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**WO 2007/098889 A1**

(54) Title: NOVEL HETEROCYCLIC SUBSTITUTED CONDENSATION POLYMERS

(57) Abstract: The invention relates to novel optionally quaternized or protonated condensation polymers having at least one heterocyclic end-group connected to the polymer backbone through a unit derived from an alkylamide, the connection comprising an optionally substituted ethylene group and to the use thereof in body care products and household products.

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10

Novel heterocyclic substituted condensation polymers

The invention relates to novel optionally quaternized or protonated condensation  
15 polymers having at least one heterocyclic end-group connected to the polymer  
backbone through a unit derived from an alkylamide, the connection comprising  
an optionally substituted ethylene group and to the use thereof in body care  
products and household products.

20 Polymers are gaining more and more importance, for example to improve the  
rheological behavior of a product or to enhance the adhesion of other ingredients  
to a surface such as skin, hair, nails, wood, plastic etc. Thus, there is a growing  
need for novel polymers suitable for use in body care products as well as in  
household products fulfilling the manifold requirements posed on such polymers in  
25 regard of availability, easy handling and cost/ performance.

In hair care preparation for example film forming polymers are used e.g. as  
conditioning agent in order to improve the combability, the shine and the visible  
appearance of the hair as well as to give the hair antistatic properties.

30

Commercially available polymers for hair care such as hair styling or conditioning  
polymers are e.g. copolymers of vinyl acetate and crotonic acid, copolymers of  
methyl vinyl ether and maleic anhydride, copolymers of acrylic acid or methacrylic  
acid with other monomers, polyurethanes, N-vinylpyrrolidone and silicone

polymers.

The aim of the invention was to provide easily available, cost efficient optionally quaternized or protonated condensation polymers having at least one heterocyclic end-group connected through the polymer backbone to a unit derived from an alkylamide, the connection comprising an optionally substituted ethylene group and to the use thereof in body care products and household products.

Polymers suitable for the incorporation into body care products or household products should exhibit an excellent heat stability, very good solubility, compatibility with cosmetic bases, pH stability in the range of 4 to 9, processability into a variety of products, compatibility with other ingredients and with the packaging materials and should be free of color and be of neutral or pleasant odor and have a low volatility.

The body care products and household products should fulfill a variety of requirements such as exhibiting low stickiness, lack of powdering or flaking, preferably being clear, transparent and glossy. Body care products such as hair care preparation should additionally fulfill a variety of requirements in regard of their performance such as providing a fine spray pattern, a good film formation, a good holding power, a high level of style retention, a prolonged curl retention, an improved combability, and should be easy to remove upon washing the hair with shampoo or soap.

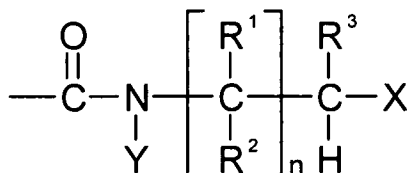
It has now surprisingly been found that optionally quaternized or protonated condensation polymers having at least one heterocyclic end-group connected to the polymer backbone through a unit derived from an alkylamide, the connection comprising an optionally substituted ethylene group (in the following referred to as *condensation polymer*) are especially suitable for the preparation of body care products and household products.

It has also been found that they can be used as conditioning agents, strengthening agents, film forming agents, surfactants, anti-static agents, moisturizers, emulsifiers or hair styling agents.

Thus, the invention relates to optionally quaternized or protonated *condensation polymers* having at least one heterocyclic end-group connected through the

polymer backbone to a unit derived from an alkylamide, the connection comprising an optionally substituted ethylene group.

In another embodiment the present invention relates a *condensation polymer*  
5 which contains at least two groups according to formula (I)

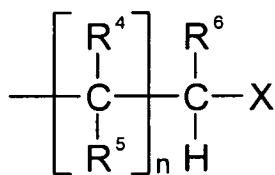


Formula I

wherein

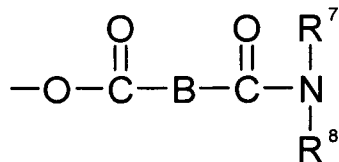
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Y is, independently of each other, a hydrogen atom, a (C<sub>1</sub>-C<sub>20</sub>) alkyl group, a (C<sub>6</sub>-C<sub>10</sub>) aryl group or



;

X is, independently of each other, NHet or



15

B is a (C<sub>6</sub>-C<sub>24</sub>) aryl diradical or a (C<sub>2</sub>-C<sub>24</sub>) alkyl diradical;

R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>6</sup> are, independently of each other, hydrogen atoms, (C<sub>6</sub>-C<sub>10</sub>) aryl groups or (C<sub>1</sub>-C<sub>8</sub>) alkyl groups;

20 R<sup>7</sup> and R<sup>8</sup> are, independently of each other, hydrogen atoms, optionally heteroatom substituted (C<sub>6</sub>-C<sub>10</sub>) aryl groups or optionally heteroatom substituted (C<sub>1</sub>-C<sub>28</sub>) alkyl groups or

R<sup>7</sup> and R<sup>8</sup> together with the nitrogen atom to which they are attached form a 5 or 6 membered ring wherein optionally one or several C-atoms are replaced by

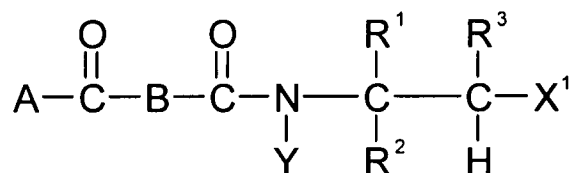
25 -NH, -N-(C<sub>1</sub>-C<sub>20</sub>) alkyl, -N-aryl, -O- or -S-;

NHet is, independently of each other, a mono-, bi- or multicyclic nitrogen containing heterocyclyl group attached via a nitrogen atom to the polymer which may be aromatic or partly or completely hydrogenated and may contain additional heteroatoms such as nitrogen, oxygen or sulfur and which may optionally be substituted.

and n is an integer of 1 to 4, preferably n is 1,

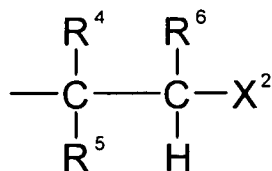
and wherein at least one group NHet is present in the *condensation polymer* of formula I.

10 According to a further embodiment, the polymer according to the invention is a polymer according to formula (II):

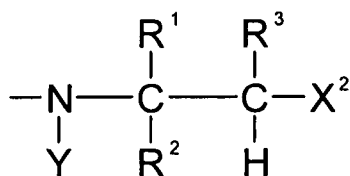


Formula II

15 in which:

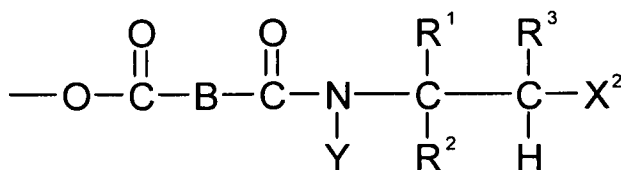


Y is a hydrogen atom, a (C<sub>1</sub>-C<sub>20</sub>) alkyl group or a (C<sub>6</sub>-C<sub>10</sub>) aryl group;



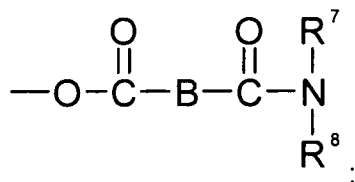
A is or OH;

20 B is a (C<sub>6</sub>-C<sub>24</sub>) aryl diradical or a (C<sub>2</sub>-C<sub>24</sub>) alkyl diradical;



X<sup>1</sup> is ;

X<sup>2</sup> is a OH group, X<sup>1</sup>, NHet or



5

R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>6</sup> are, independently of each other, hydrogen atoms, (C<sub>6</sub>-C<sub>10</sub>) aryl groups or (C<sub>1</sub>-C<sub>8</sub>) alkyl groups or -CH<sub>2</sub>-OX<sup>2</sup>;

10 R<sup>7</sup> and R<sup>8</sup> are, independently of each other, hydrogen atoms, optionally heteroatom substituted (C<sub>6</sub>-C<sub>10</sub>) aryl groups or optionally heteroatom substituted (C<sub>1</sub>-C<sub>28</sub>) alkyl groups or

R<sup>7</sup> and R<sup>8</sup> together with the nitrogen atom to which they are attached form a 5 or 6 membered ring wherein optionally one or several C-atoms are replaced by -NH, -N-(C<sub>1</sub>-C<sub>20</sub>) alkyl, -N-aryl, -O- or -S-;

15 NHet is, independently of each other, a mono-, bi- or multicyclic nitrogen containing heterocyclyl group attached via a nitrogen atom to the polymer which may be aromatic or partly or completely hydrogenated and may contain additional heteroatoms such as nitrogen, oxygen or sulfur and which may optionally be substituted.

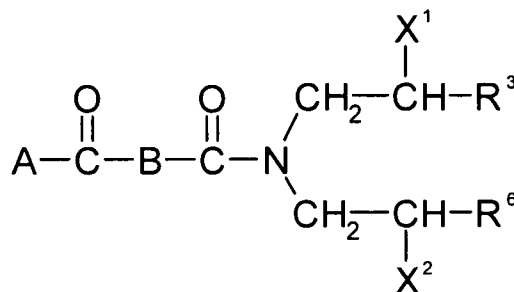
20 and wherein at least one group NHet is present in the *condensation polymer* of formula II.

Preferably R<sup>1</sup>, R<sup>2</sup> are both hydrogen atoms.

25 In another embodiment the invention relates to a *condensation polymer* characterized in that the *condensation polymer* is either linear or branched.

According to a further embodiment of the invention, the *condensation polymer* is characterized in that the number of the heterocyclic end-groups is equal to or  
30 greater than 3.

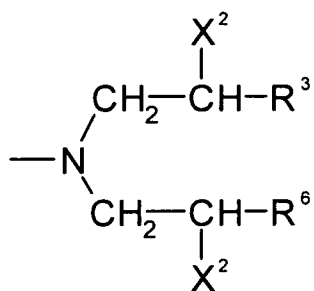
Furthermore, the invention relates to *condensation polymers* characterized in that the polymer is of the formula (III):



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Formula III

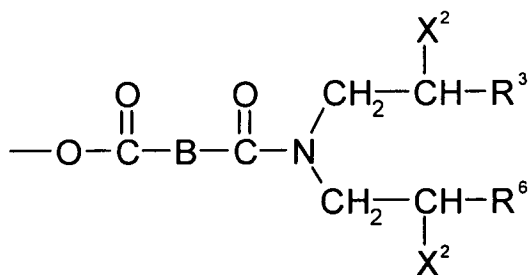
in which



A is , or OH

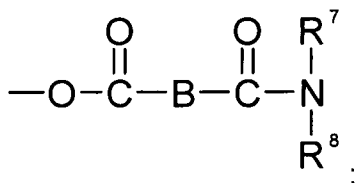
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B is a (C<sub>6</sub>-C<sub>24</sub>) arylidradical or a (C<sub>2</sub>-C<sub>24</sub>) alkylidradical;



X<sup>1</sup> is ;

15 X<sup>2</sup> is a OH group X<sup>1</sup>, NHet or ,



R<sup>3</sup> and R<sup>6</sup> are, independently of each other, hydrogen atoms, (C<sub>6</sub>-C<sub>10</sub>) aryl groups or (C<sub>1</sub>-C<sub>8</sub>) alkyl groups or -CH<sub>2</sub>-OX<sup>2</sup>;

5 R<sup>7</sup> and R<sup>8</sup> are, independently of each other, optionally heteroatom substituted (C<sub>6</sub>-C<sub>10</sub>) aryl groups or optionally heteroatom substituted (C<sub>1</sub>-C<sub>28</sub>) alkyl groups or

R<sup>7</sup> and R<sup>8</sup> together with the nitrogen atom to which they are attached form a 5 or 6 membered ring wherein optionally one or several C-atoms are replaced by -NH, -N-(C<sub>1</sub>-C<sub>20</sub>) alkyl, -N-aryl, -O- or -S-;

10 NHet is, independently of each other, a mono-, bi- or multicyclic nitrogen containing heterocyclyl group attached via a nitrogen atom to the polymer which may be aromatic or partly or completely hydrogenated and may contain additional heteroatoms such as nitrogen, oxygen or sulfur and which may optionally be substituted.

15 and wherein at least one group NHet is present in the *condensation polymer* of formula III.

Preferably R<sup>1</sup>, R<sup>2</sup> are both hydrogen atoms.

20 In all above embodiments, preferably, R<sup>3</sup> and R<sup>6</sup> are linear or branched (C<sub>1</sub>-C<sub>4</sub>) alkyl groups, more preferably a methyl- or ethyl group.

In all above embodiments, the NHet may be selected from substituted or unsubstituted mono-, bi or multicyclic heterocycles such as pyrrol, pyrazol, 25 imidazole, pyrazolon, indole, benzimidazole, hydantoin, carbazole, phthalimide, isatin, oxazolidine, 2-oxazolidone, oxindole, triazole such as 1,2,3-triazole or 1,2,4-triazole, tetrazole, pentazole, pyridazinone, barbituric acid, nucleic acids and such as cytosine, uracil, thymine or thiouracil, dioxopiperazine, chinazolinone, phthalazinone, purine, xanthin, pterin, cyclic lactames such as gamma- 30 butyrolactam or alpha-piperidone or bicyclic amidines, and derivatives thereof.

Optionally the NHet may be completely or partly hydrogenated and may be substituted. Suitable substituents, one or several, may be selected independently from the group of alcohol, ether, ester, cyanide, amide, amine, imine, oxime, sulfide, thiol, sulfone, sulfoxide, sulfate, phosphate, phosphine, phosphin oxide, 35 silane, silicone, silicate, fluoro, chloro, bromo or iodo groups or carbonyl groups.



Preferably the NHet is chosen from imidazole, benzimidazole, 1,2,4-triazole, hydantoin, and derivatives thereof.

In all above embodiments, preferably, R<sup>7</sup> and R<sup>8</sup> are optionally heteroatom substituted (C<sub>1</sub>-C<sub>20</sub>) alkyl groups.

More preferably, R<sup>7</sup> and R<sup>8</sup> are linear C<sub>2</sub>-, C<sub>3</sub>- or C<sub>6</sub>- alkyl groups wherein optionally one or several C-atoms are substituted by nitrogen, oxygen or sulfur.

R<sup>7</sup> and R<sup>8</sup> may be substituted with a group selected from the group of alcohol, ether, ester, cyanide, carbonate, urethane, urea, amide, imide, amine, imine or imidazole, oxime, sulfide, thiol, thiourea, sulfone, sulfoxide, sulfate, phosphate, phosphine, phosphin oxide, silane, silicone, silicate, fluoro, chloro, bromo or iodo groups.

Suitable choices for R<sup>7</sup> and R<sup>8</sup> are di(m)ethylaminoethyl, di(m)ethylaminopropyl, di(m)ethylaminoethyl, tri(m)ethylsilylpropyl, tri(m)ethoxysilylpropyl, perfluorooctyl, perfluorooctyl-(m)ethyl, (m)ethoxy-ethyl, (m)ethoxy-2-propyl, maleimido-propyl, maleimido-hexyl, octenylsuccinimido-hexyl, hexahydrophthalimido-hexyl, 2-(benz)imidazole-ethyl, diphenylphosphino-ethyl, diallylamine, furfuryl, cyanoethyl, or cyanopropyl groups.

R<sup>7</sup> and R<sup>8</sup> together with the nitrogen atom to which they are attached may form an optionally substituted 5 or 6 membered ring wherein optionally one or several C-atoms are replaced by -NH, -N-(C<sub>1</sub>-C<sub>20</sub>) alkyl, -N-aryl, -O- or -S-. Such optionally substituted 5 or 6 membered rings are e.g. morpholine, piperidine, pyrrolidine, piperazine, oxazolidine, thiazolidine or N-methylpiperazine and derivatives thereof.

Most preferred R<sup>7</sup> and R<sup>8</sup> are selected from N,N-dimethylaminopropyl, and/ or groups derived from N-methylpiperazine.

In all formulas in this application in which R-groups are present, the R groups may together or with neighboring carbon atoms form part of a cycloalkyl group.

Depending on the starting monomers chosen, B, R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, R<sup>7</sup> and R<sup>8</sup> in the molecule or mixture of molecules can be selected to be the same or different.

B is optionally substituted, preferably with a (C<sub>1</sub>-C<sub>26</sub>) alkyl group. Preferably, the alkyl group is chosen from the group of methyl, octenyl, nonenyl, decenyl,

undecenyl or dodecenyl. Suitable choices for B are (alkyl-)1,2-ethylene, where the alkyl is defined as above, (methyl-)1,2-ethylidene, 1,3-propylene, (methyl-)1,2-cyclohexyl, (methyl-)1,2-phenylene, 1,3-phenylene, 1,4-phenylene, 2,3-norbornyl, 2,3-norbornen-5-yl, tetrahydro-1,2-phenylene or (methyl-)1,2  
5 cyclohex-4-enyl radical.

Preferably, the weight average molecular mass of the polymer according to the invention is between 600 g/mol and 50,000 g/mol, more preferably between 800  
10 g/mol and 25,000 g/mol.

Preferably, the number average molecular mass is between 500 g/mol and 15,000  
g/mol, more preferably between 700 g/mol and 4,000 g/mol.

The average molecular weight can be determined by methods known to a person  
15 skilled in the art. For example, the number average molecular weight of a polymer can be determined by vapor pressure osmometry, end-group titration and/ or colligative properties. The weight average molecular weight can e.g. be determined by light scattering, small angle neutron scattering (SANS), X-ray scattering, and sedimentation velocity.

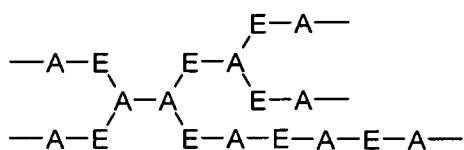
20 Preferably, the average number of NHet end-groups or NHet end-groups in combination with dialkylamide end-groups per molecule is between 2 and 250, more preferably between 3 and 50.

25 The polymer according to the invention can be linear or branched. The linear polymer generally comprises amide and ester units alternating along a chain as follows:



30 wherein a diamide (A-A) unit is coupled with alternating ester (E) and amide (A) units.

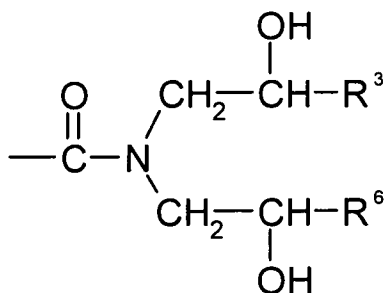
A branched polymer according to the invention generally comprises amide and the ester units alternating along the main and side chains as follows:



wherein a diamide (A-A) is coupled with alternating ester (E) and amide (A) units.

