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EUROPEAN PATENT APPLICATION

21 Application number: **89202890.3**

51 Int. Cl.⁵: **C11D 1/62, C11D 3/18**

22 Date of filing: **15.11.89**

30 Priority: **28.11.88 GB 8827698**

43 Date of publication of application:
06.06.90 Bulletin 90/23

84 Designated Contracting States:
CH DE ES FR GB IT LI NL SE

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54 **Fabric treatment composition.**

57 A liquid aqueous fabric-treatment composition comprising a water-insoluble, cationic fabric-conditioning material and a fabric-substantive hydrocarbon material, characterized in that the weight ratio of water-insoluble, cationic material to hydrocarbon material is between 1:4 and 1:10, and wherein the total level of water-insoluble, cationic material and hydrocarbon material is more than 12% of the composition.

EP 0 371 534 A2

FABRIC-TREATMENT COMPOSITION

The present invention relates to a fabric-treatment composition, which is especially suitable for use in the rinse cycle of a fabric washing process. In particular, the present invention relates to a fabric-treatment composition comprising a water-insoluble, cationic fabric-conditioning material and a hydrocarbon material.

In GB 2,007,734 it has been suggested combining a water-insoluble, cationic conditioning material and a material having oily/fatty properties in a fabric-treatment concentrate. These concentrates, however, are disadvantageous in that they can often not easily be diluted to form well-dispersed, liquid fabric-treatment compositions of a high active level without the addition of substantial amounts of solvents to aid dispersion.

It has also been suggested in GB 1,601,360 that a water-insoluble, cationic material and a hydrocarbon material be incorporated in a fabric-treatment composition, the weight ratio of water-insoluble, cationic material to hydrocarbon material being between 5:1 and 1:3, for enhanced ironing, anti-wrinkling and reduced material costs. From the specification of this patent it appears that the lower limit for the weight ratio of water-insoluble, cationic material to hydrocarbon material has been set at 1:3, because lower ratios were expected to result in poor deposition of the hydrocarbon material and, hence, in reduced anti-wrinkling of the treated fabrics.

In comparing the degree of wrinkling of fabrics treated with compositions of varying weight ratios of water-insoluble, cationic material to hydrocarbon materials, it can indeed be observed that at weight ratios between 1:2 and 1:3 there is a consistent tendency of increased wrinkling when the weight ratio is decreased. This is in line with the teaching of GB 1,601,360, which predicts a decrease of deposition of hydrocarbon material by lowering the weight ratio of water-insoluble, cationic material and hydrocarbon material. Furthermore, it can be observed that by increasing the ratio of water-insoluble, cationic material to hydrocarbon material, the viscosity of the fabric-treatment composition increases.

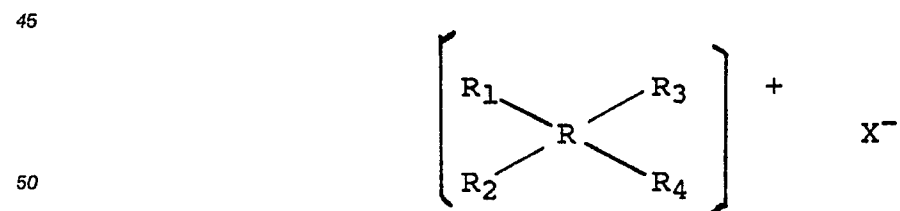
It is an object of the present invention to provide a fabric-treatment composition comprising a water-insoluble, cationic fabric treatment material and a hydrocarbon material. It is another object of the present invention to provide a fabric-treatment composition for enhanced anti-wrinkling of fabrics treated with this composition. Further objects of the present invention are the provision of a fabric-treatment composition which is easy to manufacture at low material costs, which is stable at storage conditions and which is of satisfactory viscosity, especially at high active levels.

Surprisingly, it has been found that, despite the observed consistent increase in wrinkling when lowering the ratio of water-insoluble, cationic material to hydrocarbon materials from 1:2 to 1:3, an unexpected decrease of the degree of wrinkling can be observed when water-insoluble, cationic materials and hydrocarbon materials are used in weight ratios of 1:4 to 1:10. Also surprising is the observation that compositions comprising these materials in ratios between 1:4 and 1:10 are of satisfactory viscosity at active levels of 12% and higher.

