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Publication number:

0 159 919
A2

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EUROPEAN PATENT APPLICATION

②① Application number: **85302713.4**

⑤① Int. Cl.4: **C 11 D 1/835, C 11 D 1/645**

②② Date of filing: **17.04.85**

③① Priority: **19.04.84 GB 8410322**

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④③ Date of publication of application: **30.10.85**
Bulletin 85/44

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⑧④ Designated Contracting States: **AT BE CH DE FR IT LI
NL SE**

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⑤④ **Aqueous concentrated fabric softening composition.**

⑤⑦ An aqueous concentrated fabric softening composition comprises an aqueous base, more than 10% of a water-insoluble cationic fabric softener and a least 4% of a nonionic material which includes an alkylene oxide adduct of a fatty alcohol, acid, ester or amide with not more than 7 alkylene oxide groups per molecule. The total level of cationic and nonionic components is preferably less than 25%. The nonionic component improves processing by lowering the initial viscosity of the product.

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AQUEOUS CONCENTRATED FABRIC SOFTENING COMPOSITION

5 This invention relates to an aqueous concentrated fabric softening composition, in particular to such a composition which contains more than 10% by weight of a water-insoluble cationic fabric softener.

10 Concentrated fabric softening compositions containing more than 10% by weight of a water-insoluble cationic fabric softener suffer from the disadvantage of high viscosities which inter alia makes such products difficult to process. It has been proposed in European Patent Specification No EP-A-56695 (PROCTER & GAMBLE) that
15 viscosity can be controlled by the use of small quantities, specifically up to 3% by weight of alkoxyated amines.

20 We have now surprisingly discovered that the processing of concentrated fabric softening compositions can be improved by the inclusion of higher levels of other specific alkoxyated fatty compounds. The benefit of this improved processing can be seen in a lower initial product viscosity.

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

- 5 (i) an aqueous base;
- (ii) more than 10% by weight of a water-insoluble cationic fabric softener; and
- 10 (iii) more than 4% by weight of a nonionic material which comprises an alkylene oxide adduct of a fatty compound selected from fatty alcohols, fatty acids, fatty esters, and fatty acid amides, the fatty compound containing at least 10 carbon atoms and the
- 15 adduct containing an average of not more than 7 alkylene oxide groups per molecule, when the fatty compound is a fatty acid or a fatty ester and not more than 4 alkylene oxide groups per molecule when the fatty compound is a fatty alcohol or a fatty
- 20 acid amide,

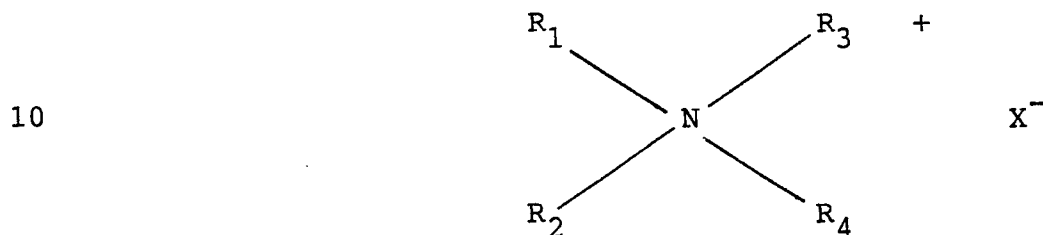
the total level of the cationic softener and the nonionic material being not more than 36% by weight, preferably not more than about 25% by weight.

- 25 The level of cationic softener in the composition is preferably from 10.5% to 21% by weight. The level of the nonionic material in the composition is preferably from 4.5% to 12.0% by weight. The weight ratio of the
- 30 cationic softener to the nonionic material is preferably at least 1:1, such as between about 1.5:1 and about 3:1.