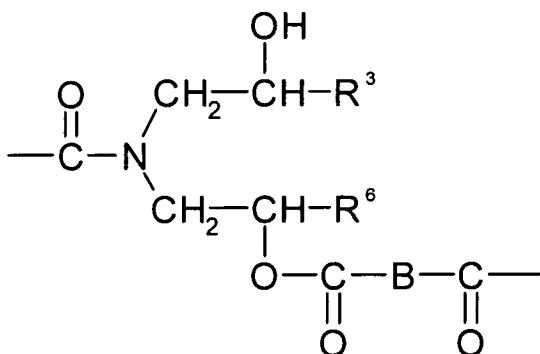
Preferably, in the branched polymer a ( $\beta$ )-hydroxyalkylamide group is present,

5 which can be both present as a bis-( $\beta$ )-hydroxyalkylamide end-group, such as



or as a pendant side chain group, such as

10



15 Preferably, the molar amount of amide units in the chain is higher than the molar amount of ester units.

In all above embodiments, optionally one or several nitrogen atoms of the *condensation polymer* may be present in quaternized forms or may be protonated. This means that nitrogen atoms present in the *condensation polymer* such as e.g.  
 20 amino groups in the NHet group are protonated with hydrogen or are quaternized with linear, branched or cyclic ( $C_1$ - $C_8$ ) alkyl groups, unsaturated ( $C_1$ - $C_8$ ) alkyl groups, aryl groups, (meth-)acrylic groups or mixtures thereof. Furthermore, one or several nitrogen atoms of the *condensation polymer* may be converted into a betaine group. The quaternization, respectively the protonation leads to a

positively charged *condensation polymer*. The counter ion may result from the quaternization, respectively protonation agent such as  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{PO}_4^{3-}$ ,  $\text{MeSO}_4^-$ ,  $\text{EtSO}_4^-$  without being limited thereto.

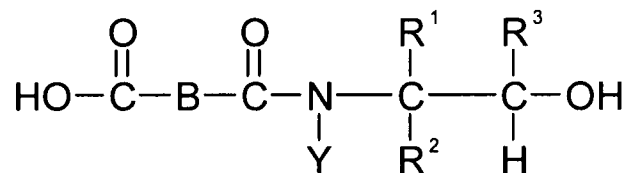
- 5 Preferably, the nitrogen atoms are quaternized with methyl and/or ethyl groups.

The invention also relates to a process for the production of the *condensation polymer* according to the invention.

- 10 According to a preferred embodiment, the *condensation polymer* according to the invention can be obtained through polycondensation of a mono- and/ or bis-hydroxyalkylamide of a dicarboxylic acid in the presence of a heterocyclic compound having a labile hydrogen atom and optionally a (mono-(dialkylamide) dicarboxylic acid.

15

Preferably, the mono-hydroxyalkylamide of the dicarboxylic acid is a compound according to formula (IV):



20

Formula IV

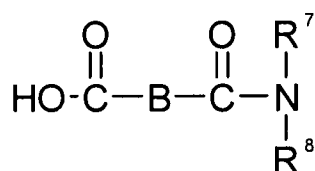
- 25 Preferably, the heterocyclic compound having a labile hydrogen atom is selected from substituted or unsubstituted mono-, bi or multicyclic heterocycles such as pyrrol, pyrazol, imidazole, pyrazolon, indole, benzimidazole, hydantoin, carbazole, phthalimide, isatin, oxazolidine, 2-oxazolidone, oxindole, triazole such as 1,2,3-triazole or 1,2,4-triazole, tetrazole, pentazole, pyridazinone, barbituric acid, nucleic acids and such as cytosine, uracil, thymine or thiouracil, dioxopiperazine, chinazolinone, phthalazinone, purine, xanthin, pterin, cyclic lactames such as  
30 gamma-butyrolactam or alpha-piperidone or bicyclic amidines, and derivatives thereof and if possible their salts such as the HCl salt.

Optionally the NHet may be completely or partly hydrogenated and may be

substituted. Suitable substituents, one or several, may be selected independently from the group of alcohol, ether, ester, cyanide, amide, amine, imine, oxime, sulfide, thiol, sulfone, sulfoxide, sulfate, phosphate, phosphine, phosphin oxide, silane, silicone, silicate, fluoro, chloro, bromo or iodo groups or carbonyl groups.

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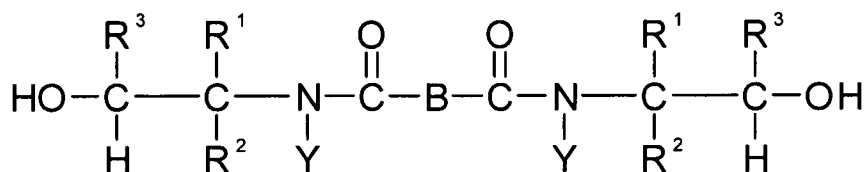
Preferably, the mono-dialkylamide of the dicarboxylic acid is a compound according to formula (V):



10

Formula V

Preferably, the bis-hydroxyalkylamide of the dicarboxylic acid is a compound according to formula (VI):



15

Formula VI

wherein (in formula's IV, V and VI)

18  $\text{R}^1$ ,  $\text{R}^2$ ,  $\text{R}^3$  and  $\text{R}^4$  are, independently of each other, a hydrogen atom, ( $\text{C}_6$ - $\text{C}_{10}$ ) aryl groups or ( $\text{C}_1$ - $\text{C}_8$ ) alkyl groups;

20

$\text{B}$  is a ( $\text{C}_6$ - $\text{C}_{24}$ ) aryl diradical or a ( $\text{C}_2$ - $\text{C}_{24}$ ) alkyl diradical;

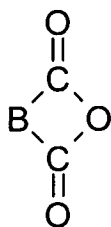
$\text{R}^7$  and  $\text{R}^8$  are, independently of each other, optionally heteroatom substituted ( $\text{C}_6$ - $\text{C}_{10}$ ) aryl groups or optionally heteroatom ( $\text{C}_1$ - $\text{C}_{28}$ ) alkyl groups or

23  $\text{R}^7$  and  $\text{R}^8$  together with the nitrogen atom to which they are attached form a 5 or 6 membered ring wherein optionally one or several C-atoms are replaced by  
25  $-\text{NH}$ ,  $-\text{N}-(\text{C}_1-\text{C}_{20})$  alkyl,  $-\text{N}$ -aryl,  $-\text{O}$ - or  $-\text{S}$ -;

25

30 A *condensation polymer* according to the invention can be obtained in a one-step procedure by reacting a cyclic anhydride, an alkanolamine and a heterocyclic compound having a labile hydrogen atom optionally in combination with a dialkylamine, at room temperature or at an elevated temperature, preferably between about  $20^\circ\text{C}$  and about  $120^\circ\text{C}$ , to form hydroxyalkylamide and

dialkylamides, after which, at an elevated temperature, preferably between 120°C and 250°C, a polyesteramide is obtained through polycondensation with water being removed, preferably through distillation. The one-step procedure can take place with or without a solvent. Suitable solvents are water or an organic solvent, such as methyl-isobutylketone, butylacetate, toluene or xylene. The removal of water through distillation can take place at either reduced or elevated pressure, such as at a pressure higher than  $1.10^5$  Pa, in a vacuum ( $< 1.10^5$  Pa) or azeotropically. Preferably, the cyclic anhydride is an anhydride according to formula (VII):



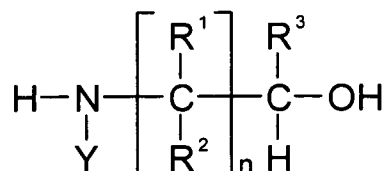
Formula VII

in which B has the meaning as specified above.

Examples of suitable cyclic anhydrides include phthalic anhydride, tetrahydrophthalic anhydride, naphthalenic dicarboxylic anhydride, hexahydrophthalic anhydride, 5-norbornene-2,3-dicarboxylic anhydride, norbornene-2,3-dicarboxylic anhydride, naphthalenic dicarboxylic anhydride, succinic anhydride, 2-octene-1-yl-succinic anhydride, 2-nonene-1-yl-succinic anhydride, 2-decene-1-yl-succinic anhydride, 2-undecene-1-yl-succinic anhydride, 2-dodecene-1-yl-succinic anhydride, maleic anhydride, (methyl)succinic anhydride, glutaric anhydride, 4-methylphthalic anhydride, 4-methylhexahydrophthalic anhydride, 4-methyltetrahydrophthalic anhydride, maleinised poly-isobutane, maleinised polybutadiene and the maleinised alkylester of an unsaturated fatty acid.

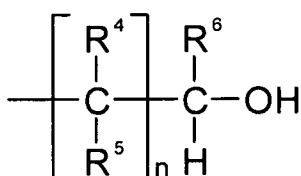
25

Preferably the alkanolamine is compound according to formula (VIII):



Formula VIII

5 in which:



Y is or a linear, branched or cyclic (C<sub>1</sub>-C<sub>20</sub>) alkyl group;

R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>6</sup> are, independently of each other a hydrogen atom,

10 (C<sub>6</sub>-C<sub>10</sub>) aryl groups, (C<sub>1</sub>-C<sub>8</sub>) alkyl groups or CH<sub>2</sub>OH

and n is an integer from 1 to 4. More preferably, n is 1.

The alkanolamine may be a monoalkanolamine, a dialkanolamine, or a mixture thereof.

15 If monoalkanolamines are used in the process according to the invention, linear polymers with a functionality of 2 can be obtained. Depending on the application desired, a linear or an entirely or partly branched polymer can be chosen, in which case the degree of branching can be set by choosing the type of alkanolamine.

If a highly branched structure with a high functionality is desired, di- or trialkanolamines are used as the starting compound. Examples of suitable mono-β-alkanolamines include ethanolamine, 1-(m)ethyl ethanolamine, n-butyl ethanolamine, 1-(m)ethyl isopropanolamine, isobutanolamine, β-cyclohexanolamine, n-butyl isopropanolamine and n-propanolamine.

20 Examples of suitable di-β-alkanolamines are 3-amino-1, 2-propanediol, 2-amino-1,3-propanediol, diisobutanolamine (bis-2-hydroxy-1-butyl)amine, di-β-cyclohexanolamine and diisopropanolamine (bis-2-hydroxy-1-propyl)amine).

Preferably a β-alkyl-substituted β-hydroxyalkylamide is used. Examples are (di)isopropanolamine, cyclohexyl isopropanolamine, 1-(m)ethyl isopropanolamine,

(di)isobutanolamine, di- $\beta$ -cyclohexanolamine and/ or n-butyl isopropanolamine. Most preferably, diisopropanolamine and diisobutanolamine are used. The choice of a  $\beta$ -alkyl-substituted  $\beta$ -hydroxyalkylamide results in a polymer with improved resistance to hydrolysis.

5

Preferably, the heterocyclic compound having a labile hydrogen atom is selected from substituted or unsubstituted mono-, bi or multicyclic heterocycles such as pyrrol, pyrazol, imidazole, pyrazolon, indole, benzimidazole, isatin, oxazolidine, 2-oxazolidone, oxindole, triazole such as 1,2,3-triazole or 1,2,4-triazole, tetrazole, 10 pentazole, pyridazinone, barbituric acid, nucleic acids and such as cytosine, uracil, thymine or thiouracil, dioxopiperazine, chinazolinone, phthalazinone, purine, xanthin, pterin, cyclic lactames such as gamma-butyrolactam or alpha-piperidone or bicyclic amidines and derivatives thereof, and if possible the salts thereof such as the HCl salt.

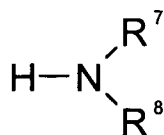
15

Optionally the NHet may be completely or partly hydrogenated and may be substituted. Suitable substituents, one or several, may be selected independently from the group of alcohol, ether, ester, cyanide, amide, amine, imine, oxime, sulfide, thiol, sulfone, sulfoxide, sulfate, phosphate, phosphine, phosphin oxide, 20 silane, silicone, silicate, fluoro, chloro, bromo or iodo groups or carbonyl groups.

Most preferred are, optionally substituted, imidazole, benzimidazole, 1,2,4 triazole, hydantoin, and derivatives thereof and in particular their salts such as the HCl salt such as imidazole hydrochloride are used in the condensation process.

25

Preferably, the dialkylamine is an amine according to formula (IX)



Formula IX

30 in which  $\text{R}^7$  and  $\text{R}^8$  are, independently of each other, optionally heteroatom substituted ( $\text{C}_6$ - $\text{C}_{10}$ ) aryl groups or optionally heteroatom substituted ( $\text{C}_1$ - $\text{C}_{28}$ ) alkyl groups or

$\text{R}^7$  and  $\text{R}^8$  together with the nitrogen atom to which they are attached form a 5 or 6 membered ring wherein optionally one or several C-atoms are replaced by



-NH, -N-(C<sub>1</sub>-C<sub>20</sub>) alkyl, -N-aryl, -O- or -S-;

Examples of suitable dialkylamines include:

- di(m)ethylamine, dibutylamine, dioctylamine, dibutylamine, dioctylamine,  
5 di-2-ethylhexylamine, distearylamine, diallylamine, dicrotylamine,  
N-(m)ethylallylamine, bis(aminopropyl)amine, bis(aminohexyl)amine,  
N-(m)ethyl-aminopropylamine, bis(di(m)ethylaminopropyl)amine,  
bis(di(m)ethylaminohexyl)amine, bis(di(m)ethylaminoethyl)amine,  
bis(trimethylsilylpropyl)amine, bis(tri(m)ethoxysilylpropyl)amine,  
10 bis(perfluorooctyl)amine, bis(perfluorooctyl-(m)ethyl)amine,  
bis(methoxyethyl)amine, N-(m)ethylmethoxyethylamine, bis(methoxy-2-  
propyl)amine, bis(maleimidoethyl)amine, bis(octenylsuccinimidopropyl)amine,  
bis(hexahydrophthalimidoethyl)amine, difurfurylamine, dicyano(m)ethylamine,  
bis(diphenylphosphinoethyl)amine, morpholine, thiomorpholine, piperidine,  
15 pyrrolidine, (2-phenyl)oxazolidine, thiazolidine, piperazine,  
2,2,6,6-tetramethylpiperidine and/ or dibenzylamine.

The alkanolamine: [heterocyclic compound having a labile hydrogen atom,  
optionally in combination with a dialkylamine], equivalent ratio can be chosen  
20 according to the molecular weight and the number of  $\beta$ -hydroxyalkylamide and  
NHet and dialkylamide end-groups desired and is generally between 100:1 and  
1:3, preferably between 10:1 and 1:2.

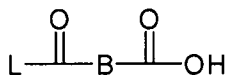
The heterocyclic compound with a labile hydrogen atom and dialkylamine  
25 equivalent ratio can be chosen according to the ratio of NHet end-groups to  
dialkylamide end-groups desired in the condensation polymer. If only NHet end-  
groups are desired only heterocyclic compounds with a labile hydrogen atom are  
used in the process. If additional dialkylamide end-groups are desired the  
equivalent ratio of heterocyclic compound with a labile hydrogen atom and  
30 dialkylamine is generally chosen between 100:1 and 1:100, preferably between  
50:1 and 1:50, most preferred between 1:10 and 10:1.

According to a further embodiment, the *condensation polymer* according to the  
invention can be obtained by a reaction between a heterocyclic compound having  
35 a labile hydrogen atom, optionally in combination with a dialkylamine, an  
alkanolamine and a compound containing an acid group and an activated acid

group, after which a polyesteramide is obtained through polycondensation.

Preferred heterocyclic compound having a labile hydrogen atom, dialkylamine and alkanolamine have been described above.

- 5 The compound containing an acid group and an activated acid group is preferably a compound according to formula (X):



in which

- 10 B is a (C<sub>6</sub>-C<sub>24</sub>) aryl diradical or a (C<sub>2</sub>-C<sub>24</sub>) alkyl diradical;  
 L is selected from -O-(CO)-OR, -O-(CO)-R, -OR<sup>9</sup>, -SR<sup>9</sup>, -Cl  
 in which R<sup>9</sup> is a linear, branched or cyclic (C<sub>1</sub>-C<sub>12</sub>) alkyl group.

- 15 Examples of suitable compounds containing an acid group and an activated acid group are alkyl esters, such as, for example, mono(m)ethyl adipate and mono(m)ethyl sebacate, anhydrides and thioesters.

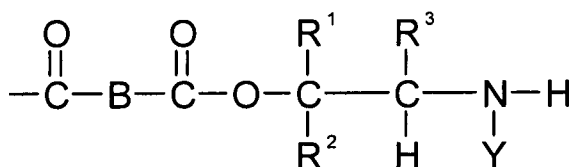
- In addition to dialkylamide and NHet end-groups, the polymer may also contain carboxyl groups and/ or β-hydroxyalkylamide groups. Carboxyl groups can be present in, for example, amounts of between 0.01 and 2.0 mg equivalent/ gram of polymer. β-Hydroxyalkylamide groups may be present in amounts of between 0.01 and 5.0 mg equivalent/ gram polymer. The amount of β-hydroxyalkylamide groups can be controlled via the ratio of alkanolamine and heterocyclic compound having a labile hydrogen atom, optionally in combination with an dialkylamine, and via the degree of conversion. If an excess of a heterocyclic compound having a labile hydrogen atom, optionally in combination with a dialkylamine, is used and the polycondensation reaction is (almost) complete, less than 0.5 mg equivalent/ gram of β-hydroxyalkylamide groups are usually present. If β-hydroxyalkylamide groups are present they may in a subsequent step react with compounds containing one or more groups that can react with β-hydroxyalkylamides, such as for example carboxyl acids, carboxylic anhydrides, isocyanates, activated esters or carboxylic halides.

The degree of branching and the functionality of the polymer are dependent on the starting materials and the molecular weight of the polymer. A molecular weight

higher than 2,000 and the use of di- and/ or trialkanolamines generally lead to highly branched structures with a functionality of  $\geq 6$ .

5 Due to the presence in amounts of less than 10% by weight (of the total amount of anhydrides) of bis- and dianhydrides instead of the anhydrides according to formula (VII), it is possible that the polymer does not comprise only of units according to formulas (II) and (III).

10 Due to side reactions during the preparation of the polymer it is possible that the reaction mixture comprising the *condensation polymer* according to the invention comprises also secondary amine groups, for example according to the formula (XI):



Formula XI

wherein  $R^1$ ,  $R^2$ ,  $R^3$  and B are defined as above.

15

The *condensation polymer* according to the invention carrying NHet end-groups can also be obtained via hydroxyl functional polymers as disclosed in EP 1 036 106. The  $\beta$ -hydroxylamide end-group of such hydroxyl functional polymers reacts with heterocyclic compounds with a labile hydrogen atom as defined above at  
 20 elevated temperatures, preferably between 120°C and 250°C with water being removed, preferably through distillation. The one-step procedure can take place with or without a solvent. Suitable solvents are water or an organic solvent, such as methyl-isobutylketone, butylacetate, toluene or xylene. The removal of water through distillation can take place at either reduced or elevated pressure, such as  
 25 at a pressure higher than  $1 \cdot 10^5$  Pa, in a vacuum ( $< 1 \cdot 10^5$  Pa) or azeotropically.

