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**(54) FABRIC CONDITIONER COMPOSITION**

**GEWEBEWEICHMACHENZUSAMMENSETZUNG**

**COMPOSITION ADOUCISSANTE POUR TEXTILES**

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(72) Inventors:

- **FRANKLIN, Kevin Ronald**  
Wirral, Merseyside L47 0LQ (GB)
- **NEILLIE, William Frederick Soutar**  
Wirral, Merseyside L48 2JT (GB)

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(74) Representative: **Mole, Peter Geoffrey**  
**UNILEVER PLC**  
Patent Division  
Colworth House  
Sharnbrook  
Bedford MK44 1LQ (GB)

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(73) Proprietors:  
• **UNILEVER PLC**  
London EC4P 4BQ (GB)  
Designated Contracting States:  
**GB**  
• **UNILEVER N.V.**  
3013 AL Rotterdam (NL)  
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**EP-A- 0 569 184**                      **WO-A-91/13136**  
**WO-A-92/13054**

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JP,A,1 261 498 (LION CORP.) 18 October 1989

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**Description**

The present invention relates to a fabric conditioner composition and, in particular, to a solid fabric conditioner composition, for instance in the form of a powder or tablet.

It is known to include enzymes in so-called "biological" detergent compositions to enhance the detergent's cleansing efficacy. For example, proteases, amylases, lipases, cellulases and mixtures thereof have previously been included in such detergent compositions. The use of lipases in detergents has been reviewed by Hans Andree et al in Journal of Applied Biochemistry, 2, 218-229 (1980). Examples of the use of lipases in detergent compositions may be found in EP-A-0130064 and EP-A-0214761, both of Novo Industri A/S.

It has also been proposed to incorporate enzymes, including lipases, into fabric conditioner compositions for use in the rinse stage of fabric washing. Thus, WO-A-91/13136 (Novo Nordisk A/S) discloses liquid fabric conditioner compositions comprising a lipase and/or a cellulase and/or a protease and/or an amylase. This document makes a passing reference to the possibility that enzymes may be included in solid rinsing agents.

In general, more effective lipase deposition may be achieved from the rinse than from the wash. For example, the rinse is unbuil and free calcium and magnesium enhance lipase adsorption. Also, typical rinse conditioner cationic actives are less inhibitory to lipase adsorption than are the anionic and nonionic actives found in main wash products.

Despite these advantages there remain problems associated with liquid (aqueous) fabric softener compositions including lipase. For instance liquid rinse conditioners must have a pH of at least 5 to ensure satisfactory lipase stability. When the compositions are stored at pH's close to neutral then there can be problems with bacterial growth. Also, lipases promote the hydrolysis of certain fabric conditioner compounds, such as those containing ester groups, so that formulations of such fabric conditioners will be prone to decomposition through hydrolysis.

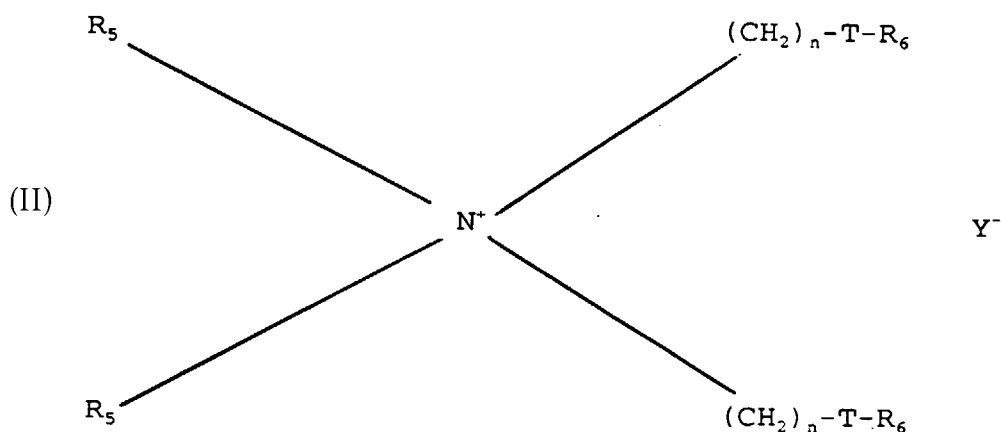
With a view to ameliorating such problems the present inventors have developed solid fabric conditioner compositions containing lipase.

