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(54) **Aqueous fabric softening composition.**

(57) An aqueous fabric softening composition containing less than 10% cationic softener also includes an alkoxylated fatty acid amide containing less than 5 alkylene oxide groups per molecule, such as tallow ethanolamide or diethanolamide in an amount such as 110%, together with an ionic salt of Li^+ , Ca^{++} , Mg^{++} or Al^{+++} . The compositions exhibit low viscosities which are stable on storage.

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AQUEOUS FABRIC SOFTENING COMPOSITION

5 This invention relates to an aqueous fabric softening composition, in particular to a composition containing a water-insoluble cationic fabric softener.

10 British Patent Specification No GB-A- 1 104 441 (UNILEVER/TUNE) discloses aqueous fabric softening compositions which contain up to 10% by weight of a water-insoluble cationic fabric softener together with a fatty acid ethanolamide which is included to enhance the softening effect and to provide an anti-static finish on fabrics treated therewith. Sodium carbonate may be added
15 to these compositions to control product thickness.

As the cationic softener is water-insoluble, this can lead to high product viscosities, especially on storage.

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We have now surprisingly discovered that products with lower viscosities, which are more stable on storage, can be obtained if the product contains specific electrolytes.

Thus, according to the invention there is provided an aqueous fabric softening composition comprising:

- (i) an aqueous base;
- (ii) at least 1% to less than 10% by weight of a water-insoluble cationic fabric softener;
- (iii) at least 1% of a nonionic material which comprises an alkylene oxide adduct of a fatty acid amide, the fatty acid amide containing at least 10 carbon atoms and the adduct containing an average of less than 5 alkylene oxide groups per molecule, the total level of the cationic softener and the nonionic material being not more than 36% by weight, preferably not more than about 25% by weight; and
- (iv) an electrolyte selected from ionic salts of lithium, magnesium, calcium, aluminium and mixtures thereof.

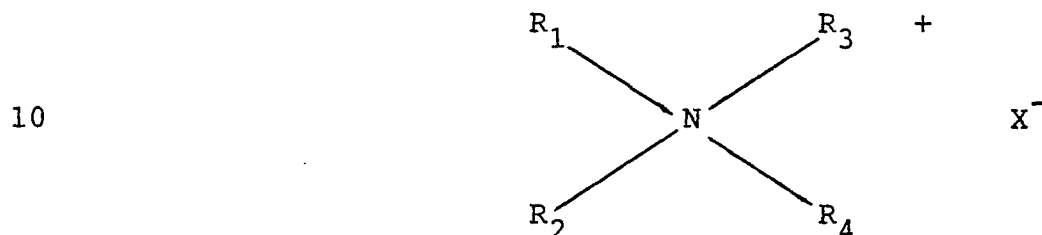
The level of cationic softener in the composition is preferably more than 6% to less than 10% by weight, most preferably from about 7% to about 9% by weight. The level of the nonionic material in the composition is preferably less than 10% by weight, most preferably from about 2% to about 8% by weight. The total level of the cationic softener and the nonionic material is preferably at least 12% by weight. The weight ratio of the cationic softener to the nonionic material is preferably at least 1:1, such as between about 1.5:1 and about 5:1.

The water-insoluble cationic fabric softener can be any fabric-substantive cationic compound which has a solubility in water at pH 2.5 and 20°C of less than 10 g/l. Highly preferred materials are quaternary ammonium