The optionally one or several nitrogen atoms of the *condensation polymer* which are present in quaternized or protonated forms may be prepared by reaction of the nitrogen atoms of the non-quaternized *condensation polymer* with customary  
 30 quaternizing or protonating agents according to standard procedures as e.g. described in Jerry March, 'Advanced organic chemistry, 4<sup>th</sup> edition, Wiley-Interscience.

Suitable quaternization reagents are e.g. alkyl or aryl halides such as Me iodide, Me chloride, phenyl iodide, allyl chloride, vinyl chloride; sulfates such as dimethylsulfate, diethylsulfate; glycidyl ethers and esters such as allyl glycidyl ether and glycidyl methacrylate without being limited thereto. Suitable quaternization agents to obtain the betaine group are chloro acetic acid and (meth-)acrylic acid. The quaternization procedure can take place with or without a solvent. Suitable solvents are water or an organic solvent, such as e.g. acetonitrile. The quaternized *condensation polymer* can be used as solution in the respective solvent or the solvent can be evaporated to yield a dried *condensation polymer*.

Suitable protonation agents are e.g. inorganic acids such as HCl; H<sub>3</sub>PO<sub>4</sub>; H<sub>2</sub>SO<sub>4</sub>; The protonation procedure can take place with or without a solvent. Suitable solvents are water or an organic solvent, such as e.g. acetonitrile. The protonated *condensation polymer* can be used as solution in the respective solvent or the solvent can be evaporated to yield a dried *condensation polymer*.

Dependent on the desired degree of the quaternization, respectively protonation, the amount of quaternization or protonation agent to nitrogen atoms has to be adjusted accordingly.

The preferred degree of quaternization, respectively protonation, of the nitrogen atoms of the *condensation polymer* is between 20 and 100%, more preferred between 50 and 100%, most preferred 80 and 100%.

Another embodiment of the invention is a body care body care product or household product comprising an effective amount of a *condensation polymer*.

The term "effective amount" means generally at least a concentration of 0.01% by weight based on the total formulation. Preferably, a concentration of 0.01 to 20 wt. %, most preferred of 0.05 to 10 wt. % is used.

In a further embodiment the invention relates to a body care product comprising a *condensation polymer* as outlined above and additional cosmetic or dermatological adjuvants and/ or additives.

Preferably, the body care product according to the invention is selected from skin-care preparations; bath and shower preparations; liquid soaps; bar soaps; preparations containing scents, fragrances and odorant ingredients; hair-care preparations; dentifrices; deodorizing and antiperspirant preparations; decorative  
5 preparations; light protecting preparations and preparations containing active ingredients.

Preferred body care products according to the invention are hair care preparations comprising additional additives and adjuvants used in hair care.

10

In a further embodiment the invention relates to a method of treating hair in which a body care product such as a hair care preparation is applied to the hair.

In another embodiment the invention relates to the use of a *condensation polymer*  
15 as defined above as conditioning agent, strengthening agent, film forming agent, surfactant, anti-static agent, moisturizer, emulsifier or hair styling agent.

The body care products according to the invention comprise additional cosmetic or dermatological adjuvants and/ or additives (cosmetic carrier) which are  
20 preferable selected from

- 1.) Water
  - 2.) Water soluble organic solvents, preferably C<sub>1</sub>-C<sub>4</sub>-Alkanols
  - 3.) Oils, fatty substances, waxes
  - 25 4.) Various esters different to 3) of C<sub>6</sub>-C<sub>30</sub> monocarboxylic acids with one-, two-, or three valent alcohols
  - 5.) Saturated acyclic and cyclic hydrocarbons
  - 6.) Fatty acids
  - 7.) Fatty alcohols
  - 30 8.) Silicone oils
- and mixtures thereof.

The body care products or household products according to the invention can contain further adjuvants and additives such as preservatives/ antioxidants, fatty  
35 substances/ oils, water, organic solvents, silicones, thickeners, softeners, emulsifiers, additional screening agents, antifoaming agents, moisturizers,

fragrances, surfactants, fillers, sequestering agents, anionic, cationic, nonionic or amphoteric polymers or mixtures thereof, propellants, acidifying or basifying agents, dyes, colorants, pigments or nanopigments, light stabilizers, insect repellants, skin tanning agents, skin whitening agents, antibacterial agents, 5 preservatives or any other ingredients usually formulated into cosmetics. The necessary amounts of the cosmetic and dermatological adjuvants and additives can, based on the desired product, easily be chosen by a skilled artisan in this field and will be illustrated in the examples, without being limited hereto.

10 Light screening agents

Additional screening agents are advantageously selected from UV-A, UV-B, UV-C and/ or broadband filters. Examples of UV-B or broad spectrum screening agents, i.e. substances having absorption maximums between about 290 nm and 340 nm may be organic or inorganic compounds. Organic UV-B or broadband screening 15 agents are e.g. acrylates such as 2-ethylhexyl 2-cyano-3,3-diphenylacrylate (octocrylene, PARSOL<sup>®</sup> 340), ethyl 2-cyano-3,3-diphenylacrylate and the like; camphor derivatives such as 4-methyl benzylidene camphor (PARSOL<sup>®</sup> 5000), 3-benzylidene camphor, camphor benzalkonium methosulfate, polyacrylamidomethyl benzylidene camphor, sulfo benzylidene camphor, 20 sulphomethyl benzylidene camphor, therephthalidene dicamphor sulfonic acid and the like; Cinnamate derivatives such as ethylhexyl methoxycinnamate (PARSOL<sup>®</sup> MCX), ethoxyethyl methoxycinnamate, diethanolamine methoxycinnamate (PARSOL<sup>®</sup> Hydro), isoamyl methoxycinnamate and the like as well as cinnamic acid derivatives bond to siloxanes; p-aminobenzoic acid derivatives, such as p-aminobenzoic acid, 2-ethylhexyl p-dimethylaminobenzoate, N-oxypropylenated 25 ethyl p-aminobenzoate, glyceryl p-aminobenzoate; benzophenones such as benzophenone-3, benzophenone-4, 2,2',4,4'-tetrahydroxy-benzophenone, 2,2'-dihydroxy-4,4'-dimethoxybenzophenone and the like; esters of benzalmalonic acid such as di-(2-ethylhexyl) 4-methoxybenzalmalonate; esters of 2-(4-ethoxy-30 anilinomethylene)propandioic acid such as 2-(4-ethoxy anilinomethylene) propandioic acid diethyl ester as described in the European Patent Publication EP 0895 776; organosiloxane compounds containing benzmalonate groups as described in the European Patent Publications EP 0358584 B1, EP 0538431 B1 and EP 0709080 A1 such as PARSOL<sup>®</sup> SLX; drometrizole trisiloxane (Mexoryl 35 XL); imidazole derivatives such as e.g. 2-phenyl benzimidazole sulfonic acid and its salts (PARSOL<sup>®</sup>HS). Salts of 2-phenyl benzimidazole sulfonic acid are e.g.

alkali salts such as sodium- or potassium salts, ammonium salts, morpholine salts, salts of primary, sec. and tert. amines like monoethanolamine salts, diethanolamine salts and the like; salicylate derivatives such as isopropylbenzyl salicylate, benzyl salicylate, butyl salicylate, ethylhexyl salicylate (PARSOL<sup>®</sup> EHS, Neo Heliopan OS), isoocetyl salicylate or homomenthyl salicylate (homosalate, PARSOL<sup>®</sup> HMS, Neo Heliopan HMS) and the like; triazine derivatives such as ethylhexyl triazone (Uvinul T-150), diethylhexyl butamido triazone (Uvasorb HEB) and the like. Encapsulated UV-filters such as encapsulated ethylhexyl methoxycinnamate (Eusolex UV-pearls) or microcapsules loaded with UV-filters as e.g. disclosed in EP 1471995 and the like; Inorganic compounds are pigments such as microparticulated TiO<sub>2</sub>, and the like. The term "microparticulated" refers to a particle size from about 5 nm to about 200 nm, particularly from about 15 nm to about 100 nm. The TiO<sub>2</sub> particles may also be coated by metal oxides such as e.g. aluminum or zirconium oxides or by organic coatings such as e.g. polyols, methicone, aluminum stearate, alkyl silane. Such coatings are well known in the art.

Examples of broad spectrum or UV A screening agents i.e. substances having absorption maximums between about 320 nm and 400 nm may be organic or inorganic compounds e.g. dibenzoylmethane derivatives such as 4-tert.-butyl-4'-methoxydibenzoyl-methane (PARSOL<sup>®</sup> 1789), dimethoxydibenzoylmethane, isopropylidibenzoylmethane and the like; benzotriazole derivatives such as 2,2'-methylene-bis-(6-(2H-benzotriazole-2-yl)-4-(1,1,3,3,-tetramethylbutyl)-phenol (Tinosorb M) and the like; bis-ethylhexyloxyphenol methoxyphenyl triazine (Tinosorb S) and the like; phenylene-1,4-bis-benzimidazolsulfonic acids or salts such as 2,2-(1,4-phenylene)bis-(1H-benzimidazol-4,6-disulfonic acid) (Neoheliopan AP); amino substituted hydroxybenzophenones such as 2-(4-Diethylamino-2-hydroxy-benzoyl)-benzoic acid hexylester (Uvinul A plus) as described in the European Patent Publication EP 1046391; Ionic UV-A filters as described in the International Patent Publication WO2005080341 A1; Pigments such as microparticulated ZnO or TiO<sub>2</sub> and the like. The term "microparticulated" refers to a particle size from about 5 nm to about 200 nm, particularly from about 15 nm to about 100 nm. The particles may also be coated by other metal oxides such as e.g. aluminum or zirconium oxides or by organic coatings such as e.g. polyols, methicone, aluminum stearate, alkyl silane. Such coatings are well known in the art.

As dibenzoylmethane derivatives have limited photostability it may be desirable to photostabilize these UV-A screening agents. Thus, the term "conventional UV-A screening agent" also refers to dibenzoylmethane derivatives such as e.g. PARSOL® 1789 stabilized by, e.g. 3,3-Diphenylacrylate derivatives as described in the European Patent Publications EP 0 514 491 B1 and EP 0 780 119 A1; Benzylidene camphor derivatives as described in the US Patent No. 5,605,680; Organosiloxanes containing benzmalonate groups as described in the European Patent Publications EP 0358584 B1, EP 0538431 B1 and EP 0709080 A1.

#### 10 Antioxidants

Based on the invention all known antioxidants usually formulated into body care and household products can be used. Especially preferred are antioxidants chosen from the group consisting of amino acids (e.g. glycine, histidine, tyrosine, tryptophan) and their derivatives, imidazole (e.g. urocanic acid) and derivatives, peptides such as D,L-carnosine, D-carnosine, L-carnosine and derivatives (e.g. anserine), carotenoids, carotenes (e.g.  $\alpha$ -carotene,  $\beta$ -carotene, lycopene) and derivatives, chlorogenic acid and derivatives, lipoic acid and derivatives (e.g. dihydrolipoic acid), aurothioglucose, propylthiouracil and other thiols (e.g. thioredoxine, glutathione, cysteine, cystine, cystamine and its glycosyl-, N-acetyl-, methyl-, ethyl-, propyl-, amyl-, butyl- and lauryl-, palmitoyl-, oleyl-,  $\gamma$ -linoleyl-, cholesteryl- and glycerylester) and the salts thereof, dilaurylthiodipropionate, distearylthiodipropionate, thiodipropionic acid and its derivatives (ester, ether, peptides, lipids, nucleotides, nucleosides and salts) as well as sulfoximine compounds (such as buthioninsulfoximine, homocysteinesulfoximine, buthioninsulfone, penta-, hexa-, heptathioninsulfoximine) in very low compatible doses (e.g. pmol bis  $\mu$ mol/ kg), additionally (metal)-chelators (such as  $\alpha$ -hydroxyfatty acids, palmitic-, phytinic acid, lactoferrin),  $\beta$ -hydroxyacids (such as citric acid, lactic acid, malic acid), huminic acid, gallic acid, gallic extracts, bilirubin, biliverdin, EDTA, EGTA and its derivatives, unsaturated fatty acids and their derivatives (such as  $\gamma$ -linoleic acid, linolic acid, oleic acid), folic acid and its derivatives, ubiquinone and ubiquinol and their derivatives, vitamin C and derivatives (such as ascorbylpalmitate and ascorbyltetraisopalmitate, Mg-ascorbylphosphate, Na-ascorbylphosphate, ascorbyl-acetate), tocopherol and derivatives (such as vitamin-E-acetate), mixtures of nat. vitamin E, vitamin A and derivatives (vitamin-A-palmitate and -



acetate) as well as coniferylbenzoate, rutinic acid and derivatives,  $\alpha$ -glycosylrutin, ferulic acid, furfurylidene-glucitol, carnosine, butylhydroxytoluene, butylhydroxyanisole, trihydroxybutyrophenone, urea and its derivatives, mannose and derivatives, zinc and derivatives (e.g. ZnO, ZnSO<sub>4</sub>), selen and derivatives (e.g. selenomethionin), stilbenes and derivatives (such as stilbenoxide, trans-stilbenoxide) and suitable derivatives (salts, esters, ethers, sugars, nucleotides, nucleosides, peptides and lipids) of the named active ingredients. One or more preservatives/ antioxidants may be present in an amount of at least 0.01 wt. % of the total weight of the composition. Preferably about 0.01 wt. % to about 10 wt. % of the total weight of the composition of the present invention is present. Most preferred, one or more preservatives/ antioxidants are present in an amount about 0.1 wt. % to about 1 wt. %.

#### Surface active ingredients

Typically body care products or household products also contain surface active ingredients like emulsifiers, solubilizers and the like. An emulsifier enables two or more immiscible components to be combined homogeneously. Moreover, the emulsifier acts to stabilize the composition. Emulsifiers that may be used in the present invention in order to form O/W, W/O, O/W/O or W/O/W emulsions/ microemulsions include sorbitan oleate, sorbitan sesquioleate, sorbitan isostearate, sorbitan trioleate, polyglyceryl-3-diisostearate, polyglycerol esters of oleic/ isostearic acid, polyglyceryl-6 hexaricinolate, polyglyceryl-4-oleate, polyglyceryl-4 oleate/ PEG-8 propylene glycol cocoate, oleamide DEA, TEA myristate, TEA stearate, magnesium stearate, sodium stearate, potassium laurate, potassium ricinoleate, sodium cocoate, sodium tallowate, potassium castorate, sodium oleate, and mixtures thereof. Further exemplary emulsifiers are phosphate esters and the salts thereof such as cetyl phosphate (Amphisol<sup>®</sup> A), diethanolamine cetyl phosphate (Amphisol<sup>®</sup>), potassium cetyl phosphate (Amphisol<sup>®</sup> K), sodium glyceryl oleate phosphate, hydrogenated vegetable glycerides phosphate and mixtures thereof. Furthermore, one or more synthetic polymers may be used as an emulsifier. For example, PVP eicosene copolymer, acrylates/ C<sub>10-30</sub> alkyl acrylate crosspolymer, acrylates/ steareth-20 methacrylate copolymer, PEG-22/ dodecyl glycol copolymer, PEG-45/ dodecyl glycol copolymer, and mixtures thereof. Further exemplary emulsifiers are fatty alcohols, e.g. ceteryl alcohol (Lanette O, Cognis Cooperation), cetyl alcohol

(Lanette 16, Cognis Cooperation), stearyl alcohol (Lanette 18, Cognis Cooperation), Laneth-5 (Polychol 5, Croda Chemicals), furthermore sucrose and glucose derivatives, e.g. sucrose distearate (Crodesta F-10, Croda Chemicals), Methyl glucose isostearate (Isolan IS, Degussa Care Chemicals), furthermore

5 ethoxylated carboxylic acids or polyethyleneglycol esters and polyethyleneglycol ethers, e.g. steareth-2 (Brij 72, Uniqema), steareth-21 (Brij 721, Uniqema), cetareth-25 (Cremophor A25, BASF Cooperation), PEG-40 hydrogenated castor oil (Cremophor RH-40, BASF Cooperation), PEG-7 hydrogenated castor oil (Cremophor WO7, BASF Cooperation), PEG-30 Dipolyhydroxystearate

10 (Arlacel P 135, Uniqema), furthermore glyceryl esters and polyglyceryl esters, e.g. polyglyceryl-3-diisostearate (Hostacerin TGI, Clariant Cooperation), polyglyceryl-2 dipolyhydroxystearate (Dehymuls PGPH, Cognis Cooperation), polyglyceryl-3 methylglucose distearate (Tego Care 450, Degussa Care Chemicals). The preferred emulsifiers are cetyl phosphate (Amphisol<sup>®</sup> A),

15 diethanolamine cetyl phosphate (Amphisol<sup>®</sup>), potassium cetyl phosphate (Amphisol<sup>®</sup> K), PVP Eicosene copolymer, acrylates/ C<sub>10-30</sub>-alkyl acrylate crosspolymer, PEG-20 sorbitan isostearate, sorbitan isostearate, and mixtures thereof. The one or more emulsifiers are present in a total amount of at least 0.01 wt. % of the total weight of the composition. Preferably about 0.01 wt. % to

20 about 20 wt. % of the total weight of the composition of the present invention is used. Most preferred, about 0.1 wt. % to about 10 wt. % of emulsifiers are used.

Typically body care products or household products also contain anionic, neutral, amphoteric or cationic surfactants.

25 Exemplary anionic surfactants comprise alkylsulfate, alkylethersulfate, alkylsulfonate, alkylarylsulfonate, alkylsuccinate, alkylsulfosuccinate, N-alkoylsarkosinate, acyltaurate, acylisethionate, alkylphosphate, alkyletherphosphate, alkylethercarboxylate, alpha-olefinsulfonate, especially the alkali-und earth alkali salts, e.g. sodium, potassium, magnesium, calcium, as well

30 as ammonium- and triethanol amine-salts. The alkylethersulfate, alkyletherphosphate and alkylethercarboxylate may comprise between 1 to 10 ethylenoxide or propylenoxide units, preferably 1 to 3 ethylenoxide-units per molecule.

Suitable are e.g. sodium laurylsulfate, ammonium lauryl sulfate, sodium laurylethersulfate, ammonium laurylethersulfate, sodium lauroylsarkonisate,

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sodiummoleylsuccinate, ammonium laurylsulfosuccinate, sodium dodecylbenzolsulfonate, triethanolamidodecylbenzolsulfonate.

Suitable amphoteric surfactants are e.g. alkylbetaine, alkylamidopropylbetaine, 5 alkylsulfobetaine, alkylglycinate, alkylcarboxyglycinate, alkylamphoacetate or propionate, alkylamphodiacetate or dipropionate such as cocodimethylsulfopropylbetain, laurylbetain, cocamidopropylbetain or sodium cocamphopropionate.