Thus, according to the present invention there is provided a solid fabric conditioner composition for use in the rinse step of a fabric washing process comprising a lipase, a dispersing aid and characterised in that it further comprises a fabric conditioning compound comprising a quaternary ammonium compound having a solubility in water at pH 2.5 and 20°C of less than 10g/l and in which the quaternary ammonium group is linked to at least one hydrocarbyl via an ester link.

Suitable fabric conditioning compounds will be apparent to those of skill in the art.

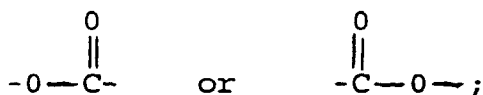
Highly preferred materials are cationic quaternary ammonium salts having two long hydrocarbyl chains, for instance two C<sub>8-28</sub>, preferably C<sub>12-24</sub>, hydrocarbyl chains. Preferably the hydrocarbyl groups are alkyl or alkenyl groups, which are optionally substituted or interrupted by other groups.

The quaternary ammonium compound may be an ester-linked quaternary ammonium compound represented by the formula:



wherein each R<sub>5</sub> group is independently selected from C<sub>1-4</sub> hydrocarbyl, such as alkyl, alkenyl or hydroxyalkyl groups; and wherein each R<sub>6</sub> group is independently selected from C<sub>8-28</sub> hydrocarbyl, such as alkyl or alkenyl groups;

T is



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n is an integer from 0-5; and

Y<sup>-</sup> is an anion, preferably selected from halide, methosulphate and ethylsulphate radicals.

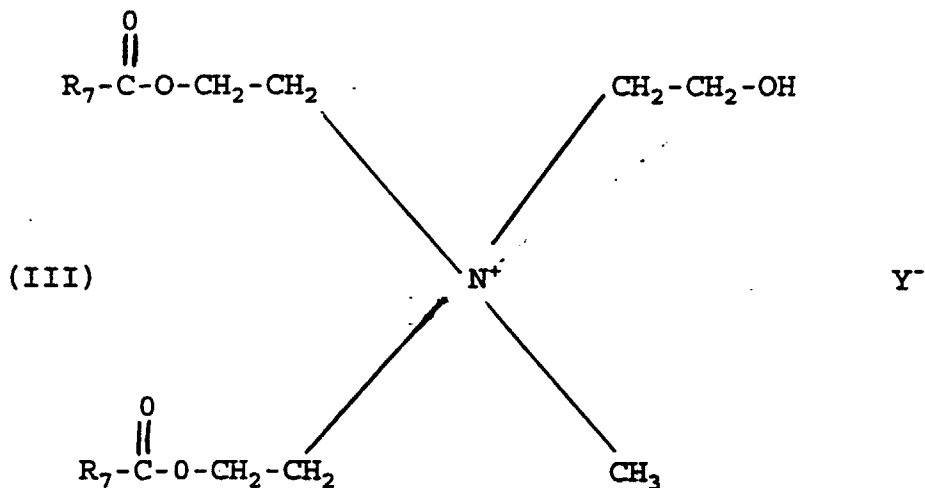
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A preferred material of this type is that of formula:

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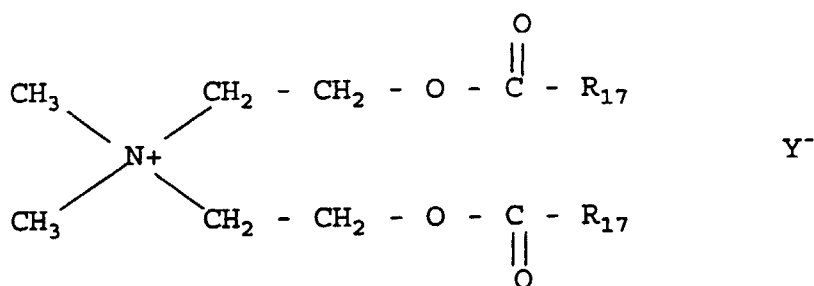
wherein each R<sub>7</sub> is a long chain alkyl or alkenyl group such as tallow and Y<sup>-</sup> is as defined above and, in particular, is methosulphate. A material having R<sub>7</sub> of tallow and Y<sup>-</sup> of methosulphate is available from Stepan under the trade name Stepanex VRH 90. Another example of a suitable material of formula (III) has R<sub>7</sub> of partially hardened tallow and Y<sup>-</sup> of methosulphate.