Therefore, the present invention relates to a liquid fabric-treatment composition comprising an aqueous base, a water-insoluble, cationic fabric-conditioning material and a fabric-substantive hydrocarbon material, wherein the total level of water-insoluble, cationic material and hydrocarbon material is between 12% and 60% by weight of the composition and wherein the weight ratio of water-insoluble, cationic material to hydrocarbon material is between 1:4 and 1:10.

The water-insoluble, cationic fabric softener can be any fabric-substantive cationic compound that 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.

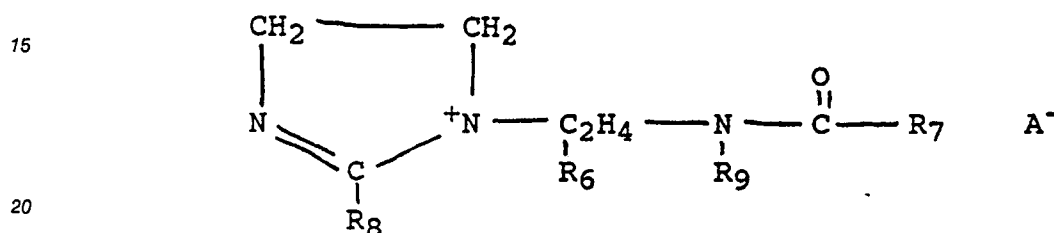
Well-known species of substantially water-insoluble, quaternary ammonium compounds have the formula:



wherein R₁ and R₂ represent hydrocarbyl groups of from about 12 to about 24 carbon atoms, R₃ and R₄ represent hydrocarbyl groups containing from 1 to about 4 carbon atoms, R₁₋₄ may optionally be

substituted or interrupted by functional groups such as -OH, -O-, -CONH-, -COO-, etc., and X is an anion, preferably selected from halide, methyl sulphate and ethyl sulphate radicals. Representative examples of these quaternary softeners include ditallow dimethyl ammonium chloride, ditallow dimethyl ammonium methyl sulphate, 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 sulphate, dihexadecyl diethyl ammonium chloride and 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 methosulphate are preferred. Other preferred quaternary ammonium compounds are disclosed in EP 239 910.

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



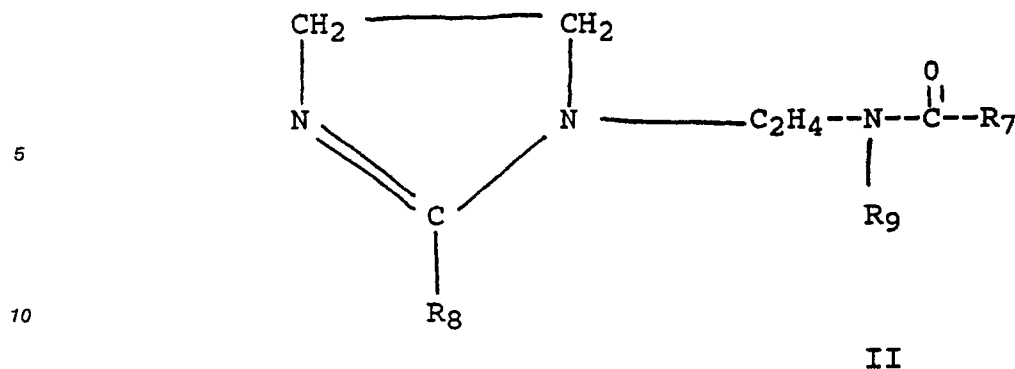
wherein R_6 is an alkyl or hydroxyalkyl group containing from 1 to 4, preferably 1 or 2 carbon atoms, R_7 is an alkyl or alkenyl group containing from 8 to 25 carbon atoms, R_8 is an alkyl or alkenyl group containing from 8 to 25 carbon atoms, and R_9 is hydrogen or an alkyl group containing from 1 to 4 carbon atoms and A^- is an anion, preferably a halide, methosulphate or ethosulphate. Preferred imidazolinium salts include 1-methyl-1-(tallowylamido) ethyl-2-tallowyl-4,5-dihydro-imidazolinium methosulphate and 1-methyl-1-(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 the imidazolinium fabric-softening components of U.S. Patent N° 4,127,489, incorporated by way of reference.