10 Examples of non ionic surfactants are e.g. reaction products of aliphatic alcohols or alkylphenols with 6 to 20 C-Atoms of a linear or branched alkyl chain with ethylenoxide and/ or propylenoxide. The amount of alkyleneoxide is about 6 to 60 mole to one mol alcohol. Furthermore alkylaminoxide, mono- or dialkylalkanolamide, fatty esters of polyethylen glycols, alkylpolyglycosides or 15 sorbitanether ester are suitable for the incorporation of hair care compositions according to the invention.

Furthermore, the body care products or household products may contain the usual cationic surfactants such as quaternised ammonium compounds e.g. 20 cetyltrimethylammoniumchlorid or bromide (INCI: cetrimoniumchloride or bromide), hydroxyethylcetyldimonium phosphate (INCI: Quaternium-44), Luviquat<sup>®</sup> Mono LS (INCI: Cocotrimoniummethosulfate), poly(oxy-1,2-Ethandiyl), (Octadecylnitrilio) tri-2, 1-Ethandiyl) tris-(hydroxy)-phosphate (INCI Quaternium-52).

25 For special effects typical conditioning agents may be combined with the *condensation polymers* within body care products or household products, especially within hair care preparations such as the previously mentioned cationic polymers named polyquaternium (INCI), especially copolymers of vinylpyrrolidone/N-vinylimidazoliumsalts (Luviquat<sup>®</sup> FC, Luviquat<sup>®</sup> HM, Luviquat<sup>®</sup> 30 MS, Luviquat<sup>®</sup> Ultracare), copolymers of N-vinylpyrrolidone/dimethylaminoethylmethacrylate quaternised with diethylsulfate (Luviquat<sup>®</sup> PQ 11), copolymers of N-cationic cellulose derivatives (Polyquaternium-4 and-10), acrylamidcopolymers (Polyquaternium-7). Furthermore protein hydrolysates may be used as well as conditioning agents on 35 silicone basis such as polyarylsiloxane, polyarylsiloxane, polyethersiloxane or silicone resins. Other suitable silicone compounds are dimethicondopolyole

(CTFA) and amino functionalised silicone derivatives such as amodimethicone (CTFA).

Furthermore cationic guar derivatives such as guarhydroxypropyltrimoniumchloride (INCI) may be used.

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The one or more anionic, neutral, amphoteric or cationic surfactants are present in a total amount of at least 0.01wt. % of the total weight of the composition. Preferably about 0.01 wt. % to about 20 wt. % of the total weight of the composition of the present invention is used. Most preferred, about 0.1 wt. % to about 10 wt. % of one or more surfactants are used.

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#### Oil and fatty components

The lipid phase can advantageously be chosen from mineral oils and mineral waxes; oils such as triglycerides of capric acid and/ or caprylic acid or castor oil; oils or waxes and other natural or synthetic oils, in an preferred embodiment esters of fatty acids with alcohols e.g. isopropanol, propyleneglycol, glycerin or esters of fatty alcohols with carbonic acids or fatty acids; alkylbenzoates; and/ or silicone oils.

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Exemplary fatty substances which can be incorporated in the oil phase of the emulsion, microemulsion, oleo gel, hydrodispersion or lipodispersion of the present invention are advantageously chosen from esters of saturated and/ or unsaturated, linear or branched alkyl carboxylic acids with 3 to 30 carbon atoms, and saturated and/ or unsaturated, linear and/ or branched alcohols with 3 to 30 carbon atoms as well as esters of aromatic carboxylic acids and of saturated and/ or unsaturated, linear or branched alcohols of 3-30 carbon atoms. Such esters can advantageously be selected from octylpalmitate, octylcocoate, octylisostearate, octyldodecylmyristate, cetearylisononanoate, isopropylmyristate, isopropylpalmitate, isopropylstearate, isopropyloleate, n-butylstearate, n-hexyllaurate, n-decyloleate, isoctylstearate, isononylstearate, isononylisononanoate, 2-ethyl hexylpalmitate, 2-ethylhexyllaurate, 2-hexyldecylstearate, 2-octyldodecylpalmitate, stearylheptanoate, oleyloleate, oleylerucate, erucyloleate, erucylerucate, tridecylstearate, tridecyltrimellitate, as well as synthetic, half-synthetic or natural mixtures of such esters e.g. jojoba oil.

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Other fatty components suitable for body care products or household products of the present invention include polar oils such as lecithins and fatty acid triglycerides, namely triglycerol esters of saturated and/ or unsaturated, straight or branched carboxylic acid with 8 to 24 carbon atoms, preferably of 12 to 18  
5 carbon atoms whereas the fatty acid triglycerides are preferably chosen from synthetic, half synthetic or natural oils (e.g. cocoglyceride, olive oil, sun flower oil, soybean oil, peanut oil, rape seed oil, sweet almond oil, palm oil, coconut oil, castor oil, hydrogenated castor oil, wheat oil, grape seed oil, macadamia nut oil and others); apolar oils such as linear and/ or branched hydrocarbons and  
10 waxes e.g. mineral oils, vaseline (petrolatum); paraffins, squalane and squalene, polyolefins, hydrogenated polyisobutenes and isohexadecanes, favored polyolefins are polydecenes; dialkyl ethers such as dicaprylylether; linear or cyclic silicone oils such as preferably cyclomethicone (octamethylcyclotetrasiloxane; cetyldimethicone, hexamethylcyclotrisiloxane,  
15 polydimethylsiloxane, poly(methylphenylsiloxane) and mixtures thereof.

Other fatty components which can advantageously be incorporated in body care products or household products of the present invention are isoeikosane; neopentylglycoldiheptanoate; propyleneglycoldicaprylate/ dicaprinate; caprylic/  
20 capric/ diglycerylsuccinate; butyleneglycol caprylate/ caprate; C<sub>12-13</sub>-alkyllactate; di-C<sub>12-13</sub>-alkyltartrate; triisostearin; dipentaerythrityl hexacaprylate/ hexacaprate; propyleneglycolmonoisostearate; tricaprylin; dimethylisosorbide. Especially beneficial is the use of mixtures C<sub>12-15</sub>-alkylbenzoate and 2-ethylhexylisostearate, mixtures C<sub>12-15</sub>-alkylbenzoate and isotridecylisononanoate  
25 as well as mixtures of C<sub>12-15</sub>-alkylbenzoate, 2-ethylhexylisostearate and isotridecylisononanoate.

The oily phase of the formulation of the present invention can also contain natural vegetable or animal waxes such as bee wax, china wax, bumblebee wax  
30 and other waxes of insects as well as shea butter and cocoa butter.

#### Silicone oils

Suitable silicone oils are e.g. such as dimethylpolysiloxane, diethylpolysiloxane, diphenylpolysiloxane, cyclic siloxanes, poly(methylphenylsiloxanes) as well as  
35 amino-, fatty acid-, alcohol-, polyether-, epoxy-, fluoro-, glycoside-, and/ or alkyl modified silicone compounds which are liquid or solid at room temperature and

mixtures thereof. The number average molecular weight of the dimethicones and poly(methylphenylsiloxanes) is preferably in the range of 100 to 150000 g/ mol. Preferred cyclic siloxanes comprise 4- to 8- membered rings which are for example commercially available as cyclomethicones.

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An oil or fatty component is present in an amount of about 1 wt. % to about 50 wt. % of the total weight of the product. The preferred amount of an oil or fatty component is about 2 wt. % to about 25 wt. %, and most preferably about 3 wt. % to about 20 wt. %.

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#### Moisturizing agents

A moisturizing agent may be incorporated into a product of the present invention to maintain hydration or rehydrate the skin. Moisturizers that prevent water from evaporating from the skin by providing a protective coating are called emollients. Additionally an emollient provides a softening or soothing effect on the skin surface and is generally considered safe for topical use. Preferred emollients include mineral oils, lanolin, petrolatum, capric/ caprylic triglyceraldehydes, cholesterol, silicones such as dimethicone, cyclomethicone, almond oil, jojoba oil, avocado oil, castor oil, sesame oil, sunflower oil, coconut oil and grape seed oil, cocoa butter, olive oil, aloe extracts, fatty acids such as oleic and stearic, fatty alcohols such as cetyl and hexadecyl (ENJAY), diisopropyl adipate, hydroxybenzoate esters, benzoic acid esters of C<sub>9-15</sub>-alcohols, isononyl isononanoate, ethers such as polyoxypropylene butyl ethers and polyoxypropylene cetyl ethers, and C<sub>12-15</sub>-alkyl benzoates, and mixtures thereof. The most preferred emollients are hydroxybenzoate esters, aloe vera, C<sub>12-15</sub>-alkyl benzoates, and mixtures thereof. An emollient is present in an amount of about 1 wt. % to about 50 wt. % of the total weight of the product. The preferred amount of emollient is about 2 wt. % to about 25 wt. %, and most preferably about 3 wt. % to about 15 wt. %.

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Moisturizers that bind water, thereby retaining it on the skin surface are called humectants. Examples of humectants which can be incorporated into a product of the present invention are glycerin, propylene glycol, polypropylene glycol, polyethylene glycol, lactic acid, sodium lactate, pyrrolidone carboxylic acid, urea, phospholipids, collagen, elastin, ceramides, lecithin, sorbitol, PEG-4, and mixtures

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thereof. Additional suitable moisturizers are polymeric moisturizers of the family of water soluble and/ or swellable/ and/ or with water gelating polysaccharides such as hyaluronic acid, chitosan and/ or a fructose rich polysaccharide which is e.g. available as Fucogel®1000 (CAS-Nr. 178463-23-5) by SOLABIA S. One or more  
5 humectants are optionally present at about 0.5 wt. % to about 8 wt. % in a product of the present invention, preferably about 1 wt. % to about 5 wt. %.

The aqueous phase of the products of the present invention can contain the usual cosmetic additives such as alcohols, especially lower alcohols, preferably ethanol  
10 and/ or isopropanol, low diols or polyols and their ethers, preferably propyleneglycol, glycerin, ethyleneglycol, ethyleneglycol monoethyl- or monobutylether, propyleneglycol monomethyl- or -monoethyl- or-monobutylether, diethyleneglycol monomethyl-or monoethylether and analogue products, polymers, mousse stabilizers; electrolytes and especially one or more thickeners.

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#### Thickeners

Thickeners that may be used in formulations of the present invention to assist in making the consistency of a product suitable include carbomer, siliciumdioxide, magnesium and/ or aluminum silicates, lipid thickeners, e.g. cetyl alcohol, cetyl  
20 palmitate (Cutina CP, Cognis Cooperation), glyceryl myristate (Estol 3650, Uniqema), microcrystalline wax (A&E Connock), myristyl alcohol (Lanette 14, Cognis Cooperation), myristyl lactate (Crodamol ML, Croda Chemicals), beeswax (A&E Connock), stearic acid (Lipo Chemicals), stearyl alcohol (Lanette 18, Cognis Cooperation), polysaccharides and their derivatives such as xanthan gum (Keltrol,  
25 CP Kelco), hydroxypropyl cellulose (Klucel, Hercules Incorporated), Hydroxyethylcellulose (Tylose H, Clariant Corporation), polyacrylamides, selfemulsifying polyacrylamide, e.g. Salcare SC 91, Salcare SC 96 (Ciba Specialty Chemicals), Sepigel 305 (Seppic), acrylate crosspolymers, preferably a carbomer, such as Carbopole® of type 980, 981, 1382, 2984, 5984, ETD 2001,  
30 ETD 2050, Ultrez 10, Ultrez 21 (Noveon Inc.), alone or mixtures thereof. Thickeners can be present in an amount of about 0.01 wt. % to about 8 wt. % in the product of the present invention, preferably, 0.05wt. % to about 5 wt. %.

#### Neutralizing agents

35 Examples of neutralizing agents which may be included in the product of the present invention to neutralize components such as e.g. an emulsifier or a

mousse builder/ stabilizer include but are not limited to alkali hydroxides such as a sodium and potassium hydroxide; organic bases such as diethanolamine (DEA), triethanolamine (TEA), aminomethyl propanol, and mixtures thereof; amino acids such as arginine and lysine and any combination of any foregoing. The neutralizing agent can be present in an amount of about 0.01 wt. % to about 8 wt. % in the product of the present invention, preferably, 1 wt. % to about 5 wt. %.

#### Electrolytes

The addition of electrolytes into the product of the present invention may be necessary to change the behavior of a hydrophobic emulsifier. Thus, the emulsions/ microemulsions of this invention may contain preferably electrolytes of one or several salts including anions such as chloride, sulfate, carbonate, borate and aluminate, without being limited thereto. Other suitable electrolytes can be on the basis of organic anions such as, but not limited to, lactate, acetate, benzoate, propionate, tartrate and citrate. As cations preferably ammonium, alkylammonium, alkali- or alkaline earth metals, magnesium-, iron- or zinc-ions are selected. Especially preferred salts are potassium and sodium chloride, magnesium sulfate, zinc sulfate and mixtures thereof. Electrolytes can be present in an amount of about 0.01 wt. % to about 8 wt. % in the product of the present invention.

#### Light stabilizers

The addition of further light stabilizers may be desirable. Such light stabilizers are e.g. known as sterically hindered amine light stabilizer (HALS) which can be of monomeric or polymeric nature. They are for example selected from the group consisting of N,N'-bisformyl-N,N'-bis-(2,2,6,6-tetramethyl-4-piperidinyloxy)hexamethylenediamine (Uvinul 4050 H), bis-(2,2,6,6-tetramethyl-4-piperidyl)sebacate (Uvinul 4077 H), bis-(1,2,2,6,6-pentamethyl-4-piperidyl)sebacate + methyl-(1,2,2,6,6-pentamethyl-4-piperidyl)sebacate. (Uvinul 4092 H), bis-(2,2,6,6-tetramethylpiperidine-4-yl)-sebacate, bis-(2,2,6,6-tetramethylpiperidine-4-yl) succinate, bis-(1,2,2,6,6-pentamethylpiperidine-4-yl) sebacate, n-butyl-3, 5-di-tert-butyl-4-hydroxybenzyl-malonic acid bis-(1,2,2,6,6-pentamethylpiperidyl) ester, the condensate of 1-hydroxyethyl-2,2,6,6-tetramethyl-4-hydroxypiperidine and succinic acid, the condensate of N,N'-bis-(2,2,6,6-tetramethyl-4-piperidyl)hexamethylenediamine and 4-tert-octylamino-2,6-dichloro-1,3,5-s-triazine, tris-(2,2,6,6-tetramethyl-4-piperidyl)nitrotriacetate, tetrakis-(2,2,



6,6-tetra-methyl-4-piperidyl)-1,2,3,4-butanetetranoate, 1,1'-(1,2-ethanediyl)-bis  
(3,3,5,5-tetramethylpiperazinone), 4-benzoyl-2,2,6,6-tetramethylpiperidine, 4-  
stearyloxy-2,2,6,6-tetramethylpiperidine, bis-(1,2,2,6,6-pentamethylpiperidyl)-2-n-  
butyl-2-(2-hydroxy-3,5-di-tert-butylbenzyl)malonate, 3-n-octyl-7,7,9,9-tetramethyl-  
5 1,3,8-triazaspiro[4.5]decan-2,4-dione, the condensate of N,N-bis-(2,2,6,6-  
tetramethyl-4-piperidyl) hexamethylenediamine and 4-morpholino-2,6-dichloro-  
1,3,5-triazine, the condensate of 2-chloro-4,6-di(4-n-butylamino-2,2,6,6-tetra-  
methylpiperidyl)-1,3,5-triazine and 1,2-bis-(3-aminopropylamino) ethane, the  
condensate of 2-chloro-4,6-di(4-n-butylamino-1,2,2,6,6-pentamethylpiperidyl)-  
10 1,3,5-triazine and 1,2-bis-(3-aminopropylamino)ethane, 8-acetyl-3-dodecyl-  
7,7,9,9-tetramethyl-1,3,8-triazaspiro[4.5]-decane-2,4-dione, 3-dodecyl-1-(2,2,6,6-  
tetramethyl-4-piperidyl) pyrrolidin-2, 5-dione, 3-dodecyl-1-(1,2,2,6,6-pentamethy-  
l-4-piperidyl)-pyrrolidine-2,5-dione, a mixture of 4-hexadecyloxy-and 4-stearyloxy-  
2,2,6,6-tetramethylpiperidine, the condensate of N,N'-bis-(2,2,6,6-tetramethyl-4-  
15 piperidyl) hexamethylenediamine and 4-cyclohexylamino-2,6-dichloro-1,3,5-  
triazine, the condensate of 1,2-bis(3-aminopropylamino) ethane and 2,4,6-  
trichloro-1,3,5-triazine and 4-butylamino-2,2,6,6-tetramethylpiperidine (CAS reg.  
No. [136504-96-6]); (2,2,6,6-tetramethyl-4-piperidyl)-n-dodecylsuccinimide,  
(1,2,2,6,6-pentamethyl-4-piperidyl)-n-dodecylsuccinimide, 2-undecyl-7,7,9,9-  
20 tetramethyl-1-oxa-3,8-diaza-4-oxo-spiro [4,5] decane, the reaction product of  
7,7,9,9-tetramethyl-2-cycloundecyl-1-oxa-3, 8-diaza-4-oxospiro [4,5] decane and  
epichlorohydrin without being limited thereto.

#### Insect repellents

25 Examples of insect repellents which can be used in products according to the  
invention are for example N,N-diethyl-m-toluamide, 1,2-pentanediol or insect  
repellant 3535.

#### Self tanning ingredients

30 Examples of self tanning ingredients are e.g. dihydroxyacetone and/ or  
erythulose or dihydroxy acetone and/ or dihydroxyacetone precursors as  
described in WO 01/85124 and/ or erythulose.

#### Skin whitening ingredients

Examples of skin whitening ingredients are for example vitamin C, sodium ascorbyl phosphate and magnesium ascorbyl phosphate, arbutin and alpha-arbutin.

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#### Deodorizing active ingredients

Examples of deodorizing active ingredients which come into consideration are antiperspirants such as aluminum chlorohydrates, aluminum hydroxyacetates and acidic aluminum/ zirconium salts. Esterase inhibitors may be added as further deodorizing active ingredients. Such inhibitors are preferably trialkyl citrates, such as trimethyl citrate, tripropyl citrate, triisopropyl citrate, tributyl citrate and especially triethyl citrate (Hydagen CAT, Henkel), which inhibit enzyme activity and hence reduce odor formation. Further substances that come into consideration as esterase inhibitors are sterol sulfates or phosphates, for example lanosterol, cholesterol, campesterol, stigmasterol and sitosterol sulfate or phosphate, dicarboxylic acids and esters thereof, for example glutaric acid, glutaric acid monoethyl ester, glutaric acid diethyl ester, adipic acid, adipic acid monoethyl ester, adipic acid diethyl ester, malonic acid and malonic acid diethyl ester and hydroxycarboxylic acids and esters thereof, for example citric acid, malic acid, tartaric acid or tartaric acid diethyl ester. Antibacterial active ingredients that influence the germ flora and kill or inhibit the growth of sweat-decomposing bacteria can likewise be present in the preparations (especially in stick preparations). Other antibacterials which could be present are chitosan, phenoxyethanol and chlorhexidinegluconate-5-chloro-2-(2,4-dichlorophenoxy)-phenol (Triclosan, Irgasan, Ciba Specialty Chemicals Inc.).