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Another preferred class of compounds containing two ester groups is:

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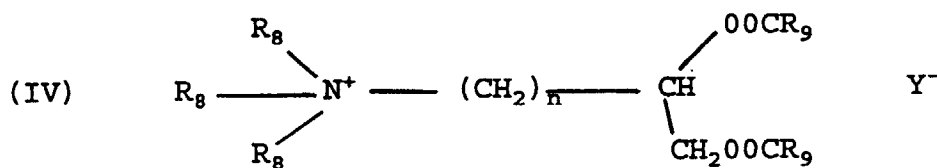


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wherein R<sub>17</sub> is a long chain alkyl or alkenyl group such as tallow, or partially hardened tallow. Preferred choices of Y<sup>-</sup> are chloride or methosulphate.

Other ester-linked quaternary ammonium compounds which may be used in the compositions of the present invention are those of formula:

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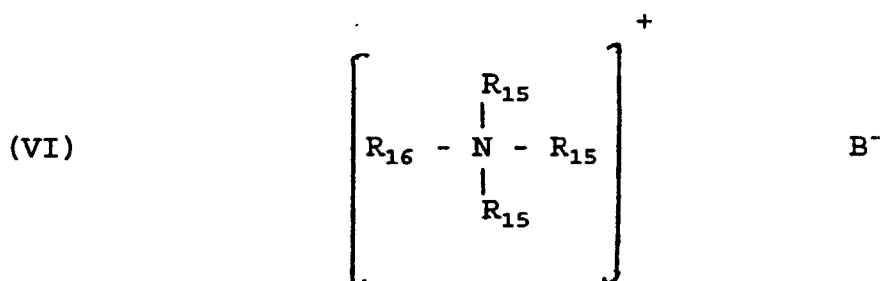


wherein each  $R_8$  is independently selected from  $C_{1-4}$  hydrocarbyl, such as alkyl, alkenyl or hydroxyalkyl groups; and each  $R_9$  is independently selected from  $C_{8-28}$  hydrocarbyl, such as alkyl and alkenyl groups;  $n$  is an integer of from 0-5; and  $Y^-$  is an anion preferably selected from halide, methosulphate and ethylsulphate radicals.

15 Preferred materials of this class and their method of preparation are, for example, described in US-A-4137180 (LEVER BROTHERS). Preferably, these materials comprise small amounts of the corresponding monoester as described in US-A-4137180 for example 1-tallowoxy, 2-hydroxy trimethyl ammonium propane chloride.

20 Compositions of the present invention preferably include 10 to 95% by weight of a quaternary ammonium fabric conditioning compound, particularly preferably 20 to 80% by weight. The amount of fabric conditioning compound included in the composition may vary depending on the particular type of softener employed and on whether it is for use as a powder or tablet. For example, the conditioning compound having one of formulae (II), (III) or (IV) above, may be included in powders in relatively large amounts, for instance between 60 and 95% by weight, preferably 70 to 90%. Where the ester-linked softener is included in a tablet composition, it will generally be included in smaller amounts such as 10 to 40% by weight, preferably 15 to 30% by weight. Fabric softeners which are readily dispersible in water may be included in larger proportions than those which are less readily dispersible.

25 Compositions of the invention preferably contain, in addition to a cationic material having a solubility in water at pH 2.5 and 20°C of less than 10g/l, an amount (preferably less than 50% by weight) of a cationic surfactant whose solubility in water at pH 2.5 and 20°C exceeds 10g/l. Examples of such cationic surfactants include quaternary ammonium compounds in which the quaternary nitrogen atom carries a single long hydrocarbyl (e.g. alkyl or alkenyl) group, for example containing from 8 to 28, preferably 12 to 24 carbon atoms. Examples include compounds of formula (VI) :



where each  $R_{15}$  is independently selected from substituted or unsubstituted alkyl or alkenyl groups having from 1 to 6 carbon atoms,  $R_{16}$  is a substituted or unsubstituted alkyl or alkenyl group having from 8 to 28 carbon atoms, and  $B^-$  is an anion, preferably a halide, methosulphate or ethosulphate.

45 Cationic materials having solubilities in excess of 10g/l under the conditions specified above assist in the dispersion of the less soluble cationic component. Preferred examples of such compounds include cocobenzyltrimethylammonium chloride, cocotrimethylammonium chloride, tallowtrimethylammonium chloride and dodecylbenzyltrimethylammonium chloride (sold under the trade name Arquad 12).