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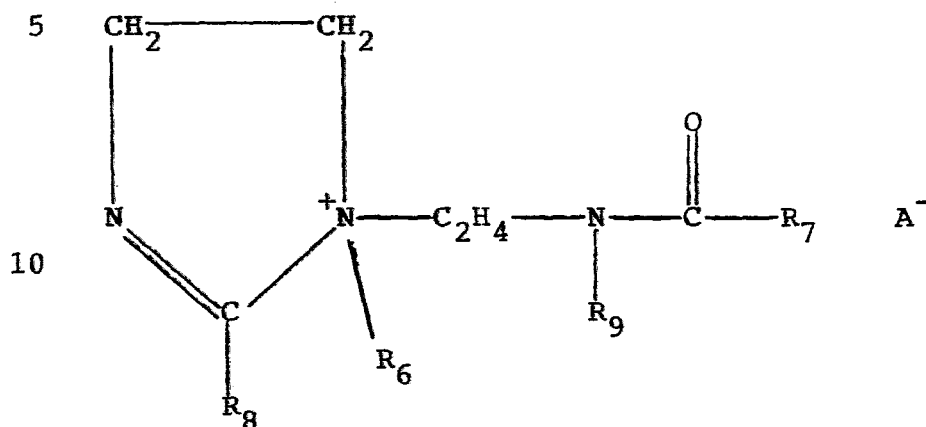
salts having two C₁₂-C₂₄ alkyl or alkenyl chains, optionally substituted or interrupted by functional groups such as -OH, -O-, -CONH, -COO-, etc.

5 Well known species of substantially water-insoluble quaternary ammonium compounds have the formula



15 wherein R₁ and R₂ represent hydrocarbyl groups from about 12 to about 24 carbon atoms; R₃ and R₄ represent hydrocarbyl groups containing from 1 to about 4 carbon atoms; and X is an anion, preferably selected from halide, methyl sulfate and ethyl sulfate radicals. Representative examples of these quaternary softeners include ditallow
20 dimethyl ammonium chloride; ditallow dimethyl ammonium methyl sulfate; dihexadecyl dimethyl ammonium chloride; di(hydrogenated tallow alkyl) dimethyl ammonium chloride; dioctadecyl dimethyl ammonium chloride; dieicosyl dimethyl ammonium chloride; didocosyl dimethyl ammonium chloride;
25 di(hydrogenated tallow) dimethyl ammonium methyl sulfate; dihexadecyl diethyl ammonium chloride; di(coconut alkyl) dimethyl ammonium chloride. Ditallow dimethyl ammonium chloride, di(hydrogenated tallow alkyl) dimethyl ammonium chloride, di(coconut alkyl) dimethyl ammonium chloride and
30 di(coconut alkyl) dimethyl ammonium methosulfate are preferred.

Another class of preferred water-insoluble cationic materials are the alkyimidazolinium salts believed to have the formula:



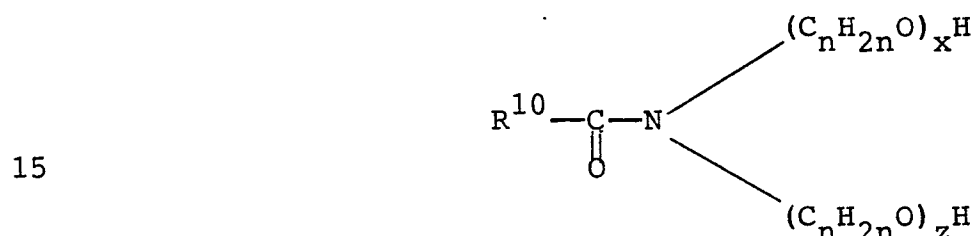
15 wherein R_6 is an alkyl or hydroxyalkyl group containing from 1 to 4, preferably 1 or 2 carbon atoms, R_7 is an alkyl or alkenyl group containing from 8 to 25 carbon atoms, R_8 is an alkyl or alkenyl group containing from 8 to 25 carbon atoms, and R_9 is hydrogen or an alkyl
 20 containing from 1 to 4 carbon atoms and A^- is an anion, preferably a halide, methosulfate or ethosulfate. Preferred imidazolinium salts include 1-methyl-1-(tallowylamido-) ethyl -2-tallowyl- 4,5-dihydro imidazolinium methosulfate and 1-methyl-1-
 25 (palmitoylamido)ethyl -2-octadecyl-4,5- dihydro- imidazolinium chloride. Other useful imidazolinium materials are 2-heptadecyl-1-methyl-1- (2-stearyl-amido)- ethyl-imidazolinium chloride and 2-lauryl-1-hydroxyethyl-1-oleyl-imidazolinium chloride. Also suitable herein are
 30 the imidazolinium fabric softening components of US Patent No 4 127 489, incorporated by reference.