Other suitable cationic softener materials for use in compositions of the present invention are amines which are used at relatively low pH values to effect at least the partial protonation thereof. Suitable water-insoluble amine fabric softeners have, in protonated form, a solubility in water at pH 2.5 and 20 °C of less than 10 g/l.

Preferably the relatively in-soluble amine materials are selected from the following groups:
(i) amines of formula



wherein R_{15} , R_{16} and R_{17} are defined as below;
(ii) imidazolines of formula



wherein R_7 , R_8 and R_9 are defined as above.

- 15 (iii) condensation products formed from the reaction of fatty acids with a polyamine selected from the group consisting of hydroxy alkylalkylenediamines and dialkylenetriamines and mixtures thereof. Suitable materials are disclosed in European Patent Application 199 382 (Procter and Gamble), incorporated herein by reference.

20 When the amine is of the formula I above, R_{15} is a C_6 to C_{24} , hydrocarbyl group, R_{16} is a C_1 to C_{24} hydrocarbyl group and R_{17} is a C_1 to C_{10} hydrocarbyl group. Suitable amines include those materials from which the quaternary ammonium compounds disclosed above are derived, in which R_{15} is R_1 , R_{16} is R_2 and R_{17} is R_3 . Preferably, the amine is such that both R_{15} and R_{16} are C_6 - C_{20} alkyl preferably C_{12} - C_{20} with C_{16} - C_{18} being most preferred and with R_{17} as C_1 - C_3 alkyl, or R_{15} is an alkyl or alkenyl group with at least 22 carbon atoms and R_{16} and R_{12} are C_1 - C_3 alkyl.

- 25 Preferably these amines are protonated with hydrochloric acid, orthophosphoric acid (OPA), C_1 - C_5 carboxylic acids or any other similar acids suitable for use in the fabric conditioning compositions of the invention.

30 The hydrocarbon material can be any fabric-substantive hydrocarbon material suitable for inclusion in fabric treatment compositions. Suitable hydrocarbon materials include hydrocarbon materials comprising a linear or branched alkyl chain and comprising an average of from 12 to 50 carbon atoms per molecule, preferably from 12 to 30 carbon atoms. Preferably, the hydrocarbon materials are either alkanes or alkenes or mixtures thereof; relatively small amounts of non-alkyl substituent groups may be present, provided the hydrocarbon nature of the product is not substantially affected.

- 35 The softening temperature of the hydrocarbon material should preferably be less than 60°C , more preferably less than 50°C , most preferably less than 40°C . The hydrocarbon material can be either solid, semi-solid or liquid at room temperature.

Examples of suitable hydrocarbon materials are the liquid hydrocarbon materials of natural source and other liquid hydrocarbon materials including the liquid fractions derived from crude oil, such as mineral oil or liquid paraffins and branched hydrocarbons.

- 40 Examples of solid or semi-solid hydrocarbon materials are the paraffinic materials of longer average chain length and the hydrogenated version of the liquid materials mentioned above.

A particularly useful combination of hydrocarbon materials is a mixture of mineral oil (M85 ex Daltons) and petroleum jelly (Silkolene 910 ex Daltons). Mineral oil is a liquid mixture of linear and branched hydrocarbons having an average number of 26 carbon atoms per molecule. Petroleum jelly is a semi-solid mixture of linear and branched hydrocarbons having an average number of 26 carbon atoms per molecule and having a softening temperature of about 50°C .

- 45 Fabric-treatment compositions according to the present invention will generally have a total level of water-insoluble, cationic material and hydrocarbon material of from 12 to 60% by weight, the remaining of the composition being predominantly water optionally plus minors. Preferably, the total amount of water-insoluble, cationic material and hydrocarbon material is more than 14% by weight, more preferably between 14 and 50% by weight, most preferably between 16 and 45%, typically from 20 to 35 % by weight.

The pH of the composition is preferably between 2 and 7, more preferably from 3 and 6, especially preferred from 3 to 4.5; the viscosity of the composition is preferably less than 200 cPs at 110 S-1 (Haake viscometer).

- 55 In addition to the water-insoluble, cationic material and the hydrocarbon material, the fabric-treatment composition may comprise one or more ingredients which are suitable for incorporation in fabric-treatment compositions. Examples of these optional ingredients are nonionic, amphoteric or zwitterionic fabric-treatment materials.