50 These "high solubility" cationic materials are preferably included in amounts not greater than 50% by weight of the composition, especially not greater than 30% by weight of the composition, and particularly preferably are included in amounts of from 5 to 20% by weight. Preferably the cationic having a solubility of less than 10g/l and the cationic having a solubility in excess of 10g/l are present in a ratio by weight in the range 20:1 to 1:1, preferably 10:1 to 2:1 and particularly preferably 5:1 to 3:1.

55 The amount of lipase enzyme in the fabric conditioning composition may be chosen such that, on dilution, the concentration of enzyme in the rinse liquor is in the range of 0.0002 to 5mg preferably 0.002 to 2mg pure enzyme protein per litre of rinse liquor. Consequently, the concentration of enzyme in the composition prior to dilution generally lies in the range  $2 \times 10^{-8}$  to 1 weight percent, preferably  $2 \times 10^{-7}$  to  $10^{-1}$  weight percent, particularly preferably  $2 \times 10^{-6}$  to

10<sup>-2</sup> weight percent.

Compositions of the invention also include a dispersing agent for assisting the dispersion of the fabric conditioner compound in water. Suitable dispersing agents will be apparent to those of skill in the art and include nonionic materials such as alkoxylated fatty alcohols, preferably containing a fatty alcohol having from 8 to 28 carbon atoms, the alcohol being ethoxylated with 2 to 50, preferably from 4 to 40 ethoxy groups. One example of a suitable nonionic is cocoalcohol 20E0; this is particularly suitable for use in conjunction with ester-linked fabric conditioning compounds such as those of formula (IV) above.

Another possible dispersing aid is an electrolyte, of which sodium bicarbonate is a preferred example. Electrolytes are suitable, for example, for use in conjunction with fabric conditioning compounds of formula (I) above.

The amount and type of dispersing agent used will depend on the amount and type of fabric conditioner compound employed as well as on the form of the composition (eg. whether powder or tablet). Thus, the amount of dispersing agent, where present, may vary between 1 and 90%, preferably 4 to 80%. In general, electrolytic dispersing agents, which are preferably employed to disperse the less readily dispersible cationic fabric conditioning compounds, will be present in larger proportions such as 50 to 90% by weight, preferably 60 to 80% by weight, than will dispersing aids of the nonionic type which are typically employed in dispersions of the more readily water dispersible conditioning compounds, and are generally present in amounts of 2 to 15% preferably 4 to 10% by weight.

Solid fabric softener compositions currently on the market contain urea as a dispersing aid. However, the present inventors have found that this material is unsuitable as a dispersing aid in solid fabric softener compositions containing enzymes, because of adverse effects on storage stability of the enzyme. Consequently, compositions of the invention preferably contain not more than 10% by weight urea, especially preferably not more than 5% by weight and most preferably not more than 1% by weight. Ideally, the compositions contain substantially no urea.

In order to ensure that the composition of the invention is solid, it is preferable that little or no solvent, in particular little or no water be included in the composition. In general, compositions may contain not more than 10% by weight solvent, preferably not more than 5% by weight solvent, particularly preferably not more than 1% and, most preferably contain substantially no solvent. Examples of solvents which may be present in compositions of the present invention, because of incidental presence in raw materials, deliberate addition, or absorption from the surroundings include water and alcohols such as isopropyl alcohol and ethanol, glycerol, propylene glycol.

The compositions of the invention may be in the form of powders (e.g. granules) or tablets. Such compositions may be prepared by conventional techniques. For example, powders may be prepared by sieving and mixing the components. Components which are included in small amounts, such as the enzyme, are preferably added on an inert carrier, for example on a silicate such as Microsil™. The carrier may account for up to 10% by weight of the composition, preferably not more than 5% by weight.

Tablets may be prepared by compression of a powdered composition. Tablets preferably contain at least 60% of an electrolyte such as sodium bicarbonate as a dispersing aid.

The compositions of the invention may also contain other optional ingredients such as perfumes, perfume carriers, fluorescers, colourants, hydrotropes, antifoaming agents, antiredeposition agents, optical brightening agents, anti-shrinking agents, anti-wrinkle agents, fabric crisping agents, anti-spotting agents, soil-release agents, germicides, linear or branched silicones, fungicides, antioxidants, anti-corrosion agents, preservatives such as Proxel, ascorbic acid, Bronopol (Trade Mark), a commercially available form of 2-bromo-2-nitropropane-1,2-diol, dyes, bleaches and bleach precursors, drape imparting agents, antistatic agents and ironing aids.