Representative commercially available materials of the above classes are the quaternary ammonium compounds
 35 Arquad 2HT (ex AKZO); Noranium M2SH (ex CEKA); Aliquat-2HT (Trade Mark of General Mills Inc) and the imidazolinium

compounds Varisoft 475 (Trade Mark of Sherex Company, Columbus Ohio) and Rewoquat W7500 (Trade Mark of REWO).

The nonionic material is or includes an alkylene oxide adduct of a fatty acid amide but may also include other alkoxylated or non-alkoxylated nonionic materials.

Alkylene oxide adducts of fatty amides useful in the present invention, preferably have the general formula



wherein R^{10} is an alkyl or alkenyl group having at least 10 carbon atoms, most preferably from 10 to 22 carbon atoms, n is 2 or 3 and x and z in total are not more than 4.0, preferably from about 0.5 to about 3.5 while one of x and z can be zero. Examples of such materials include tallow monoethanolamide and diethanolamide, and the corresponding coconut and soya compounds.

The viscosity of the product, when measured at 110 sec^{-1} shear rate should be less than about 150 cP, preferably between about 20 and about 100 cP and the product can be added as such to a fabric rinse liquor or may be pre-diluted with water.

Preferably, the compositions of the invention contain substantially no anionic material, in particular no anionic surface active materials. If such materials are present, the weight ratio of the cationic material to

the anionic material should preferably be more than 10:1, such as more than 100:1.

5 The compositions include specific electrolytes to assist in controlling the viscosity of the product. A suitable electrolyte level in the compositions is from 0.01% to 0.5%, most preferably from about 0.02% to about 0.2%, measured as the anhydrous salt. Examples of
10 suitable electrolytes include lithium chloride, calcium chloride, magnesium chloride and aluminium chloride. Mixtures of two or more of these electrolytes or mixtures thereof with sodium or potassium salts may also be used.

15 The compositions may include low levels of solvents for the cationic fabric softener. Indeed, the cationic raw materials will often include isopropanol as a solvent. It is preferred that the level of isopropanol or any other C_1-C_4 monohydric alcohol in the composition is less than about 5% by weight, most preferably less than about 2.5%
20 by weight.

25 Additionally, the composition can contain substances for maintaining the stability of the product on cold storage. Examples of such substances include polyhydric alcohols such as ethylene glycol, propylene glycol, glycerol and polyethylene glycol. A suitable level for such materials is from about 0.5% to about 5%, preferably about 1.0% to 2.0% by weight.

30 The compositions of the invention may further include other additional ingredients including colourants, perfumes, preservations, anti-foams, optical brighteners, opacifiers, pH buffers (the preferred pH for the compositions is between about 3 and about 8, such as from
35 about 4 to about 6), further viscosity modifiers,

non-cationic fabric conditioning agents, anti-shrinkage agents, anti-wrinkle agents, fabric crisping agents, spotting agents, soil-release agents, germicides, anti-oxidants and anti-corrosion agents.

5

The compositions of the invention may be prepared by a variety of methods. One suitable method is to form a molten mixture of the cationic fabric softener and the nonionic material, add this molten mixture to water with stirring to form a dispersion and thereafter adding the electrolyte (such as in the form of a concentrated solution thereof) and any optional ingredients.

The invention will now be illustrated by the following Examples, where all parts and percentages are by weight. Where commercially available materials are referred to, the percentages quoted are of the active ingredients therein. Viscosities were measured in a Haake Roto-viscometer (Model RV2) at 110 sec^{-1} at 25°C .

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EXAMPLES 1 TO 12

Compositions were prepared according to the formulations in the following Tables. The compositions were prepared by forming a molten mixture of the cationic and nonionic ingredients at 65°C , adding to water at the same temperature, stirring to form a dispersion, adding electrolyte in the form of a saturated solution, cooling and the adding perfume. The compositions were made in batches of 100g. The dispersion was formed by stirring for 7 minutes at 500 rpm.