The compositions may also contain, in addition to the cationic fabric softening agent, other non-cationic fabric softening agents, such as nonionic fabric softening agents. Suitable nonionic fabric softening agents include glycerol esters, such as glycerol mono-stearate, fatty alcohols, such as stearyl alcohol, alkoxylated fatty alcohols C₉-C₂₄ fatty acids and lanolin and derivatives thereof. Suitable materials are disclosed in
 5 European Patent Application 88 520 (Unilever PLC/NV case C 1325), 122 141 (Unilever PLC/NV case C 1363) and 79 746 (Procter and Gamble), the disclosures of which are incorporated herein by reference. Typically such materials are included at a level within the range of from 0.5% to 10% by weight of the composition.

The compositions may also contain one or more ingredients selected from non-aqueous solvents such
 10 as C₁-C₄ alkanols and polyhydric alcohols, pH-buffering agents such as weak acids, e.g. phosphoric, benzoic or citric acid (the pH of the compositions being preferably less than 6.0), rewetting agents, viscosity modifiers, silicones, anti-gelling agents, perfumes, perfume carriers, fluorescers, colourants, hydrotropes, anti-foaming agents, anti-redeposition agents, enzymes, optical brightening agents, opacifiers, stabilizers such as guar gum and polyethylene glycol, anti-shrinking agents, anti-wrinkle agents, fabric-crisping agents,
 15 spotting agents, soil-release agents, germicides, silicones, fungicides, antioxidants, anti-corrosion agents, preservatives, dyes, bleaches and bleach precursors, drape-imparting agents and antistatic agents.

Preferably the level of solvent materials as referred to above is less than the level of cationic fabric softener materials in the composition. More preferably the level of solvents is less than 75 %, more preferred less than 50 % based on the weight of the cationic fabric softener material. Typically compositions
 20 of the invention are substantially free from solvents.

Advantageously, the fabric-treatment composition according to the invention also comprises a small amount of water-soluble, cationic material. Examples of suitable materials of this nature are given in GB 1,601,360. Other suitable water-soluble cationic materials include polyamine materials, preferably diamine materials, wherein each nitrogen atom is connected to three other atoms. A preferred diamine, water-
 25 soluble, cationic material of this nature is Ethoduomeen T13 (ex AKZO) which comprises an N,N',N'-tris (2-hydroxyethyl) N-tallow 1,3-diaminopropane. The amount of water-soluble, cationic material is preferably less than the amount of water-insoluble, cationic material. Generally, the amount of water-soluble, cationic material will preferably be from 0.5 to 10% by weight of the composition.

Compositions according to the invention can be prepared by any method suitable for preparing
 30 dispersed, emulsified systems. A preferred method involves the forming of a molten pre-mixture of the active materials in water at an elevated temperature, adding additional water to obtain the desired active concentration, and then cooling to ambient temperature. When desired, some minor ingredients such as electrolytes, colouring agents, etc. may be post-dosed. A second preferred method involves the forming of the product by phase inversion of a water in hydrocarbon emulsion, wherein the cationic softener is either
 35 part of the hydrocarbon phase or is added as a separate dispersion after phase inversion. This method is especially advantageous, because this provides very finely divided hydrocarbon particles in the final product.

The fabric-treatment compositions according to the invention are preferably used in the final rinse of the washing cycle of an ordinary washing machine. The amount of fabric-treatment composition to be added is
 40 mainly dependent on the active concentration of the composition and the volume of the water used in the rinsing cycle. Preferably, the dose is chosen such that the concentration of active material (softener plus hydrocarbon material) in the rinse water is from 0.05 to 3.0 g/l, preferably from 0.5 to 2.0 g/l.

The invention will be further illustrated by the following Examples. In these Examples, the percentages are by weight of the composition.

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EXAMPLE I

50 Fabric-treatment compositions A-D were prepared as follows: The cationic materials and the hydrocarbon materials were mixed, melted and heated to a temperature of 70 ° C. The molten actives were added to water of 70 ° C while mixing at a high speed with a Silverson mixer. After being mixed for 10 minutes, the compositions were cooled to room temperature by rapid chilling in an ice bath while being gently stirred.