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#### Anti-dandruff agents

Examples of anti-dandruff agents which may be used are climbazole, octopirox and zinc pyrithione.

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#### Film formers

Customary film formers include, for example, chitosan, microcrystalline chitosan, quaternized chitosan, polyvinylpyrrolidone, vinylpyrrolidone/ vinyl acetate copolymers, polymers of quaternary cellulose derivatives containing a high proportion of acrylic acid, collagen, hyaluronic acid and salts thereof and similar compounds.

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### Preservatives

Examples of preservatives include Methyl-, Ethyl-, Propyl-, Butylparabens, Benzalkonium chloride, 2-Bromo-2-nitro-propane-1,3-diol, Dehydroacetic acid, 5 Diazolidinyl Urea, 2-Dichlorobenzyl alcohol, DMDM hydantoin, Formaldehyde solution, Methyldibromoglutaronitrile, Phenoxyethanol, Sodium Hydroxymethylglycinate, Imidazolidinyl Urea, Triclosan and further substance classes listed in the following reference: K. F. De Polo-A short textbook of cosmetology, Chapter 7, Table 7-2,7-3, 7-4 and 7-5, p210-219.

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### Bacteria-inhibiting agents

Typical examples of bacteria-inhibiting agents are preservatives that have a specific action against gram-positive bacteria, such as 2,4,4'-trichloro-2'-hydroxydiphenyl ether, chlorhexidine (1,6-di-(4-chlorophenyl-biguanido) hexane) 15 or TCC (3,4,4'-trichlorocarbanilide). A large number of aromatic substances and ethereal oils also have antimicrobial properties. Typical examples are the active ingredients eugenol, menthol and thymol in clove oil, mint oil and thyme oil. A natural deodorizing agent of interest is the terpene alcohol farnesol (3,7,11-trimethyl-2,6,10-dodecatrien-1-ol), which is present in lime blossom oil. 20 Glycerolmonolaurate has also proved to be a bacteriostatic agent. The amount of the additional bacteria-inhibiting agents present is usually from 0.1 to 2 wt. %, based on the solids content of the preparations.

### Polymers

25 The products according to the invention may comprise additional cosmetically and dermatologically acceptable polymers which is different from the *condensation polymer* in order to established the desired properties. For this purpose all anionic, cationic, amphoteric or neutral polymers may be used.

30 Examples for anionic polymers are homo- and copolymers of acrylic acid or methacrylic acid and the salts thereof; copolymers of acrylic acid and acrylamide and the salts thereof; sodium salts of polyhydroxy carbonic acids, water soluble or water dispersable polyester; polyurethanes such as Luviset pur<sup>®</sup> of BASF and polyureas. Especially suitable are copolymers of t-butyl acrylate, ethylacrylate, 35 methyl acrylic acid (e.g. Luvimer<sup>®</sup> 100P); copolymers of ethylacrylate and methacrylic acid (e.g. Luviflex<sup>®</sup> Soft); copolymers of N-tert.-butyl-acrylamide,

ethylacrylate and acrylic acid (Ultrahold<sup>®</sup>, strong); copolymers of vinylacetate, crotonic acid and eventually other vinylic esters (e.g. Luviset<sup>®</sup> grades); copolymers of maleic acid anhydride; eventually with alcohols reacted anionic polysiloxanes e.g. carboxy functionalized, t-butylacrylate, methacrylic acid (Luviskol<sup>®</sup> VBM);  
5 copolymers of acrylic acid and methacrylic acid with hydrophobic monomers such as C4-C30 alkylester of methacrylic acid, C4-C30-alkylvinylester, C4-C30-alkylvinylether and hyaluronic acid. Examples of anionic polymers are also vinylacetate/ crotonic acid copolymers (Resyn<sup>®</sup> by National Starch or Gafset<sup>®</sup> by GAF); vinylpyrrolidone/ vinylacrylate copolymers (e.g. Luviflex<sup>®</sup> by BASF). Other  
10 suitable polymers are vinylpyrrolidone/ acrylate terpolymer and sodiumsulfonate containing polyamides or sodiumsulfonate containing polyesters.

Additional polymers which can be used in combination with the condensation polymers comprises Balance<sup>®</sup> CR (National Starch; Acrylate  
15 Copolymer), Balance<sup>®</sup> 0/ 55 (National Starch; Acrylate Copolymer), Balances<sup>®</sup> 47 (National Starch; Octylacrylamid/ Acrylate/ Butylaminoethylmethacrylate-Copolymer), Aquaflex<sup>®</sup> FX 64 (ISP; Isobutylene/ Ethylmaleimid/ Hydroxyethylmaleimid-Copolymer), Aquaflex<sup>®</sup> SF-40 (ISP/ National Starch; VP/Ninylcaprolactam/ DMAPA Acrylate Copolymer), Allianz<sup>®</sup> LT-120 (ISP/ Rohm &  
20 Haas; Acrylat/ C1-2 succinate/ hydroxyacrylate copolymer), Aquarez<sup>®</sup> HS (Eastman; Polyester-1), Diaformer<sup>®</sup> Z-400 (Clariant; Methacryloylethylbetaine/ Methacrylate-Copolymer), Diaformer<sup>®</sup> Z-711 (Clariant; Methacryloylethyl N-oxide/ Methacrylate-Copolymer), Diaformer<sup>®</sup> Z-712 (Clariant; Methacryloylethyl N-oxide/ MethacrylateCopolymer), Omnirez<sup>®</sup> 2000 (ISP; Monoethylester from Poly  
25 (Methylvinylether/ Maleic Acid in Ethanol), Amphomer<sup>®</sup> HC (National Starch; Acrylate/ Octylacrylamide-Copolymer), Amphomer<sup>®</sup> 28-4910 (National Starch; Octyl-acrylamide/ Acrylate/ Butylaminoethylmethacrylate-Copolymer), Advantage<sup>®</sup> HC 37 (ISP; Terpolymer of vinylcaprolactam/ N-vinylpyrrolidone/ dimethylaminoethylmethacrylate), Advantage<sup>®</sup> LC55 and LC80 or LC A and LC E, Advantage<sup>®</sup>  
30 Plus (ISP; VA/ butylmaleate/ isobornylacrylate copolymer), Aculyne<sup>®</sup>258 (Rohm & Haas; Acrylate/ Hydroxyesteracrylate-Copolymer), Luviset<sup>®</sup> P.U.R. (BASF, Polyurethane-1), Luviflex<sup>®</sup> Silk (BASF), Eastman<sup>®</sup> AQ 48 (Eastman), Styleze<sup>®</sup> CC-10 (ISP; VP/ DMAPA Acrylates Copolymer), Styleze<sup>®</sup> 2000 (ISP; VP/ Acrylates/ Lauryl Methacrylate Copolymer), DynamX (National Starch; Polyurethane-14  
35 AMP-Acrylates Copolymer), Resyn XP (National Starch; Acrylates/ Octylacrylamide Copolymer), Fixomer A-30 (OndeoNalco; poly-methacrylic acid

(and) acrylamidomethyl propanesulfonic acid), Fixate G-100 (Noveon; AMP-Acrylates/ Allyl Methacrylate Copolymer).

5 Examples of cationic polymers are Polyquaternium (INCI), e.g. copolymers of vinylpyrrolidone/N-vinylimidazolium salts (Luviquat<sup>®</sup>FC, Luviquat<sup>®</sup> HM, Luviquat<sup>®</sup>MS, Luviquat<sup>®</sup>Ultracare), copolymers of N-vinylpyrrolidone/dimethylaminoethylmethacrylate, quaternized with diethylsulfate (Luviquat<sup>®</sup> PQ 11, INCI: Polyquaternium-11), copolymers of N-vinylcaprolactam/ N-vinylpyrrolidone/ N-vinylimidazolium salts (Luviquat<sup>®</sup>Hold; INCI: Polyquaternium-46);  
10 cationic derivatives of cellulose (Polyquaternium-4 und -10), acrylamidocopolymers (Polyquaternium-7), Chitosan, cationic starch derivatives (INCI: starch hydroxypropyltrimonium chloride, corn starch modified), cationic guar derivates (INCI: hydroxypropyl guar hydroxypropyltrimonium chloride), cationic sun flower seed derivatives (INCI: sun flower seed amidopropyl  
15 hydroxyethyldimonium chloride), copolymers of acrylic acid, acrylamide and methacrylamidopropyltrimoniumchlorid (INCI: Polyquaternium-53), Polyquaternium-32, Polyquaternium-28 without being limited thereto. Suitable cationic quaternized polymers are furthermore Merquat<sup>®</sup> (polymers on the basis of dimethyldiallyl ammoniumchlorid), Gafquat<sup>®</sup> (quaternary polymers formed by  
20 reacting polyvinylpyrrolidone with quaternary ammonium compounds); Polymer JR (hydroxyethylcellulose with cationic groups), and cationic polymers on plant basis such as guar polymers, commercially available as Jaguar<sup>®</sup> grades of Rhodia.

25 Examples of neutral polymers are polyvinylpyrrolidone, copolymers of N-vinylpyrrolidone and vinylacetate and/ or vinylpropionate, polysiloxane, polyvinylcaprolactam and other copolymers of N-vinylpyrrolidone, copolymers of N-vinylpyrrolidone and alkylacrylate or methacrylate monomers with C1-C18 alkyl chains, copolymers of polyvinylalcohol and polyalkylenglycol such as  
30 Kollicoats<sup>®</sup> IR (BASF) or copolymers of other vinyl monomers to polyalkylenglycol, polysiloxane, polyvinylcaprolactam and copolymers with N-Vinylpyrrolidone, polyethylenimine and the salts thereof, polyvinylamine and the salts thereof, cellulose derivatives, chitosan, polyasparaginic acid salts and derivatives thereof, polyethylenimine and the salts thereof, polyvinylamine and the salts thereof such  
35 as Luviflex<sup>®</sup> Swing (partly hydrolysed copolymer of polyvinylacetate and polyethylenglycol by BASF).

Suitable polymers are also non-ionic, water soluble respectively water dispersible polymers or oligomers such as polyvinylcaprolactam, e.g. Luviskol<sup>®</sup> Plus (BASF), or polyvinylpyrrolidone and copolymers with e.g. vinylesters such as vinylacetate  
5 e.g. Luviskol<sup>®</sup> VA 37 (BASF); polyamide e.g. on the basis of itaconic acid and aliphatic diamines as e.g. described in DE-A-43 33 23.

Examples of amphoteric or zwitterionic polymers are octylacrylamide/ methyl methacrylate/ tert-butylaminoethyl methacrylate/ 2-hydroxypropyl methacrylate  
10 copolymers e.g. obtainable under the names Amphomer<sup>®</sup> (Delft National) and zwitterionic polymers as disclosed, for example, in German Patent Applications DE 39 29 973, DE 21 50 557, DE 28 17 369 and DE 37 08 451. Preferred zwitterionic polymers are acrylamidopropyltrimethylammonium chloride/ acrylic acid or methacrylic acid copolymers and their alkali metal and ammonium salts.  
15 Other suitable polymers are methacroylethylbetaine/ methacrylate copolymers, which are obtainable commercially under the name Amersette<sup>®</sup> (AMERCHOL) and copolymers of hydroxyethyl methacrylate, methyl methacrylate, N,N-dimethylaminoethyl methacrylate and acrylic acid (Jordapon<sup>®</sup>);  
20 Additional suitable polymers are nonionic, siloxane-containing, water-soluble or -dispersible polymers, e.g. polyether siloxanes, such as Tegopren(R) (Goldschmidt) or Belsil(R) (Wacker).

#### Scents and fragrances

25 The body care products and household products according to the invention may contain scents and fragrances comprising at least one, preferably numerous odorant ingredients of natural and/ or synthetic origin. The range of the natural odorants includes, in addition to readily volatile, also moderately and only slightly volatile components. The synthetic odorants embrace representatives from  
30 practically all classes of odorant substances.

The following list comprises examples of known odorants which may be stabilized with the stabilizing composition according to the invention without being limited thereto:

35 natural products such as tree moss absolute, basil oil, tropical fruit oils (such as bergamot oil, mandarin oil, etc.), mastix absolute, myrtle oil, palmarosa oil,

patchouli oil, petitgrain oil, wormwood oil, lavender oil, rose oil, jasmine oil, ylang-ylang oil, etc.;

alcohols: farnesol, geraniol, linalool, nerol, phenylethyl alcohol, rhodinol, cinnamic alcohol, (Z)-hex-3-en-1-ol, menthol,  $\alpha$ -terpineol, etc.;

5 aldehydes such as citral, alpha-hexyl cinnamaldehyde, Lilial, methylionone, verbenone, nootkatone, geranylacetone, etc.;

esters such as allyl phenoxyacetate, benzyl salicylate, cinnamyl propionate, citronellyl acetate, decyl acetate, dimethylbenzylcarbiny acetate, dimethylbenzylcarbiny butyrate, ethyl acetoacetate, cis-3-hexenyl isobutyrate, cis-

10 3-hexenyl salicylate, linalyl acetate, methyl dihydrojasmonate, styralyl propionate, vetiveryl acetate, benzyl acetate, geranyl acetate, etc.;

lactones such as gamma-undecalactone, delta-decalactone, pentadecanolide, 12-oxahexadecanolide, etc.;

acetals such as Viridine (phenylacetaldehyde dimethylacetal), etc.;

15 and other components often used in perfumery such as indole, p-mentha-8-thiol-3-one, methyleugenol, eugenol, anethol, etc.

### Colorants

Generally, for the coloration of household products or body care products  
20 according to the invention all substances are suitable which have an absorption in the visible light of electromagnetic radiation (400-4000nm) The absorption is often caused by the following chromophores: Azo- (mono-, di-, tris-, or poly-)stilbene-, carotenoide-, diarylmethan-, triarylmethan-, xanthene-, acridine-, quinoline-, methin- (also polymethin-) thiazole-, indamine-, indophenol-, azine-, oxazine-,  
25 thiazine-, anthraquinone- indigo-, phthalocyanin and further synthetic, natural and/or inorganic chromophores.

FD&C and D&C which can be used in household products or body care products according to the invention are e.g. curcumin, riboflavin, lactoflavin, tartrazine, chinolinyellow, cochennille, azorubin, amaranth, ponceau 4R, erythrosine, red 2G,  
30 indigotin, chlorophyll, chlorophyllin, caramel, carbo medicinalis, carotenoids, carotin, bixin, norbixin, annatto, orlean, capsanthin, capsorubin, lycopin, xanthophyll, flavoxanthin, lutein, kryptoaxanthin, rubixanthin, violaxanthin, rhodoxanthin, canthaxanthin, betanin, anthocyanins without being limited thereto. Examples of dyes are e.g. inorganic pigments such as iron oxide (iron oxide red,  
35 iron oxide yellow, iron oxide black etc.) ultramarines, chromium oxide green or carbon black. Other colorants and dyes which can be stabilized with the stabilizing

composition according to the invention comprise natural or synthetic organic pigments, disperse dyes which may be solubilized in solvents like direct hair dyes of the HC type, for example HC red No. 3, HC Blue No. 2 and all other hair dyes listed in International Cosmetic Ingredient Dictionary Handbook 7<sup>th</sup> edition 1997) or the dispersion dyes listed in Color Index International Society of Dyers and Colorist, color varnishes (insoluble salts of soluble dyes, like many Ca-, Ba- or Al-salts of anionic dyes), soluble anionic or cationic dyes such as acid dyes (anionic), basic dyes (cationic), direct dyes, reactive dyes or solvent dyes, fluorescent dyes, fluorescein and isothiocyanates.

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#### Active ingredients

Active ingredients which might be used in body care products and household products according to the invention comprise vitamins such as tocopherol, ascorbic acid, ascorbyl phosphate, vitamin Q, D, and K, retinol, retinal, retinoic acid, retinol acetate, retinol palmitate, biotin, carotinoid derivatives such as beta carotene, lycopene, asthaxanthene, vegetable extracts, antibacterial ingredients, instable amino acids comprising dipeptides, oligopeptides and polypeptides such as methionen, cystein, cystin, tryptophan, phenylalanine, tyrosine, phenols, polyphenols or flavonoids, bisabolol, allantoin, phytantriol, panthenol, AHA acids, Ubichinones such as Coenzym Q 10, ceramides, pseudoceramides, essential oils, plant extracts deoxyribonucleic acid, protein hydrolysates.

15  
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Preferred body-care products are skin care preparations, preparations containing scents and/ or fragrances, hair-care preparations, dentrifices, deodorant and antiperspirant, decorative preparations, light protection preparations and functional preparations.

25

Examples of skin care preparations are, in particular, body oils, body lotions, body creams, body gels, facial lotions, facial creams, facial gels, e.g. eye creams, anti-wrinkle creams, day care lotions, night creams, treatment creams, skin protection ointments, sunscreens, shaving preparations, such as shaving mousses or gels, skin powders such as baby powder, moisturizing gels, moisturizing creams, moisturizing sprays, revitalizing body sprays, cellulite gels, anti acne preparations, cleansing milks and peeling preparations.

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According to the invention the skin care preparations have a pH of 3-10, preferably pH 4-8.

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Preparations containing scents and/ or fragrances are in particular perfumes, toilet waters and shaving lotions (aftershave preparations).

5 Examples of hair care products are, for example, shampoo for humans and animals, hair conditioners, products for styling and treating hair, perming agents, hair sprays and lacquers, hair gels, hair fixatives and hair dying or bleaching agents.

10 Examples of dentifrices are in particular tooth cream, toothpastes, mouth-washes, mouth rinses, anti-plaque preparations and cleansing agents for dentures.

Examples of decorative preparations are in particular lipstick, nail varnishes, eye shadow, mascaras, dry and moist make-up, rouge, powders, depilatory agents,  
15 and suntan lotions.

Examples of functional preparations are cosmetic or dermatological compositions containing active ingredients such as hormone preparations, vitamin preparations, vegetable extract preparations and antibacterial preparations.

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Body care products in accordance with the invention such as cosmetic and dermatological compositions can be in the form of a liquid, lotion, a thickened lotion, a gel, a cream, a milk, an ointment, a paste, a powder, a make-up, or a solid tube stick and can be optionally be packaged as an aerosol and can be  
25 provided in the form of a mousse, foam or a spray mousse, sprays, sticks or aerosols or wipes. The body care products according to the invention can be packed as an ampoule. The body care products according to the invention can be in the form of a suspension or dispersion in solvents or fatty substances, or alternatively in the form of an emulsion or micro emulsion (in particular of O/W or  
30 W/O type, O/W/O or W/O/W-type), such as a cream or a milk, a vesicular dispersion, in the form of an ointment, a gel, a solid tube stick or an aerosol mousse. The emulsions can also contain anionic, nonionic, cationic or amphoteric surfactants.