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EXAMPLE NO:	1	2	3	4	5	6	7
Ingredient (%)							
Arquad 2HT ¹	8.0	9.0	9.0	7.5	5.0	9.5	6.0
5 Tallow diethanolamide	2.0	-	-	-	5.0	-	-
Soya diethanolamide	-	-	-	7.5	-	9.5	9.0
10 Coconut diethanolamide	-	6.0	-	-	-	-	-
Coconut monoethanolamide	-	-	6.0	-	-	-	-
Calcium chloride	0.02	0.05	0.05	0.03	0.01	0.05	0.02
15 Water and minor ingredients	-----balance-----						

1 - A commercially available di-hardened tallow dimethyl ammonium chloride (about 82% active - balance water and isopropanol)

20

EXAMPLE NO:	8	8A	9	9A
Ingredients (%)				
Arquad 2HT	6.0	6.0	9.0	9.0
25 Tallow monoethanolamide	3.0*	3.0	-	-
Tallow diethanolamide	3.0	3.0	-	-
Coconut diethanolamide	-	-	6.0	6.0
Calcium chloride	0.05	-	0.04	-
Sodium chloride	-	0.05	-	0.04
30 Water and minor ingredients	-----balance-----			
Initial viscosity (cP)	72	123	93	163

* 1% of the tallow monoethanolamide can be replaced by 1% hardened tallow fatty acid.

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EXAMPLE NO*	10	11	12
<u>Ingredient (%)</u>			
Arquad 2HT	9.0	7.5	6.0
5 SDEA ²	6.0	7.5	9.0
Calcium chloride	0.05	0.05	0.05
Water and minor ingredients	-----balance-----		
Initial viscosity (cP)	72	126	148

10 Note

2 - Soya diethanolamide (MacKamide S ex McIntyre Co).

EXAMPLES 13 AND 14

15

In order to demonstrate the influence of the number of alkylene oxide groups in the nonionic adduct, the following compositions were prepared as described in Example 1 and their viscosities measured:

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EXAMPLE NO:	13	14	13A
<u>Ingredient (%)</u>			
Arquad 2HT	9.0	9.0	9.0
25 Coconut monoethanolamide	6.0	-	-
Soya diethanolamide	-	6.0	-
Genogen CAO 50 ³	-	-	6.0
Calcium chloride	0.05	0.05	0.05
Water	-----balance-----		
30 Initial viscosity (cP)	85	72	>500

Note:

- 3 - A commercially available material ex HOECHST AG
which is believed to be the addition product of
5 coconut fatty monoethanolamide with 5 mols of
ethylene oxide.

10 This experiment shows that an ethoxylated amide,
where the number of ethylene oxide groups in the molecule
is lower than 5, produces a product with an acceptably low
initial viscosity, whereas the product (Example 13A) where
the number of ethylene oxide groups is not below 5 has an
unacceptably high initial viscosity.

C L A I M S

1. An aqueous fabric softening composition comprising:
 - 5 (i) an aqueous base;
 - (ii) at least 1% to less than 10% by weight of a water-insoluble cationic fabric softener;
 - 10 (iii) at least 1% of a nonionic material which comprises an alkylene oxide adduct of a fatty acid amide, the fatty acid amide containing at least 10 carbon atoms and the adduct containing an average of less than 5 alkylene oxide groups per molecule, the total level
15 of the cationic softener and the nonionic material being not more than 36% by weight.
 - (iv) an electrolyte selected from ionic salts of lithium, magnesium, calcium, aluminium and mixtures thereof.
- 20 2. An aqueous fabric softening composition according to Claim 1, wherein the level of said water-insoluble cationic fabric softener is more than 6% by weight of the composition.
- 25 3. An aqueous fabric softening composition according to Claim 1, wherein the level of said nonionic material is less than 10% by weight of the composition.

4. An aqueous fabric softening composition according to Claim 1, wherein the weight ratio of said water-insoluble cationic fabric softener to said nonionic material is at least 1:1.

5

5. An aqueous fabric softening composition according to Claim 1, wherein the level of said electrolyte is from 0.01% to 0.5% by weight of the composition, measured as the anhydrous salt.

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6. A process for preparing an aqueous fabric softening composition according to Claim 1, the process comprising the steps of adding a molten mixture of the cationic softener and the nonionic material to water with stirring to form a dispersion and thereafter adding the electrolyte.

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