl; or a single bond; and/or

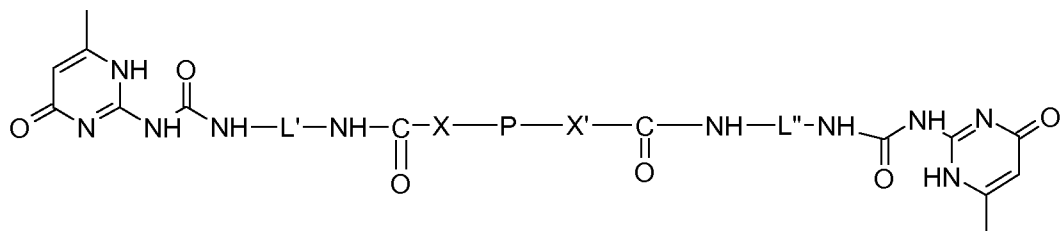
25 -R'<sub>3</sub> is a C<sub>4</sub>-C<sub>12</sub> cycloalkyl group; a linear or branched C<sub>1</sub>-C<sub>30</sub> alkyl group or a C<sub>4</sub>-C<sub>12</sub> aryl group; optionally substituted with an amino, thio and/or hydroxyl function; preferentially, R'<sub>3</sub> represents H, CH<sub>3</sub>, CH<sub>2</sub>OH or (CH<sub>2</sub>)<sub>2</sub>-OH; and even better still methyl.

30 22. Composition according to one of the preceding claims, in which the functionalised joining group capable of reacting with the functionalised polyalkene polymer is of formula (IV):



in which L is a single bond or a linear, cyclic and/or branched, saturated or unsaturated, or even aromatic, C<sub>1</sub>-C<sub>20</sub> divalent carbon-based (alkylene) group, optionally comprising 1 to 4 N and/or O heteroatoms, in particular in the form of a substituent NO<sub>2</sub>, and in particular a phenylene; 1,4-nitrophenyl; 1,2-ethylene; 1,6-hexylene; 1,4-butylene; 1,6-(2,4,4-trimethylhexylene); 1,4-(4-methylpentylene); 1,5-(5-methylhexylene); 1,6-(6-methylheptylene); 1,5-(2,2,5-trimethylhexylene); 1,7-(3,7-dimethyloctylene); -isophorone-; 4,4'-methylenebiscyclohexylene; tolylene; 2-methyl-1,3-phenylene; 4-methyl-1,3-phenylene or 4,4-bisphenylenemethylene group; preferably, L is -isophorone-; -(CH<sub>2</sub>)<sub>2</sub>-; -(CH<sub>2</sub>)<sub>6</sub>-; -CH<sub>2</sub>CH(CH<sub>3</sub>)-CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>; 4,4'-methylenebiscyclohexylene or 2-methyl-1,3-phenylene; and better still isophorone.

23. Composition according to one of the preceding claims, in which the supramolecular polymer corresponds to the formula:



in which:

-L' and L" are, independently of one another, a linear, cyclic and/or branched, saturated or unsaturated, or even aromatic, C<sub>1</sub>-C<sub>20</sub> divalent carbon-based (alkylene) group, optionally comprising 1 to 4 N and/or O heteroatoms;

- $X = X' = 0$  and

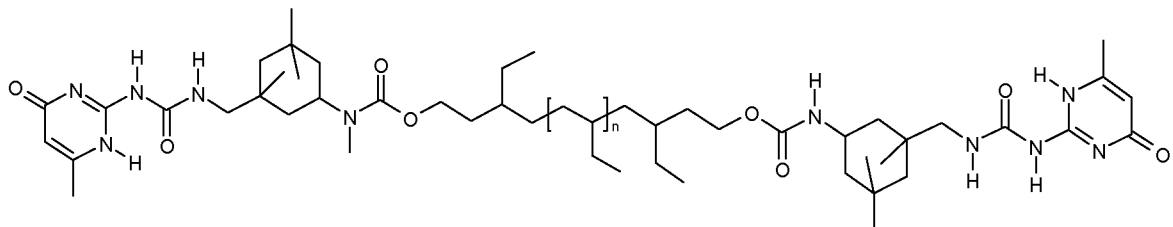
- P represents a homopolymer or a copolymer which can be obtained by polymerisation of one or more linear, cyclic and/or branched, monounsaturated or polyunsaturated, C<sub>2</sub>-C<sub>10</sub> alkenes.