35 The *condensation polymer* may be present in the oil or in the aqueous or aqueous ethanolic phase.

The *condensation polymers* as defined above are especially suitable for body care products, in particular:

- 5       • skin-care preparations, e. g. skin-washing and cleansing preparations in the form of tablet-form or liquid soaps, sapless detergents or washing pastes,
- bath preparations, e. g. liquid (foam baths, milks, shower preparations) or solid bath preparations, e. g. bath cubes and bath salts;
- 10       • skin-care preparations, e. g. skin emulsions, multi-emulsions or skin oils; body oils, body lotions, body gels; skin protection ointments; facial creams/ lotions/ gels; day care skin or facial creams/ lotions/ gels; night creams, eye creams/ lotions/ gels/ ampoules; anti-wrinkle creams/ lotions/ gels/ ampoules;
- 15       • cosmetic personal care preparations, e. g. facial make-up in the form of day creams or powder creams, face powder (loose or pressed), rouge or cream make-up, eye-care preparations, e. g. eye shadow preparations, mascara, eyeliner, eye creams or eye-fix creams; lip-care preparations, e. g. lipsticks, lip gloss, lip contour pencils, nail-care preparations, such as nail varnish, nail varnish removers, nail hardeners or cuticle removers;
- 20       • foot-care preparations, e. g. foot baths, foot powders, foot creams or foot balsams, special deodorants and antiperspirants or callus-removing preparations;
- light-protective preparations, such as sun milks, lotions, creams or oils, facial day care products, unblocks or tropicals, pre-tanning preparations or after-sun preparations;
- 25       • skin-tanning preparations, e. g. self-tanning creams;
- depigmenting preparations, e. g. preparations for bleaching the skin or skin-lightening preparations;
- insect-repellents, e. g. insect-repellent oils, lotions, sprays or sticks;
- 30       • deodorants, such as deodorant sprays, pump-action sprays, deodorant gels, sticks or roll-ons;
- antiperspirants, e. g. antiperspirant sticks, creams or roll-ons, pump-action sprays;
- 35       • preparations for cleansing and caring for blemished skin, e. g. synthetic detergents (solid or liquid), peeling or scrub preparations or peeling masks;

- hair-removal preparations in chemical form (depilation), e. g. hair-removing powders, liquid hair-removing preparations, cream-or paste-form hair-removing preparations, hair- removing preparations in gel form or aerosol mousses;
- 5 • shaving preparations, e. g. shaving soap, foaming shaving creams, non-foaming shaving creams, mousses and gels, pre-shave preparations for dry shaving, aftershaves or aftershave lotions;
- scent or fragrance preparations, e. g. scent, fragrance and/ or odorant ingredient containing preparations such as perfumes, eau de Colognes,
- 10 eau de toilettes, eau de parfumes, eau de toilettes, perfume oils or perfume creams;
- dentifrices, in particular tooth creams, toothpastes, mouth-washes, mouth rinses, anti- plaque preparations and cleansing agents for dentures;
- decorative preparations, in particular lipsticks, nail varnishes, eye
- 15 shadows, mascaras, dry and moist make-up, rouge, powders, depilatory agents and suntan lotions
- cosmetic formulations containing active ingredients, in particular hormone preparations, vitamin preparations, vegetable extract preparations and antibacterial preparations.

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The final formulations listed may exist in a wide variety of presentation forms, for example in the form of liquid preparations, as a W/O, O/W, O/W/O, W/O/W or PIT emulsion and all kinds of micro emulsions, in the form of a gel, in the form of an

25 oil, a cream, milk or lotion, in the form of a stick, in the form of a spray (spray with propellant gas or pump-action spray) or an aerosol, in the form of a mousse, or in the form of a paste.

Especially preferred embodiments of the invention are hair care preparations containing the *condensation polymer*.

30

Hair-care preparations according to the invention contain the *condensation polymer* in a concentration of 0.1 to 30 wt. %, preferably 0.5 to 20 wt. % based on the total weight of the composition.

35 Preferably the hair care preparations are in the form of a cosmetic hair-treatment preparations, e. g. hair-washing preparations in the form of shampoos and

conditioners, hair-care preparations, e. g. pre-treatment preparations, hair tonics, styling creams, styling gels, pomades, hair rinses, treatment packs, intensive hair treatments, e. g. leave-on and rinse-off deep conditioners, hair-structuring preparations, e. g. hair-waving preparations for permanent waves (hot wave, mild wave, cold wave), hair-straightening preparations, liquid hair-setting preparations, hair mousses, hairsprays, bleaching preparations, e. g. hydrogen peroxide solutions, lightening shampoos, bleaching creams, bleaching powders, bleaching pastes or oils, temporary, semi-permanent or permanent hair colorants, preparations containing self-oxidizing dyes, or natural hair colorants, such as henna or chamomile.

Based on the application the hair care preparations may be in the form of a (aerosol) spray, (aerosol) mousse, gel, gel spray, cream, lotion or a wax. Hair sprays comprise as well aerosol sprays as pump sprays without propellant. Hair mousses comprise as well aerosol mousses as pump mousses without propellant. Hair sprays and hair mousses comprise mainly or exclusively water soluble or water dispersible components. If the components used in hair sprays or hair mousses according to the invention are water dispersible, then they may be in the form of microdispersions with particle sizes of usually 1 to 350 nm, preferably 1 to 250 nm. The solid content of such preparations is typically in the range of 0.5 to 20 wt. % of the total weight of the preparation. Such microdispersions normally do not need further emulsifiers or surfactants for their stabilization.

A preferred hair-treatment composition comprises:

1. 0.2 to 20 wt. % of a *condensation polymer*
2. 30 to 99.5 wt. %, preferably 40 to 99 wt. %, of at least one solvent chosen from water, water-miscible solvents and mixtures thereof
3. 0 to 70 wt. % of propellant
4. 0 to 10 wt. % of at least one water-soluble or water-dispersible hair polymer which is different from 1.)
5. 0 to 0.3 % by weight of at least one water-insoluble silicone
6. 0 to 0.5 wt. % of at least one wax, preferably at least one fatty acid amide,
7. and customary additives.

The hair care preparations according to the invention can comprise, as component 4), at least one other water-soluble or water-dispersible hair polymer.

The content of this component is then generally from about 0.1 to 10 % by weight, based on the total weight of the composition. Here, it is preferable to use water-soluble or water-dispersible polyurethanes which, if desired, additionally comprise siloxane groups in copolymerized form.

- 5 The composition according to the invention can comprise, as component 5), at least one water-insoluble silicone, in particular a polydimethylsiloxane, e.g. the Abil® grades from Goldschmidt. The content of this component is then generally from about 0.0001 to 0.2 % by weight, preferably from 0.001 to 0.1 % by weight, based on the total weight of the composition. Preference is given to using at least  
10 one fatty acid amide, such as, for example, erucamide, as component 6).

The hair care preparations according to the invention can, where appropriate, additionally comprise an antifoam, e.g. one based on silicone. The amount of antifoam is generally up to 0.001 % by weight, based on the total amount of the composition. The compositions according to the invention have the advantage  
15 that, on the one hand, they impart the desired hold to the hair and, on the other hand, the polymers are easy to wash out. Generally, a natural appearance and shine is imparted to the hair, even when the hair is by its very nature especially thick and/ or dark.

In particular, the hair care preparations according to the invention can be  
20 formulated to give hair-treatment compositions, in particular hairsprays, with a high propellant content. Advantageously, the hair-treatment compositions according to the invention essentially do not have a "flaking" effect.

In a preferred embodiment, the hair care preparations according to the invention  
25 comprise:

1. 0.05 to 20 wt. % of at least one *condensation polymer*
2. 20 to 99.95 wt. % of water and/ or alcohol
3. 0 to 79.5 wt. % of customary additives

30 The term alcohols refers to all alcohols usually used in cosmetics such as ethanol, n-propanol, isopropanol without being limited thereto.

Other ingredients are cosmetic adjuvants and additives such as propellants, anti-foaming agents, surface active ingredients e.g. surfactants, emulsifiers, foam/  
35 mousse former and solubilisators. The used surface active ingredients may be anionic, cationic, amphoteric or neutral. Further ingredients may be preservatives,

antioxidants, perfume oils, lipidic refatters, active and/ or caring ingredients such as panthenol, collagen, vitamins, protein hydrolysates, alpha- and beta hydroxyl carbonic acids, stabilisators, pH regulators, opacifiers, colorants, dyes, gel formers, salts, moisturizers, complex formers, viscosity regulators or light screening agents without being limited thereto. Furthermore all known styling- and conditioning polymers can be used in combination with the *condensation polymers* in order to obtain special effects.

As traditional polymers the above mentioned cationic, anionic, neutral, non-ionic and amphoteric polymers may be used which are included explicitly herein.

In order to obtain certain properties the hair care preparations may additionally comprise conditioning compounds on silicone basis such as polyalkylsiloxane, polyarylsiloxane, polyarylalkylsiloxane, silicone resins, polyethersiloxane or dimethicon copolyole (CTFA) and amino functionalized silicone compounds such as amodimethicone (CTFA), GP 4 Silicone fluid<sup>®</sup> and GP 7100<sup>®</sup> (Genesee), Q2 8220<sup>®</sup> (Dow Corning), AFL 40<sup>®</sup> (Union Carbide) or polymers as disclosed in EP-B 852 488.

Other suitable ingredients comprise silicone propfpolymers having a polymeric silicone backbone and non-silicone containing side chains or a non silicone containing polymeric backbone and silicone side chains such as Luviflex<sup>®</sup> Silk or polymers disclosed in EP-B 852 488.

Preferred hair care preparations containing the *condensation polymer* are styling preparations such as hair-sprays and hair mousses.

In a preferred embodiment these preparations comprise:

1. 0.1 to 10 wt. % of at least on condensation polymer
2. 20 to 99 wt. % water and/ or alcohol
3. 0 to 70 wt. % of at least one propellant
4. 0 to 20 wt. % of customary additives

Propellants for hair sprays or aerosol mousses are typically used propellants. Preferred are mixtures of propane/ butane, pentane, dimethylether, 1,1-difluoroethane (HFC-152a), carbon dioxide, nitrogen or compressed air.

A preferred preparation for aerosol mousses comprise:

1. 0.1 to 10 wt. % of at least one condensation polymer
2. 55 to 99.8 wt. % water and/ or alcohol
3. 3 to 20 wt. % of a propellant
- 5 4. 0.1 to 5 wt. % of an emulsifier
5. 0 to 10 wt. % of customary additives

Emulsifiers for aerosol mousses may be all conventionally used non-ionic, cationic, anionic or amphoteric emulsifier.

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Examples of non-ionic emulsifiers comprise (INCI-nomenclature) Laureths, e.g. Laureth-4; Cetheths, e.g. Cetheth-1, polyethyleneglycolcetyether; cetheareths, e.g. cetheareth-25, polyglycolfattyacidglycerides, hydroxylated lecithins, lactyl esters of fatty acids, alkylpolyglycosides.

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Examples of cationic emulsifiers are cetyldimethyl-2-hydroxyethylammonium-dihydrogenphosphate, cetyltrimoniumchloride, cetyltrimoniumbromide, cocotrimonium-methylsulfate quaternium-1 to x (INCI).

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Anionic emulsifiers can be selected from alkylsulfate, alkylethersulfate, alkylsulfonate, alkylarylsulfonate, alkylsuccinate, alkylsulfosuccinate, N-alkoylsarcosinate, acyltaurate, acylisethionate, alkylphosphate, alkyletherphosphate, alkylethercarboxylate, alpha-olefinsulfonate, especially the alkali-und earth alkali salts, e.g. sodium, potassium, magnesium, calcium, as well

25 as ammonium- and triethanolamine-salts. The alkylethersulfate, alkyletherphosphate and alkylethercarboxylate may comprise between 1 to 10 ethylenoxide or propylenoxide units, preferably 1 to 3 ethylenoxide-units per molecule.

Preferred hair care preparations comprise hair gels. Such hair gels comprise exemplary:

- 5 1. 0.1 to 20 wt. % preferably 1 to 10 wt. % of at least one *condensation polymer*
2. 0 to 10 wt. % of at least one carrier (solvent), selected from C2 to C5 alcohols, preferably ethanol
3. 0.01 to 5 wt. %, preferably 0.2 to 3 wt. % of at least one thickener
4. 0 to 50 wt. % of a propellant
- 10 5. 0 to 10 wt. %, preferably 0.1 to 3 wt. % of a styling polymer different to 1.), preferably a water soluble non-ionic polymer
6. 0-1 wt. % of at least one refatter, preferably selected from glycerine and glycerine derivatives
7. 0 to 30 wt. % of other customary additives e.g. a silicone component
- 15 8. water ad 100 wt. %

An exemplary styling gel can be comprised as follows:

1. 0.1 to 10 wt. % of a condensation polymer
- 20 2. 60 to 99.85 wt. % of water and/ or alcohol
3. 0.05 to 10 wt. % of a gel former
4. 0.20 wt. % of other customary additives

As gel formers all typically cosmetic gel formers can be used such as slightly  
25 cross linked polyacrylic acid e.g. Carbomer (INCI), cellulose derivatives, polysaccharides e.g. xanthan gum, capryl/ caprin triglyceride, sodiumacrylate-copolymers, polyquaternium-32 (and) paraffinum liquidum (INCI), sodiumacrylate-copolymers (and) paraffinum liquidum (INCI) (and) PPG-1 trideceth-6, polyquaternium-37 (and) propyleneglycoldicapratdicarylate (and) PPG-1 trideceth-  
30 6, polyquaternium-7, polyquaternium-44.



Preferred hair care preparations are shampoo preparations comprising the *condensation polymer* as strengthening and/ or conditioning agent.

Preferred shampoo preparations comprise:

- 5       1. 0.05 to 10 wt. % of a condensation polymer
2. 25 to 94.95 wt. % of water
3. 5 to 50 wt. % of tenside
4. 0 to 5 wt. % of an additional conditioning agent
5. 0 to 10 wt. % other customary additives

10

All typically used anionic, neutral, amphoteric or cationic surfactants may be used within the shampoo preparations.

Exemplary anionic surfactants comprise alkylsulfate, alkylethersulfate, alkylsulfonate, alkylarylsulfonate, alkylsuccinate, alkylsulfosuccinate, N-

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alkoylsarcosinate, acyltaurate, acylisethionate, alkylphosphate, alkyletherphosphate, alkylethercarboxylate, alpha-olefinsulfonate, especially the alkali-und earth alkali salts, e.g. sodium, potassium, magnesium, calcium, as well as ammonium- and triethanolamine-salts. The alkylethersulfate, alkyletherphosphate and alkylethercarboxylate may comprise between 1 to 10 ethylenoxide or propylenoxide units, preferably 1 to 3 ethylenoxide-units per molecule.

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Suitable are e.g. sodium laurylsulfate, ammonium lauryl sulfate, sodium laurylethersulfate, ammonium laurylethersulfate, sodium lauroylsarcosinate, sodiummoleylsuccinate, ammonium laurylsulfosuccinate, sodium dodecylbenzolsulfonate, triethanolamidodecylbenzolsulfonate.

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Suitable amphoteric surfactants are e.g. alkylbetaine, alkylamidopropylbetaine, alkylsulfobetaine, alkylglycinate, alkylcarboxyglycinate, alkylamphoacetate or propionate, alkylamphodiacetate or dipropionate such as cocodimethylsulfopropylbetaine, laurylbetaine, cocamidopropylbetaine or sodium cocamphopropionate.

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Examples of non ionic surfactants are e.g. reaction products of aliphatic alcohols or alkylphenols with 6 to 20 C-Atoms of a linear or branched alkyl chain with ethylenoxide and/ or propylenoxide. The amount of alkylenoxide is about 6 to 60 mole to one mol alcohol. Furthermore alkylaminoxide, mono- or

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dialkylalkanolamide, fatty esters of polyethyleneglycols, alkylpolyglycosides or sorbitanetherester are suitable for the incorporation of hair care preparations according to the invention.

5 Furthermore, the shampoo preparations may contain the usual cationic surfactants such as quaternized ammonium compounds e.g. cetyltrimethylammoniumchloride or bromide (INCI: cetrimoniumchloride or bromide), hydroxyethylcetyldimoniumphosphate (INCI: Quaternium-44), Luviquat<sup>®</sup> Mono LS (INCI: Cocotrimoniummethosulfate), poly(oxy-1,2-ethanediyl),  
10 ((Octadecylnitrilio) tri-2,1-ethanediyl)tris(hydroxy)-phosphate (1:1) (Salt) (INCI Quaternium-52).

For special effects typical conditioning agents may be combined with the *condensation polymers* within the shampoo preparations such as the previously mentioned cationic polymers named polyquaternium (INCI), especially copolymers  
15 of vinylpyrrolidone/ N-vinylimidazoliumsalts (Luviquat<sup>®</sup> FC, Luviquat<sup>®</sup> HM, Luviquat<sup>®</sup> MS, Luviquat<sup>®</sup> Ultracare), copolymers of N-vinylpyrrolidone/ dimethylaminoethylmethacrylate quaternized with diethylsulfate (Luviquat<sup>®</sup> PQ 11), copolymers of N-cationic cellulose derivatives (Polyquaternium-4 und-10), acrylamidecopolymers (Polyquaternium-7). Furthermore protein hydrolysates may  
20 be used as well as conditioning agents on silicone basis such as polyarylsiloxane, polyarylsiloxane, polyethersiloxane or silicone resins. Other suitable silicone compounds are dimethiconopolyole (CTFA) and amino functionalised silicone derivatives such as amodimethicone (CTFA).

Furthermore cationic guar derivatives such as  
25 guarhydroxypropyltrimoniumchloride (INCI) may be used.

Preferred hair care compositions are hair treatment preparations such as rinse off- and leave on-conditioners comprising the *condensation polymer* as strengthening and/ or conditioning agent.

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Preferred conditioner preparations comprise:

1. 0.05-10 wt. % of a *condensation polymer*;
2. 25-94.95 wt. % of water;
3. 0.1-30 wt. % of surfactants / emulsifier / surface active ingredient;
- 35 4. 0.1-30 wt. % of oil / emollient;
5. 0-5 wt. % of an additional conditioning agent;

6. 0-10 wt. % other customary additives.

All typically used anionic, neutral, amphoteric or cationic surfactants may be used within the conditioner preparations.