These optional ingredients, if added, preferably are present at levels up to 5% by weight of the composition.

Embodiments of the invention are illustrated below by way of example only.

These compositions are suitable for use as powders or may be formed into tablets.

**EXAMPLES**

Table 1 exemplifies formulations containing 1,2 ditallowoxytrimethyl ammonium propane chloride (HEQ) as cationic fabric softener.

Table 1

	F	G	H	J	K	L
HEQ	89	75	75	18	17	80
Cocobenzyltrimethyl ammonium chloride	-	14	20	-	-	-
Cocotrimethyl ammonium chloride	-	-	-	-	3	16
Genapol C-100	4	4	5	1	1	4

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Table 1 (continued)

	F	G	H	J	K	L
Hardened tallow fatty acid	7	7	-	1	1	-
Sodium bicarbonate	-	-	-	80	78	-

Compositions J and K may be powders or tablets. Other compositions are more suitable for use as powders. Table 2 exemplifies three further solid formulations containing ester-linked cationic fabric softeners:

Table 2

	M	N	O
DEEDMAC	86	-	-
NDEQ	-	86	-
DEQ	-	-	86
Genapol C-100	4	4	4
Sodium Chloride	10	10	10

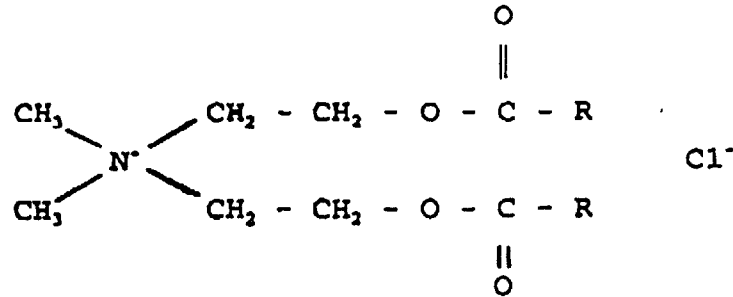
Microsoil™ carrying a total of 5% by weight perfume and lipase may be added. Other optional ingredients such as antifoam, dye, and preservative may, of course, also be added.

Notes to tables:

HEQ = 1,2 ditallowoxytrimethyl ammonium propane chloride

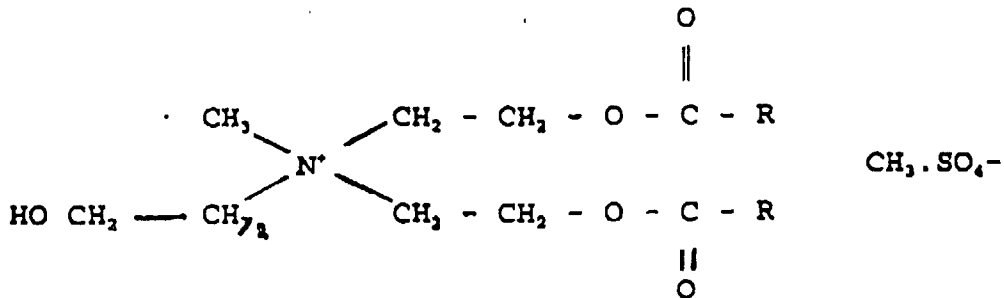
Genapol C-100™ = coco alcohol 20 EO

DEEDMAC is



NDEQ is the corresponding methosulphate salt of HEQ

DEQ is







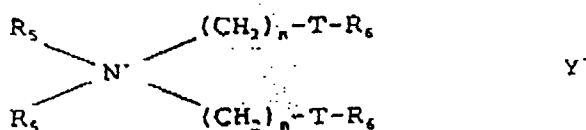
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Gruppe  $R_9$  unabhängig ausgewählt ist aus  $C_8$ - $C_{28}$ -Alkyl- oder Alkenylgruppen; n eine ganze Zahl von 0-5 ist; und  $Y^-$  ein Anion ist.