- 35 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

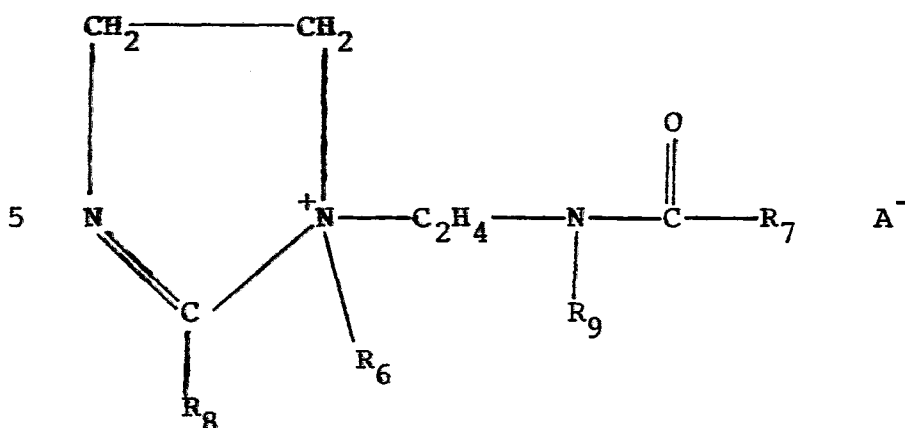
salts having two C₁₂-C₂₄ alkyl or alkenyl chains, optionally substituted or interrupted by functional groups such as -OH, -O-, -CONH, -COO-, etc.

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



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 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; 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 di(coconut alkyl) dimethyl ammonium methosulfate are preferred.

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



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 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-dihydroimidazolinium methosulfate and 1-methyl-1-(palmitoylamido)ethyl-2-octadecyl-4,5-dihydroimidazolinium 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 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 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 various fatty compounds as specified above, but may also include other alkoxyated or non-alkoxyated nonionic materials.

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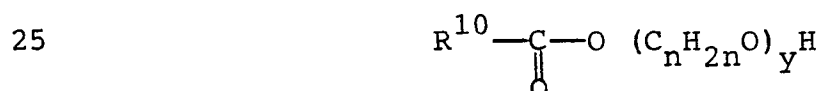
Alkylene oxide adducts of fatty alcohols useful in the present invention, preferably have the general formula:



wherein R^{10} is an alkyl or alkenyl group having at least 10 carbon atoms, most preferably from 10 to 22 carbon atoms, y is not more than 4.0, such as from about 0.5 to about 3.5 and n is 2 or 3. Examples of such materials include Synperonic A3 (ex ICI) which is a C_{13} - C_{15} alcohol with about three ethylene oxide groups per molecule and Empilan KB3 (ex Marchon) which is lauric alcohol 3EO. Alkylene oxide adducts of primary alcohols are preferred over those of secondary alcohols.

20

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



wherein R^{10} , and n are as given above and y is preferably not more than 4.0, such as from about 0.5 to about 3.5. Suitable examples include ESONAL 0334 (ex Diamond Shamrock) which is a tallow fatty acid with about 2.4 ethylene oxide groups per molecule.

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Alkylene oxide adducts of fatty esters useful in the present invention include adducts of mono-, di- or tri-esters of polyhydric alcohols containing 1 to 4 carbon

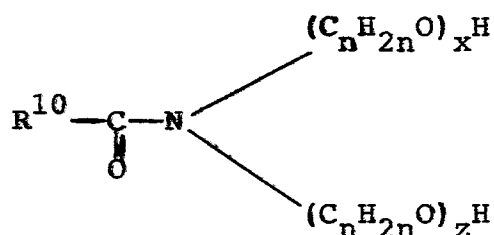
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atoms with not more than 4.0, such as from about 0.5 to about 3.5 alkylene oxide groups per molecule; such as coconut or tallow oil (triglyceride) 3EO (ex Stearine Dubois).

5

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

10



15

wherein R^{10} and n are as given above, and x and z in total are not more than 4.0, such as 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.

20

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.

25

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.

35

The compositions may include electrolytes to assist in controlling the viscosity of the product. A suitable

electrolyte level in the compositions is from about 0.01% to about 0.5%, most preferably from about 0.02% to about 0.2%, measured as the anhydrous salt. Examples of suitable materials include the ionic salts of sodium,
5 potassium, lithium, magnesium, calcium or aluminium, such as lithium chloride, sodium chloride, ammonium chloride, sodium methosulphate, sodium benzoate, calcium chloride, magnesium chloride or aluminium chloride. Of these, sodium and potassium salts are less preferred.

10

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
15 C₁-C₄ monohydric alcohol in the composition is less than about 10% by weight, most preferably less than about 5% by weight.

Additionally the composition can contain substances
20 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
25 about 1.0% to 2.0% by weight.

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
30 compositions is between about 3 and about 8, such as from 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,
35 anti-oxidants and anti-corrosion agents.

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 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 Rotorviscometer (Model RV 2) at 110 sec^{-1} at 25°C .

EXAMPLES 1 TO 18

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 then adding perfume. The compositions were made in batches of 100g. Stirring was continued for 7 minutes at 500 rpm.