- 5 Exemplary anionic surfactants comprise alkylsulfate, alkylethersulfate, alkylsulfonate, alkylarylsulfonate, alkylsuccinate, alkylsulfosuccinate, N-alkoylsarkosinate, acyltaurate, acylisethionate, alkylphosphate, alkyletherphosphate, alkylethercarboxylate, alpha-olefinsulfonate, especially the  
10 as ammonium- and triethanol amine-salts. The alkylethersulfate, alkyletherphosphate and alkylethercarboxylate may comprise between 1 to 10 ethylenoxide or propylenoxide units, preferably 1 to 3 ethylenoxide-units per molecule.

- Suitable are e.g. sodium laurylsulfate, ammonium lauryl sulfate, sodium  
15 laurylethersulfate, ammonium laurylethersulfate, sodium lauroylsarkonitate, sodiummoleylsuccinate, ammonium laurylsulfosuccinate, sodium dodecylbenzolsulfonate, triethanolamidodecylbenzolsulfonate.

- Suitable amphoteric surfactants are e.g. alkylbetaine, alkylamidopropylbetaine,  
20 alkylsulfobetaine, alkylglycinate, alkylcarboxyglycinate, alkylamphoacetate or propionate, alkylamphodiacetate or dipropionate such as cocodimethylsulfopropylbetain, laurylbetain, cocamidopropylbetain or sodium cocamphopropionate.

- 25 Examples of non ionic surfactants are e.g. reaction products of aliphatic alcohols or alkylphenols with 6 to 20 C-Atoms of a linear or branched alkyl chain with ethylenoxide and/ or propylenoxide. The amount of alkyleneoxide is about 6 to 60 mole to one mol alcohol. Furthermore alkylaminoxide, mono- or dialkylalkanolamide, fatty esters of polyethylen glycols, alkylpolyglycosides or  
30 sorbitanether ester are suitable for the incorporation of hair care compositions according to the invention.

- Furthermore, the conditioner preparations may contain the usual cationic surfactants such as quaternised ammonium compounds e.g.  
35 cetyltrimethylammoniumchlorid or bromide (INCI: cetrymoniumchloride or bromide), hydroxyethylcetyldimonium phosphate (INCI: Quaternium-44), Luviquat®

Mono LS (INCI: Cocotrimoniummethosulfate), poly(oxy-1,2-Ethandiyl), (Octadecylnitrilio) tri-2, 1-Ethandiyl) tris-(hydroxy)-phosphate (INCI Quaternium-52).

For special effects typical conditioning agents may be combined with the  
5 *condensation polymers* within the conditioning preparations such as the previously mentioned cationic polymers named polyquaternium (INCI), especially copolymers of vinylpyrrolidone/N-vinylimidazoliumsalts (Luviquat<sup>®</sup> FC, Luviquat<sup>®</sup> HM, Luviquat<sup>®</sup> MS, Luviquat<sup>®</sup> Ultracare), copolymers of N-vinylpyrrolidone/dimethylaminoethylmethacrylate quaternised with diethylsulfate  
10 (Luviquat<sup>®</sup> PQ 11), copolymers of N-cationic cellulose derivatives (Polyquaternium-4 and-10), acrylamidcopolymers (Polyquaternium-7). Furthermore protein hydrolysates may be used as well as conditioning agents on silicone basis such as polyarylsiloxane, polyaryalkylsiloxane, polyethersiloxane or silicone resins. Other suitable silicone compounds are dimethicondopolyole  
15 (CTFA) and amino functionalised silicone derivatives such as amodimethicone (CTFA).

Furthermore cationic guar derivatives such as guarhydroxypropyltrimoniumchloride (INCI) may be used.

20 Furthermore, the conditioner preparations may contain the usual surface active ingredients like emulsifiers, solubilizers and the like. An emulsifier enables two or more immiscible components to be combined homogeneously. Moreover, the emulsifier acts to stabilize the composition. Emulsifiers that may be used in the present invention in order to form OW, W/O, OW/O or W/OW emulsions/  
25 microemulsions include sorbitan oleate, sorbitan sesquioleate, sorbitan isostearate, sorbitan trioleate, polyglyceryl-3-diisostearate, polyglycerol esters of oleic/isostearic acid, polyglyceryl-6 hexaricinolate, polyglyceryl-4-oleate, polyglyceryl-4 oleate/PEG-8 propylene glycol cocoate, oleamide DEA, TEA myristate, TEA stearate, magnesium stearate, sodium stearate, potassium  
30 laurate, potassium ricinoleate, sodium cocoate, sodium tallowate, potassium castorate, sodium oleate, and mixtures thereof. Further exemplary emulsifiers are phosphate esters and the salts thereof such as cetyl phosphate (Amphisol<sup>®</sup> A), diethanolamine cetyl phosphate (Amphisol<sup>®</sup>), potassium cetyl phosphate (Amphisol<sup>®</sup> K), sodium glyceryl oleate phosphate, hydrogenated vegetable  
35 glycerides phosphate and mixtures thereof. Furthermore, one or more synthetic

polymers may be used as an emulsifier. For example, PVP eicosene copolymer, acrylates/C<sub>10-30</sub> alkyl acrylate crosspolymer, acrylates/steareth-20 methacrylate copolymer, PEG-22/dodecyl glycol copolymer, PEG-45/dodecyl glycol copolymer, and mixtures thereof. Further exemplary emulsifiers are fatty

5 alcohols, e.g. cetearyl alcohol (Lanette O, Cognis Coopearation), cethyl alcohol (Lanette 16, Cognis Cooperation), stearyl alcohol (Lanette 18, Cognis Coopearation), Laneth-5 (Polychol 5, Croda Chemicals), furthermore sucrose and glucose derivatives, e.g. sucrose distearate (Crodesta F-10, Croda

10 Chemicals), Methyl glucose isostearate (Isolan IS, Degussa Care Chemicals), furthermore ethoxylated carboxylic acids or polyethyleneglycol esters and polyethyleneglycol ethers, e.g. steareth-2 (Brij 72, Uniqema), steareth-21 (Brij 721, Uniqema), cetareth-25 (Cremophor A25, BASF Cooperation), PEG-40 hydrogenated castor oil (Cremophor RH-40, BASF Cooperation), PEG-7 hydrogenated castor oil (Cremophor WO7, BASF Cooperation), PEG-30

15 Dipolyhydroxystearate (Arlacel P 135, Uniqema), furthermore glyceryl esters and polyglyceryl esters, e.g. polyglyceryl-3-diisostearate (Hostacerin TGI, Clariant Cooperation), polyglyceryl-2 dipolyhydroxystearate (Dehymuls PGPH, Cognis Cooperation), polyglyceryl-3 methylglucose distearate (Tego Care 450, Degussa Care Chemicals). The preferred emulsifiers are cetyl phosphate (Amphisol<sup>®</sup> A),

20 diethanolamine cetyl phosphate (Amphisol<sup>®</sup>), potassium cetyl phosphate (Amphisol<sup>®</sup> K), PVP Eicosene copolymer, acrylates/C<sub>10-30</sub>-alkyl acrylate crosspolymer, PEG-20 sorbitan isostearate, sorbitan isostearate, and mixtures thereof. The one or more emulsifiers are present in a total amount of at least 0.01wt. % of the total weight of the composition. Preferably about 0.01 wt. % to

25 about 20 wt. % of the total weight of the composition of the present invention is used. Most preferred, about 0.1 wt. % to about 10 wt. % of emulsifiers are used.

Furthermore, the conditioner preparations may contain the usual oily and fatty components may be chosen from mineral oils and mineral waxes; oils such as

30 triglycerides of caprinic acid and/or caprylic acid or castor oil; oils or waxes and other natural or synthetic oils, in an preferred embodiment esters of fatty acids with alcohols e.g. isopropanol, propyleneglycol, glycerin or esters of fatty alcohols with carbonic acids or fatty acids; alkylbenzoates; and/or silicone oils.

Exemplary fatty substances which can be incorporated in the oil phase of the emulsion, microemulsion, oleo gel, hydrodispersion or lipodispersion of the present invention are advantageously chosen from esters of saturated and/or unsaturated, linear or branched alkyl carboxylic acids with 3 to 30 carbon atoms, and saturated and/or unsaturated, linear and/or branched alcohols with 3 to 30 carbon atoms as well as esters of aromatic carboxylic acids and of saturated and/or unsaturated, linear or branched alcohols of 3-30 carbon atoms. Such esters can advantageously be selected from octylpalmitate, octylcocoate, octylisostearate, octyldodecylmyristate, cetearylisononanoate, isopropylmyristate, isopropylpalmitate, isopropylstearate, isopropyloleate, n-butylstearate, n-hexyllaurate, n-decyloleate, isooctylstearate, isononylstearate, isononylisononanoate, 2-ethyl hexylpalmitate, 2-ethylhexyllaurate, 2-hexyldecylstearate, 2-octyldodecylpalmitate, stearylheptanoate, oleyloleate, oleylerucate, erucyloleate, erucylerucate, tridecylstearate, tridecyltrimellitate, as well as synthetic, half-synthetic or natural mixtures of such esters e.g. jojoba oil.

Other fatty components suitable for conditioner preparations of the present invention include polar oils such as lecithins and fatty acid triglycerides, namely triglycerol esters of saturated and/or unsaturated, straight or branched carboxylic acid with 8 to 24 carbon atoms, preferably of 12 to 18 carbon-atoms whereas the fatty acid triglycerides are preferably chosen from synthetic, half synthetic or natural oils (e.g. cocoglyceride, olive oil, sun flower oil, soybean oil, peanut oil, rape seed oil, sweet almond oil, palm oil, coconut oil, castor oil, hydrogenated castor oil, wheat oil, grape seed oil, macadamia nut oil and others); apolar oils such as linear and/ or branched hydrocarbons and waxes e.g. mineral oils, vaseline (petrolatum); paraffins, squalane and squalene, polyolefins, hydrogenated polyisobutenes and isohexadecanes, favored polyolefins are polydecenes; dialkyl ethers such as dicaprylylether; linear or cyclic silicone oils such as preferably cyclomethicone (octamethylcyclotetrasiloxane; cetyldimethicone, hexamethylcyclotrisiloxane, polydimethylsiloxane, poly(methylphenylsiloxane) and mixtures thereof.

Other fatty components which can advantageously be incorporated in conditioner preparations of the present invention are isoeikosane; neopentylglycoldiheptanoate; propyleneglycoldicaprylate/ dicaprate; caprylic/ capric/ diglycerilsuccinate; butyleneglycol caprylat/caprat; C<sub>12-13</sub>-alkyllactate; di-

C<sub>12-13</sub>-alkyltartrate; triisostearin; dipentaerythryl hexacaprylat/hexacaprate; propyleneglycolmonoisostearate; tricaprylin; dimethylisosorbid. Especially beneficial is the use of mixtures C<sub>12-15</sub>-alkylbenzoate and 2-ethylhexylisostearate, mixtures C<sub>12-15</sub>-alkylbenzoate and isotridecylisononanoate as well as mixtures of C<sub>12-15</sub>-alkylbenzoate, 2-ethylhexylisostearate and isotridecylisononanoate.

The oily phase of the conditioner preparation can also contain natural vegetable or animal waxes such as bees wax, china wax, bumblebee wax and other waxes of insects as well as shea butter and cocoa butter.

Suitable silicone oils are e.g. dimethylpolysiloxane, diethylpolysiloxane, diphenylpolysiloxane, cyclic siloxanes, poly(methylphenylsiloxanes) as well as amino-, fatty acid-, alcohol-, polyether-, epoxy-, fluor-, glycoside-, and/or alkyl modified silicone compounds which are liquid or solid at room temperature and mixtures thereof. The number average molecular weight of the dimethicones and poly(methylphenylsiloxanes) is preferably in the range of 100 to 150000g/mol. Preferred cyclic siloxanes comprise 4- to 8- membered rings which are for example commercially available as cyclomethicones.

In all preparations described above the sum of the ingredients adds to 100%.

The condensation polymers is also suited for the incorporation into household cleansing and treatment agents, for example in laundry products and fabric softeners, non-detergent based fabric products, liquid cleansing and scouring agents, glass detergents, neutral cleaners (all-purpose cleaners), acid household cleaners (bath), bathroom cleaners, for instance in washing, rinsing and dishwashing agents, kitchen and oven cleaners, clear rinsing agents, dishwasher detergents, shoe polishes, polishing waxes, floor detergents and polishes, metal, glass and ceramic cleaners, textile-care products, rug cleaners and carpet shampoos, agents for removing rust, color and stains (stain remover salt), furniture and multipurpose polishes and leather and vinyl dressing agents (leather and vinyl sprays) and air fresheners.

The present invention also concerns home care and fabric care products containing *condensation polymers* such as drain cleaners, disinfectant solutions,

upholstery cleaners, automotive care products (e.g., to clean and/ or polish and protect paint, tires, chrome, vinyl, leather, fabric, rubber, plastic and fabric), degreasers, polishes (glass, wood, leather, plastic, marble, granite, and tile, etc. ), and metal polishes and cleaners. Antioxidants are suitable to protect fragrances in  
5 above products as well as in dryer sheets.

The present invention also relates to home care products such as candles, gel candles, air fresheners and fragrance oils (for the home).

10 The *condensation polymer* may be employed in fabric treatment that takes place after use of the fabric, referred to as fabric care. Such treatments include laundering, which uses detergents, laundry aids and/ or fabric conditioner, and the application of non-detergent based fabric care products, such as spray-on products.

15

In a further embodiment the invention relates to the use of an effective amount of a *condensation polymer* as defined above in protective, anti corrosion or decorative coatings; paper coating formulations; inks; biocides; oil field chemicals; and for the immobilization of heavy metals in soil, bitumen or concrete, without  
20 being limited thereto.

The following examples are provided to further illustrate the processes and compositions of the present invention. These examples are illustrative only and are not intended to limit the scope of the invention in any way.

25

### **Example 1**

#### Synthesis of a hydantoin functional hyper branched polyester amide

162.0 g of molten diisopropanolamine were added to a glass reactor equipped with stirrer and condenser, and which can be heated by oil. Next 291.8 g  
30 dodecenyl succinic anhydride and 146.2 g hydantoin were added and the mixture was slowly heated to 180°C. 1½ h later vacuum was applied to remove the reaction water. After 5 h the mixture was cooled and a glassy polymer is obtained.

35



**Example 2**Synthesis of an triazole functional hyper branched polyester amide

299.5 g of diethanolamine were added to a glass reactor equipped with stirrer, and condenser and which can be heated by oil. Next 237.8 g succinic anhydride  
5 were added and the mixture was slowly heated to 180°C. ½ h after the start, 262.7 g triazole were added and 1½ h later vacuum was applied to remove the reaction water. After 5 h the mixture was cooled and a glassy polymer was obtained.

**Example 3**

10 Synthesis of an imidazole and tertiary amine functional hyper branched polyester amide

134.6 g of bis-(N,N-dimethyl aminopropyl) amine and 191.7 g of molten diisopropanolamine were added to a glass reactor equipped with stirrer and condenser, and which can be heated by oil. Next 192.0 g succinic anhydride were  
15 added and the mixture was slowly heated to 180°C. ½ h after the start, 81.7 g imidazole were added and 1½ h later vacuum was applied to remove the reaction water. After 5 h the mixture was cooled and a glassy polymer was obtained.

**Example 4**

20 Synthesis of an imidazole methyl quat functional hyper branched polyester amide

261.3 g of molten diisopropanolamine were added to a glass reactor equipped with stirrer and condenser, and which can be heated by oil. Next 171.8 g succinic anhydride were added and the mixture was slowly heated to 180°C. ½ h after the start, 166.8 g imidazole were added and 1½ h later vacuum was applied to  
25 remove the reaction water. After 5 h the mixture was cooled and a glassy polymer was obtained.

50 g of the polymer were dissolved in 50 g water and at room temperature 22 g of dimethyl sulphate were slowly added. First the mixture was turbid but within 10 min the temperature raised to about 50°C and the mixture became clear again.  
30 After 24 h the polymer-quat solution was ready for use.

**Example 5**Synthesis of an imidazole\*HCl, morpholine amide and ethylene oxide functional hyper branched polyester amide

- 5 275g of molten hexahydro phthalic anhydride was added to a glass reactor equipped with stirrer and condenser, and which can be heated by oil. Next 298g of polyethyleneoxide-monomethylether (MW=750) was added and the mixture was slowly heated to 120°C. After 30 min 52g morpholine and 132 g of molten diisopropanolamine were added. Next 42g imidazole hydrochloride was added
- 10 and the mixture was slowly heated to 180°C. ½ h after the start vacuum was applied to remove the reaction water. After 5 h the mixture was cooled and a polymer was obtained.

**Example 6**

- 15 Hair styling spray

<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
Alcohol, anhydrous	ad 100
Octylacrylamide/ acrylate/ butylaminoethylmethacrylate copolymer	2.50
Hydroxypropyl cellulose	0.50
Aminomethylpropanol	0.50
Perfume oil	0.200
Condensation polymer according to the invention	0.01-20

- 20 The hydroxypropyl cellulose is first dissolved in half of the alcohol and is subsequently charged with aminomethylpropanol. The other components, with exception of the acrylate resin, are dissolved in alcohol and this solution is added under agitation to the hydroxypropyl cellulose followed by the addition of the acrylate resin.

**Example 7**Protective Styling Hair Mousse

<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
Aqua (water)	ad 100
Polyquaternium-4	2.00
Cocamidopropylamine Oxide	0.40
PEG-12 Dimethicone	0.20
Propylene Glycol & Diazolidinyl Urea & Methylparaben & Propylparaben	1.00
Perfume oil	0.20
Propane/ Butane	10.00
Condensation polymer according to the invention	0.01-20

- 5 Add the ingredients in the order shown under agitation. Afterwards, charge in adequate containers with propane/ butane.

**Example 8**Shampoo for greasy hair

<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
Sodium myreth sulfate	15.00
TEA abietoyl collagen hydrolysate	3.50
Laureth-3	3.00
Phosphonomethylchitosan sodium salt	0.01
Aqua (water)	ad 100
Colorant (D&C Red No. 33)	0.20
Parfume oil	0.15
Condensation polymer according to the invention	0.01-20

- 10 The components are mixed with stirring at RT until they are completely dissolved.