24. Composition according to Claim 23, in which:

- L' and L" are chosen from a linear or branched C<sub>1</sub>-C<sub>20</sub> alkylene, a C<sub>5</sub>-C<sub>20</sub> (alkyl)cycloalkylene, an alkylene-biscycloalkylene and a C<sub>6</sub>-C<sub>20</sub> (alkyl)-arylene; preferentially, L' and L" represent an -isophorone-; -(CH<sub>2</sub>)<sub>2</sub>-; -(CH<sub>2</sub>)<sub>6</sub>-; -CH<sub>2</sub>CH(CH<sub>3</sub>)-CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-; 4,4'-methylenebis-cyclohexylene or 2-methyl-1,3-phenylene group;

- P represents a polyethylene, a polybutylene, a polybutadiene, a polyisoprene, a poly(1,3-pentadiene), a polyisobutylene, or a copolymer thereof, in particular a poly(ethylene/butylene).

25. Composition according to one of the preceding claims, in which the supramolecular polymer is of formula:



the value of n being such that the number-average molecular weight (Mn) of said polymer is between 1000 and 8000, in particular between 1000 and 5000, or even between 1500 and 4500, and even better still between 2000 and 4000.

26. Composition according to one of the preceding claims, in which the supramolecular polymer is present in an amount of between 0.1% and 99% by weight, preferably between 1% and 80% by weight, in particular between 2% and 70% by weight, or even between 3% and 60% by weight, and better still between 4% and 50% by weight, preferentially 5% to 40% by weight of dry matter, relative to the weight of the final cosmetic composition.
27. Composition according to one of the preceding claims, in which the cosmetically acceptable medium comprises at least one constituent chosen from volatile or non-volatile, carbon-based, hydrocarbon-based and/or silicone oils and/or solvents of mineral, animal, plant or synthetic origin; pigments, fillers, pearlescent agents and glitter flakes, liposoluble or water-soluble dyes; water, hydrophilic solvents, antioxidants, fragrances, essential oils, preservatives, cosmetic active agents, moisturisers, vitamins, ceramides, sunscreens, surfactants, gelling agents, thickeners, spreading agents, wetting agents, dispersants, antifoams, neutralising agents, stabilisers, polymers and in particular film-forming polymers, and mixtures thereof.
28. Composition according to one of the preceding claims, in the form of a care and/or makeup product for the skin of the body or of the face, the lips, the

eyelashes, the eyebrows, the hair or the nails; an anti-sun or self-tanning product; a hair product; they are advantageously in the form of a makeup composition, in particular a mascara, eyeliner, lipstick, lip gloss (gloss), face powder, eyeshadow, foundation, nail varnish or hair mascara composition.

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29. Cosmetic treatment process for keratin materials, in particular the skin of the body or of the face, the lips, the nails, the eyelashes and/or the hair, comprising the application to said materials of a cosmetic composition as defined in one of Claims 1 to 28.

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2011/057785

A. CLASSIFICATION OF SUBJECT MATTER		
INV. A61K8/81	A61K8/898	A61Q1/02 A61Q1/04 A61Q1/06
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, 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	WO 2004/052963 A1 (SUPRAPOLIX B V [NL]; BOSMAN ANTON WILLEM [NL]; JANSSEN HENRICUS MARIE) 24 June 2004 (2004-06-24) cited in the application the whole document	1-29
A	WO 02/098377 A1 (OREAL [FR]; MOUGIN NATHALIE [FR]; LIVOREIL AUDE [FR]; MONDET JEAN [FR]) 12 December 2002 (2002-12-12) the whole document	1-29
A	WO 03/032929 A2 (UNILEVER PLC [GB]; UNILEVER NV [NL]; LEVER HINDUSTAN LTD [IN]; COOPER) 24 April 2003 (2003-04-24) the whole document	1-29
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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  12 July 2011		Date of mailing of the international search report  20/07/2011
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer  Donovan-Beermann, T

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International application No

PCT/EP2011/057785

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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