Example No:		1	2	3	4	5	6	7	8	9	9A
Ingredient (%)											
5	Arquad 2HT ¹	10.5	10.5	10.5	10.5	10.5	10.5	11.0	16.0	13.0	17.5
	Coconut diethanolamide	-	-	-	-	-	7.0	-	-	-	-
	Isostearic diethanolamide	4.5	-	-	-	-	-	-	-	-	-
	Tallow monoethanolamide	-	4.5	-	-	-	-	-	-	-	-
	Coconut monoethanolamide	-	-	4.5	-	-	-	-	-	-	-
10	Soya diethanolamide	-	-	-	-	4.5	-	-	-	-	-
	Trydet ISA4 ²	-	-	-	-	-	-	11.0	9.0	-	-
	Tallow diethanolamide	-	-	-	4.5	-	-	-	-	-	-
	Tallow alcohol 4 EO	-	-	-	-	-	-	-	-	4.5	-
	Calcium chloride	0.05	0.05	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.05
Water and minor ingredients		-----balance-----									
15	Initial Viscosity (cP)										200

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

2 - Ethoxylated isostearic acid having approximately 4 ethylene oxide groups per molecule.

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Example No:	10	11	12	13	14	15	16	17	18
Ingredient (%)									
Arquad 2HT	12.3	12.3	12.3	13.2	13.2	16.0	13.9	11.0	11.0
5 Coconut diethanolamide	5.2	-	-	-	5.8	-	-	-	-
Tallow monoethanolamide	-	5.2	-	-	-	-	-	-	-
Coconut monoethanolamide	-	-	5.2	5.8	-	4.0	6.1	-	-
Hardened tallow fatty acid	-	-	-	-	-	-	-	0.5	0.5
Tallow diethanolamide	-	-	-	-	-	-	-	3.5	-
10 Tallow alcohol 4 EO	-	-	-	-	-	-	-	-	3.5
Calcium chloride	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04
Water and minor ingredients	-----balance-----								

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EXAMPLES 19 AND 20

In order to demonstrate the effect of the degree of alkoxylation of the nonionic adduct on the initial viscosities of products according to the invention, the following compositions were prepared using the method described in Example 1:

Example No:	19	19A	20	20A
<u>Ingredients (%)</u>				
Arquad 2HT	10.5	10.5	10.5	10.5
Synperonic A3 ³	7.0	-	-	-
Synperonic A11 ⁴	-	7.0	-	-
Cocodiethanol amide	-	-	7.0	-
Genogen CA 050 ⁵	-	-	-	7.0
Calcium chloride	0.05	0.05	0.05	0.05
Water	-----balance-----			
Initial viscosity (cP)	40	500	78	>500

Notes:

3 - A commercially available alkoxyated alcohol which is approximately straight chain C₁₃-C₁₅ alcohol with 3 EO groups per molecule.

4 - As Synperonic A3 but with 11 EO groups per molecule.

5 - A commercially available material (ex HOECHST) believed to be the addition product of coconut fatty monoethanolamide with 5 moles of ethylene oxide.

C L A I M S

1. An aqueous concentrated fabric softening composition comprising:

5

(i) an aqueous base;

(ii) more than 10% by weight of a water-insoluble cationic fabric softener; and

10

(iii) more than 4% by weight of a nonionic material which comprises an alkylene oxide adduct of a fatty compound selected from fatty alcohols, fatty acids, fatty esters, and fatty acid amides, the fatty compound containing at least 10 carbon atoms and the adduct containing an average of not more than 7 alkylene oxide groups per molecule, when the fatty compound is a fatty acid or a fatty ester and not more than 4 alkylene oxide groups per molecule when the fatty compound is a fatty alcohol or a fatty acid amide,

15

20

the total level of the cationic softener and the nonionic material being not more than 36% by weight.

25

2. An aqueous concentrated fabric softening composition according to Claim 1, wherein the level of said water-insoluble cationic fabric softener is from 10.5% to 21% by weight of the composition.

30

3. An aqueous concentrated fabric softening composition according to Claim 1, wherein the level of said nonionic material is from 4.5% to 12% by weight of the composition.

4. An aqueous concentrated 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 concentrated fabric softening composition further comprising an electrolyte selected from the ionic salts of lithium, magnesium, calcium, aluminium and mixtures thereof.

10

6. A process for preparing an aqueous concentrated fabric softening composition according to Claim 1, wherein a molten mixture of the cationic softener and the nonionic material is added to water with stirring to form a dispersion.

15