**Example 9****Anti Dandruff Shampoo**

<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
Aqua (water)	<i>ad 100</i>
Ammonium laureth sulphate	10.00
Ammonium lauryl sulphate	5.00
Glycol disearate	1.00
Dimethicone	1.00
Cetyl alcohol	0.50
Cocamide MEA	3.00
ZPT	1.00
Guar hydroxypropyltrimonium chloride	0.20
Hydrogenated polydecene	1.00
Polyquaternium 10	0.10
PEG 7m	0.50
Trimethylpropane tricaprylate/ tricaprte	1.00
Preservative	q.s.
Fragrance	0.30
E 104, E 110, E 132	0.02
Condensation polymer according to the invention	0.01-20

5 **Example 10****Conditioning Shampoo**

<i>INCI NOMENCLATURE</i>	<i>Wt. %</i>
Aqua (water)	<i>Ad 100</i>
Sodium laureth sulphate	11.00
Cocamidopropyl betaine	2.00
Sodium chloride	2.50
Glycol distearate	1.00
Glycerine	2.00
Dimethiconol	0.50
Fragrance	0.50
Coco-glucoside	3.00
Carbomer	0.10

Arginine	0.05
Glyceryl oleate	0.05
Glyceryl stearate	1.00
Guar hydroxypropyltrimonium chloride	0.10
Panthenol	1.00
Disodium EDTA	0.05
Preservative	q.s.
Hydrolyzed keratin	0.10
Citric acid/ sodium hydroxide	q.s.
Condensation polymer according to the invention	0.01-20
E 102, E 110, FD&C blue	0.01

**Example 11**Shampoo with plant extracts

<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
Aqua (water)	Ad 100
Sodium laureth sulfate	10.00
Lauryl glucoside	5.00
Cocamidopropyl betaine	2.00
Propylene glycol	2.0
Perfume oil	1.25
Sodium citrate	0.25
Sodium benzoate	0.20
Panthenol	1.00
Sodium formate	0.20
Polyquaternium-10	0.20
Hydroxypropyl guar hydroxypropyltrimonium chloride	0.05
PEG-35 castor oil	1.00
Maris sal	1.25
Polysorbate 20	1.00
Tocopheryl acetate	0.20
Prunus armeniaca	0.20
Echinacea purpurea	0.05
Retinyl palmitate	0.05

Tocopherol	0.05
Linoleic acid	0.20
Preservative	1.00
Condensation polymer according to the invention	0.01-20
CI77891	0.02

**Example 12**Shine Shampoo

<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
Aqua (water)	Ad 100
Sodium laureth sulfate	5.00
Disodium cocoamphodiacetate	10.00
Sodium chloride	2.00
Glycol distearate	1.00
Cocamidopropyl PYL betaine	2.00
Laurdimonium hydroxypropyl hydrolyzed wheat protein	1.00
PEG-12 dimethicone	1.00
Guar hydroxypropyltrimonium chloride	0.05
Hydrolyzed wheat protein	0.20
Laureth-4	1.00
PEG-7 glyceryl, cocoate	2.00
Hydrogenated castor oil	1.00
Laureth-2	0.50
PEG-55 propylene glycol oleate	2.00
Propylene glycol	2.00
Mica	0.20
Citric acid	0.01
Fragrance	1.00
E 110, E 104, E 122	0.05
Condensation polymer according to the invention	0.01-20

**Example 13**Shower gel

<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
Aqua (water)	Ad to 100
Sodium Laureth Sulfate	12.90
Cocamidopropyl Betaine	2.50
Potassium Cocoyl Hydrolyzed Collagen	1.50
Sodium Chloride	1.00
Perfume oil	1.00
Hydrolyzed Collagen	0.90
Decyl Glucoside	0.90
Polyquaternium 10	0.20
Propylene Glycol	0.18
5-Bromo-5-Nitro-1,3-Dioxane	0.02
Chinoline yellow E 104 1 % solution	0.01
Condensation polymer according to the invention	0.01-20

**Example 14**5 Make up / Foundation / Day Cream

	<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
A )	Octyldodecanol	4.00
	Glyceryl Stearate SE	4.50
	Talc	1.00
	Titanium Dioxide	6.00
	Iron Oxides	0.80
	Ricinus Communis (Castor) Seed Oil	8.00
	Sorbitan Sesquioleate	0.50
	Steareth-2	0.50
	Tocopheryl Acetate	2.00
	Disodium EDTA	0.10
	BHT	0.05
	Phenoxyethanol & Methylparaben & Ethylparaben & Butylparaben & Propylparaben & Isobutylparaben	0.60
	Condensation polymer according to the invention	0.20

	Potassium Cetyl Phosphate	2.00
B)	Aqua (water)	<i>Ad 100</i>
	Propylene Glycol	5.00
	Carbomer	1.00
C)	Cyclomethicone	4.00
	Dimethicone	5.00
	Perfume oil	0.20

Heat part A) to 85°C while stirring. When homogeneous, add part B) pre-heated to 75°C. While mixing, cool to ambient temperature, (not above 25°C) and add part C) under stirring. Pass through a 3-Rollmill.

5

### Example 15

#### Green colored glass detergent

<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
Anionic/ amphoteric surfactants (Lumuroil RK)	0.70
Butyl glycol	5.00
Isopropanol	20.00
Colorant (D&C Green No. 2)	0.05
Aqua (water)	<i>ad 100</i>
Perfume oil	4.00
Condensation polymer according to the invention	0.01-20

The components are mixed with stirring at RT until a homogenous mixture is obtained.

10

### Example 16

#### Nail varnish

<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
Methyl ethyl ketone	36.00
Isopropyl alcohol	28.00
Aqua (water)	<i>ad 100</i>
Ethyl acetate	20.00
Tocopheryl acetate	0.05
Perfume oil	0.50



Condensation polymer according to the invention	0.01-20
CI 42090	0.01

The components are mixed with stirring at RT until a homogenous mixture is obtained. Excellent results are achieved.

### 5 Example 17

#### Conditioning Mousse

<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
Polyquaternium-11	1.00
Condensation polymer according to the invention	0.01-20
Hydroxyethyl Cetyldimonium Phosphate	0.50
Alcohol	10.00
Perfume oil	0.40
Preservative	q.s.
Aqua (water)	ad. 100
Propane/ Butane	10.00

### Example 18

#### Aerosol Spray VOC 80

<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
Condensation polymer according to the invention	0.01-20
Acrylates Copolymer	1.00
Aminomethyl Propanol	0.24
Alcohol	35.00
Aqua (water)	Ad 100
Cyclopentylsiloxane	0.10
Perfume oil	0.10
Butane	10.00
Dimethylether	35.00

10

Add all ingredients and mix intensively until a homogeneous solution is obtained.

**Example 19**Setting Lotion/ Solution

<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
Condensation polymer according to the invention	0.01-20
PEG-8	0.20
Perfume oil	0.10
Aqua (water)	10.00
Alcohol	Ad 100

Add all ingredients and mix intensively until a homogeneous solution is obtained.

5

**Example 20**Hair Gel

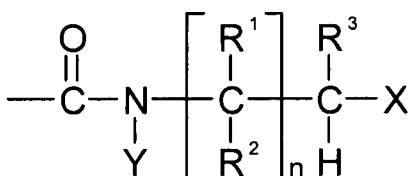
<i>INCI NOMENCLATURE</i>	<i>wt. %</i>
Carbomer	0.50
Aqua (water)	Ad 100
Triethanolamine	0.70
Condensation polymer according to the invention	0.01-20
Acrylates/ C1-2 Succinates/ Hydroxycrylates Copolymer	2.00
Aminomethyl Propanol	0.19
Perfume oil	q.s.
PEG-40 Hydrogenated Castor Oil	q.s.
PEG-8	0.10
Phenoxyethanol, Methylparaben, Butylparaben, Ethylparaben and Propylparaben	0.10
Hydroxyethylcellulose	0.50

Add all ingredients of part 1 and mix intensively until a homogeneous gel is obtained.

10

Claims

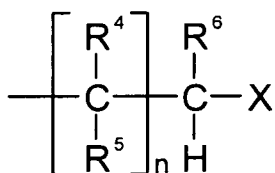
1. An optionally quaternized or protonated condensation polymer having at least one heterocyclic end-group connected to the polymer backbone through a unit derived from an alkylamide, the connection comprising an optionally substituted ethylene group.
2. A condensation polymer according to claim 1 wherein the condensation polymer contains at least two groups according to formula (I)



Formula I

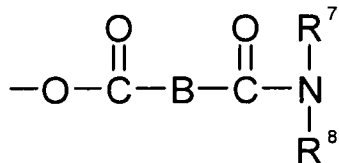
wherein

- Y is, independently of each other, a hydrogen atom, a (C<sub>1</sub>-C<sub>20</sub>) alkyl group, a (C<sub>6</sub>-C<sub>10</sub>) aryl group or



;

- X is, independently of each other, NHet or



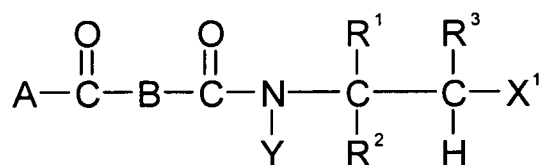
20

- B is a (C<sub>6</sub>-C<sub>24</sub>) aryl diradical or a (C<sub>2</sub>-C<sub>24</sub>) alkyl diradical;

R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>6</sup> are, independently of each other, hydrogen atoms, (C<sub>6</sub>-C<sub>10</sub>) aryl groups or (C<sub>1</sub>-C<sub>8</sub>) alkyl groups;

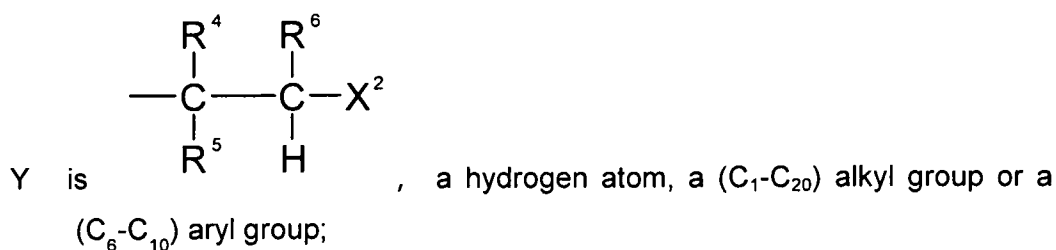
- R<sup>7</sup> and R<sup>8</sup> are, independently of each other, hydrogen atoms, optionally heteroatom substituted (C<sub>6</sub>-C<sub>10</sub>) aryl groups or optionally heteroatom
- 25

- substituted (C<sub>1</sub>-C<sub>28</sub>) alkyl groups or  
 R<sup>7</sup> and R<sup>8</sup> together with the nitrogen atom to which they are attached form a 5 or 6  
 membered ring wherein optionally one or several C-atoms are replaced by  
 -NH, -N-(C<sub>1</sub>-C<sub>20</sub>) alkyl, -N-aryl, -O- or -S-;
- 5 NHet is, independently of each other, a mono-, bi- or multicyclic nitrogen  
 containing heterocyclyl group attached via a nitrogen atom to the polymer  
 which may be aromatic or partly or completely hydrogenated and may  
 contain additional heteroatoms such as nitrogen, oxygen or sulfur and  
 which may optionally be substituted.
- 10 and wherein at least one group NHet is present in the condensation polymer of  
 formula I.
3. A condensation polymer according to claim 2, characterized in that n is 1.
- 15 4. A condensation polymer according to any of claim 1 to 3, characterized in that  
 the polymer is of the formula (II):

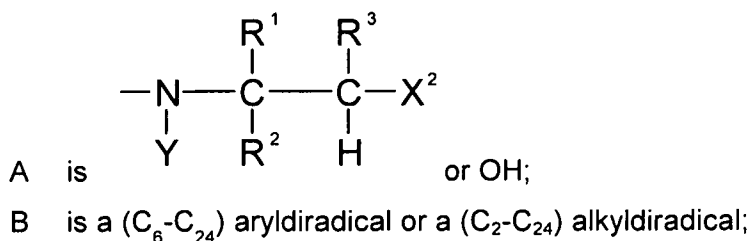


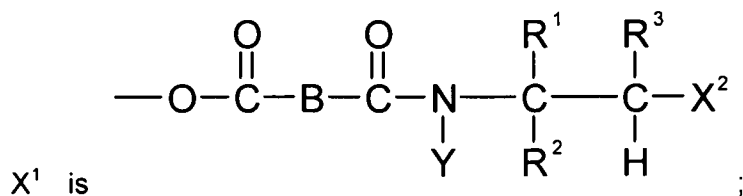
Formula II

20 in which:

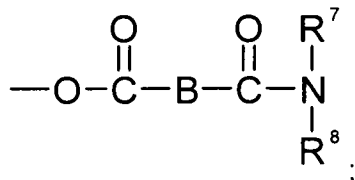


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X<sup>2</sup> is a OH group, X<sup>1</sup>, NHet or



R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>6</sup> are, independently of each other, hydrogen atoms, (C<sub>6</sub>-C<sub>10</sub>) aryl groups or (C<sub>1</sub>-C<sub>8</sub>) alkyl groups or -CH<sub>2</sub>-OX<sup>2</sup>;

10 R<sup>7</sup> and R<sup>8</sup> are, independently of each other, hydrogen atoms, optionally heteroatom substituted (C<sub>6</sub>-C<sub>10</sub>) aryl groups or optionally heteroatom substituted (C<sub>1</sub>-C<sub>28</sub>) alkyl groups or

R<sup>7</sup> and R<sup>8</sup> together with the nitrogen atom to which they are attached form a 5 or 6 membered ring wherein optionally one or several C-atoms are replaced by -NH-, -N-(C<sub>1</sub>-C<sub>20</sub>) alkyl, -N-aryl, -O- or -S-;

15 NHet is, independently of each other, a mono-, bi- or multicyclic nitrogen containing heterocyclyl group attached via a nitrogen atom to the polymer which may be aromatic or partly or completely hydrogenated and may contain additional heteroatoms such as nitrogen, oxygen or sulfur and which may optionally be substituted.

20 and wherein at least one group NHet is present in the condensation polymer of formula II.

5. A condensation polymer according to any of claims 1 to 4, characterized in that the condensation polymer is either linear or branched.

25

6. A condensation polymer according to any of claims 1 to 5, characterized in that the condensation polymer has a number of heterocyclic end-groups equal to or greater than 3.

30 7. A condensation polymer according to any of claims 1 to 6 characterized in that



groups or

R<sup>7</sup> and R<sup>8</sup> together with the nitrogen atom to which they are attached form a 5 or 6 membered ring wherein optionally one or several C-atoms are replaced by -NH, -N-(C<sub>1</sub>-C<sub>20</sub>) alkyl, -N-aryl, -O- or -S-;

5 NHet is, independently of each other, a mono-, bi- or multicyclic nitrogen containing heterocyclyl group attached via a nitrogen atom to the polymer which may be aromatic or partly or completely hydrogenated and may contain additional heteroatoms such as nitrogen, oxygen or sulfur and which may optionally be substituted.

10 and wherein at least one group NHet is present in the condensation polymer of formula III.

8. A condensation polymer according to any of claims 1 to 7, characterized in that in the condensation polymer R<sup>1</sup> and R<sup>2</sup> are hydrogen atoms.

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9. A condensation polymer according to any of claims 1 to 8, characterized in that in the condensation polymer R<sup>3</sup> and R<sup>6</sup> are (C<sub>1</sub>-C<sub>4</sub>) alkyl groups, preferably a methyl or ethyl group.

20 10. A condensation polymer according to any of claims 1 to 9, characterized in that NHet is selected from imidazole, benzimidazole, 1,2,4-triazole, hydantoin, and derivatives thereof.

25 11. A condensation polymer according to any of claims 1 to 10, characterized in that the condensation polymer has a weight average molecular mass between 600 g/ mol to 50'000 g/ mol, more preferably between 800 g/ mol and 25'000 g/ mol.

30 12. A condensation polymer according to any of claims 1 to 11, characterized in that the condensation polymer has a number average molecular mass between 500 g/ mol to 15'000 g/ mol, more preferably between 700 g/ mol and 4'000 g/ mol.

35 13. A condensation polymer according to any of claims 1 to 12, characterized in that the average number of NHet groups or the NHet groups in combination with dialkylamide end-groups per molecule of condensation polymer is between

2 and 250, more preferable between 3 and 50.

14. A condensation polymer according to any of claims 1 to 13, characterized in that one or several nitrogen atoms of the condensation polymer are present in quaternized forms or are protonated.
15. A condensation polymer according to claim 14, characterized in that the quaternized nitrogen atoms are quaternized with branched or cyclic (C<sub>1</sub>-C<sub>8</sub>) alkyl groups, unsaturated (C<sub>1</sub>-C<sub>8</sub>) alkyl groups, aryl groups, acrylic groups or mixtures thereof or are in the form of a betaine group.
16. A condensation polymer according to claim 14 and 15, characterized in that the quaternized nitrogen atoms of the condensation polymer are quaternized with methyl and/ or ethyl groups.
17. Process for the preparation of a condensation polymer according to any of claims 1 to 13, characterized in that the polymer is obtained through polycondensation of a mono- and/ or bis-hydroxyalkylamide of a dicarboxylic acid in the presence of a heterocyclic compound having a labile hydrogen atom and, optionally, a (mono-(dialkylamide))dicarboxylic acid.
18. Process for the preparation of a condensation polymer according to any of claims 1 to 13, characterized in that the polymer is obtained in a one-step procedure by reacting a cyclic anhydride, an alkanolamine and a heterocyclic compound having a labile hydrogen atom optionally in combination with a dialkylamine, to form a polyesteramide by polycondensation.
19. A body care product or household product comprising an effective amount of a condensation polymer according to any of claim 1 to 16.
20. A body care product or household product according to claim 19 wherein the effective amount is within a concentration range of 0.01 to 20 wt. % based on the total weight of the product.
21. A body care product or household product according to any of claims 19 to 20 comprising additional cosmetic adjuvants and/ or additives.



22. A body care product according to any of claims 19 to 21 selected from skin-care preparations; bath and shower preparations; liquid soaps; bar soaps; preparations containing scents, fragrances and odorant ingredients; hair-care  
5 preparations; dentifrices; deodorizing and antiperspirant preparations; decorative preparations; light protecting preparations and preparations containing active ingredients.
23. A body care product according to claim 22 wherein the hair care preparation  
10 comprises additional additives and adjuvants used in hair care.
24. A method of treating hair in which a hair care preparation as described in claim 22 and 23 is applied to the hair
- 15 25. Use of an optionally quaternized or protonated condensation polymer having at least one heterocyclic end-group connected to the polymer backbone through a unit derived from an alkylamide, the connection comprising an optionally substituted ethylene group as conditioning agent, strengthening agent, film forming agent, surfactant, anti-static agent, moisturizer, emulsifier or hair  
20 styling agent.

## INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2007/001576

A. CLASSIFICATION OF SUBJECT MATTER INV. C08G69/44 A61K8/49 A61K8/88		
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) C08G A61K		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where 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.
X	WO 00/58388 A (DSM) 5 October 2000 (2000-10-05)  page 1, line 10 - page 15, line 14; claims 1-21	1-6, 8-13,17, 18
A	EP 1 081 176 A (DSM) 7 March 2001 (2001-03-07) paragraph [0021] - paragraph [0046]; claims 1-6	1-18
A	GB 1 458 541 A (MONTEDISON) 15 December 1976 (1976-12-15) page 1, line 8 - page 3, line 47	1-18
A	US 2002/189030 A1 (COLLIN) 19 December 2002 (2002-12-19) paragraph [0022] - paragraph [0033]; claims 1-19; example 1	19-25
<input 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  5 July 2007	Date of mailing of the international search report  16/07/2007	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer  Bourgonje, Andreas	

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