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5. Festes Textilveredelungsmittel nach einem der vorangehenden Ansprüche, das im wesentlichen frei von Harnstoff ist.
6. Mittel nach einem der vorangehenden Ansprüche, wobei die Dispergierhilfe ausgewählt ist aus Elektrolyten und nichtionischen Stoffen.
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7. Mittel nach einem der vorangehenden Ansprüche, umfassend die Dispergierhilfe in einer Menge von 1-90 Gewichtsprozent des gesamten Mittels.
8. Mittel nach einem der vorangehenden Ansprüche, zusätzlich umfassend ein kationisches Tensid, dessen Löslichkeit in Wasser bei pH 2,5 und 20°C 10 g/l übersteigt.
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9. Mittel nach Anspruch 8, umfassend ein kationisches Tensid, dessen Löslichkeit in Wasser bei pH 2,5 und 20°C 10 g/l übersteigt, in einer Menge von nicht mehr als 50 Gewichtsprozent.
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10. Mittel nach einem der vorangehenden Ansprüche, enthaltend 10-95 Gewichtsprozent einer textilveredelnden quaternären Ammoniumverbindung.

### Revendications

- 25
1. Une composition adoucissante pour textiles solide destinée à être utilisée au cours de l'étape de rinçage d'un processus de lavage de textiles, comprenant une lipase, un auxillaire de dispersion et caractérisée en ce qu'elle comprend en outre un composé adoucissant pour textiles comprenant un composé d'ammonium quaternaire ayant une solubilité dans l'eau à un pH de 2,5 et à une température de 20 °C inférieure à 10 g/l et dans lequel le groupe ammonium quaternaire est lié à au moins un groupe hydrocarbyle via une liaison ester.
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2. Une composition adoucissante pour textiles solide selon la revendication 1 sous forme d'un granulé ou d'une poudre.
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3. Une composition adoucissante pour textiles solide selon la revendication 1 ou 2, dans laquelle le composé adoucissant pour textiles est sélectionné parmi les composés de formule (II)



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où chaque groupe  $R_5$  est indépendamment sélectionné parmi des groupes alkyle, alkényle ou hydroxyalkyle en  $C_{1-4}$ ; et où chaque groupe  $R_6$  est indépendamment sélectionné parmi des groupes alkyle ou alkényle en  $C_{8-28}$ .  
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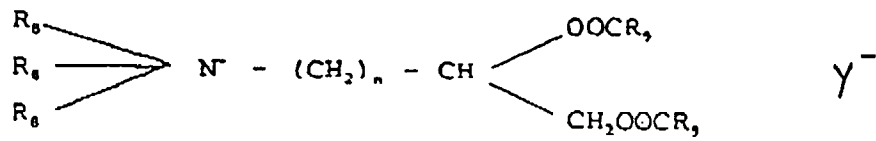


n est un entier compris entre 0 et 5; et  $Y^-$  est un anion.

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4. Une composition adoucissante pour textiles solide selon l'une quelconque des revendications 1 à 3, dans laquelle le composé adoucissant pour textiles est sélectionné parmi des composés de formule (IV)

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où chaque groupe  $R_5$  est indépendamment sélectionné parmi des groupes alkyle, alkényle ou hydroxyalkyle en  $C_{1-4}$  ; chaque groupe  $R_6$  est indépendamment sélectionné parmi des groupes alkyle ou alkényle en  $C_{8-28}$  ;  $n$  est un entier compris entre 0 et 5 ; et  $Y^-$  est un anion.

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5. Une composition adoucissante pour textiles solide selon l'une quelconque des revendications précédentes substantiellement exempte d'urée.

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6. Une composition selon l'une quelconque des revendications précédentes, dans laquelle l'auxiliaire de dispersion est sélectionné parmi des électrolytes et des matières non ioniques.

7. Une composition selon: l'une quelconque des revendications précédentes, comprenant l'auxiliaire de dispersion dans une quantité comprise entre 1 et 90 % en masse de la composition totale.

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8. Une composition selon l'une quelconque des revendications précédentes, comprenant en outre un agent tensioactif cationique, dont la solubilité dans l'eau à un pH de 2,5 et une température de 20°C est supérieure à 10 g/l.

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9. Une composition selon la revendication 8, comprenant un agent tensioactif cationique, dont la solubilité dans l'eau à un pH de 2,5 et une température de 20°C est supérieure à 10g/l dans une quantité n'excédant pas 50 % en masse.

10. Une composition selon l'une quelconque des revendications précédentes, comprenant 10 à 95 % en masse d'un composé adoucissant pour textiles d'ammonium quaternaire.

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