The following compositions were obtained :

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Composition A :

6.7% ARQUAD 2HT (ex Atlas)

13.3% M85 (mineral oil, ex Daltons)

2.0% Ethoduomeen T13

Composition B :

5.0% ARQUAD 2HT

15.0% M85

2.0% Ethoduomeen T13

5 Composition C :

4.0% ARQUAD 2HT

16.0% M85

2.0% Ethoduomeen T13

Composition D :

10 3.3% ARQUAD 2HT

16.7% M85

2.0% Ethoduomeen T13 The compositions were tested as follows :

15 Creasing assessment

Two pieces of 9 x 9 inches of 50/50 polyester/cotton, two pieces of 9 x 9 inches of 67/33 polyester/cotton and two pieces of 9 x 9 inches of cotton poplin were rinsed at room temperature for 5 minutes in 1 litre of deminwater with 1 g of fabric-conditioning composition. The fabrics were squeezed to
20 remove excess water, spun for 10 seconds, further squeezed in a clenched fist for 10 seconds and subsequently line-dried. The pieces were assessed by a trained panel of 4 persons by the Round Robin method. The creasing score was expressed in arbitrary units, a higher creasing score indicating less creasing.

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Viscosity

The viscosity of the compositions was measured by a Haake viscometer at ambient temperature. Values are quoted at 110 S^{-1} .

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Results

The results of the tested compositions are represented in Fig. 1. This Figure clearly shows that the
35 creasing score increases by decreasing the ratio water-soluble cationic material to hydrocarbon material. From the Figure it is clear that at ratios of 1:2 or higher, the viscosity of the compositions is unacceptably high. At ratios from 1:2 to 1:3, a significant decrease in creasing score is observed. At ratios of 1:4 and lower, a satisfactory creasing score in combination with an adequate viscosity is obtained.

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EXAMPLE II

Fabric-treatment compositions were prepared according to the method as described in Example I. The
45 following compositions were obtained :

Composition E :

6.7% ARQUAD 2HT

4.4% Petroleum Jelly

(Silkolene 910 ex Daltons)

50 8.9% M85

2.0% Ethoduomeen T13

Composition F :

5.0% ARQUAD 2HT

5.0% Petroleum Jelly

55 10.0% M85

2.0% Ethoduomeen T13

Composition G :

4.0% ARQUAD 2HT

5.3% Petroleum Jelly
 10.7% M85
 2.0% Ethoduomeen T13
 Composition H :
 3.3% ARQUAD 2HT
 5.6% Petroleum Jelly
 11.1% M85
 2.0% Ethoduomeen T13

The compositions were tested according to the method of Example I. The results of the tests are represented in Fig. 2. These results clearly illustrate a relatively high viscosity for compositions of a ratio water-insoluble cationics to hydrocarbon mixture of 1:3 and higher. An acceptably low viscosity is obtained when ratios lower than 1:3 are used. The results also illustrate a consistent decrease in wrinkling score in lowering the ratio from 1:2 to 1:3, and an unexpected increase in creasing score at ratios of 1:4 and lower. The combination of acceptable viscosity and adequate creasing score is only found at ratios of 1:4 and lower.

EXAMPLE III				
Chemical	Trade Name	Supplier	A	B
			Level	
			(as 100% ai)	
Dihardened tallow dimethyl ammonium chloride	ADOGEN 442	SHEREX	3.3	3.3
Mineral oil	Sirius 85	Daltons Co	10.8	10.8
Pet jelly	Silkolene 910	Daltons Co	5.4	5.4
Dicoco dimethyl ammonium chloride	Adogen 462	Sherex	2.2	2.2
Glycerol monostearate	-	Unichema	1.65	1.65
C ₁₂ -C ₁₅ alcohol 3 ethoxylate	Dobanol 25-3	Shell UK Ltd.	1.1	1.1
N,N,N-tris-(2 hydroxy(ethyl)-N-tallow-1,3-diaminopropane	Ethoduomeen T13	Akzo	1.24	1.24
Preservative	Proxel XL2	ICI	0.02	0.02
Perfume	Koala 188	IFF	0.60	0.60
Dye	DAB AE	Cassella	0.004	0.004
Amine functional	TP 226	Union Carbide	1.5	1.5
Water			to balance	

The above compositions were made by preheating the Sirius 85, the Silkolene 920, the Adogen 462, the GMS and the Dobanol 25-3 to 60 °C and adding water to this premix under stirring. This provides a water in oil type emulsion, which upon further addition of water is phase reversed to a oil in water type emulsion, wherein the oil phase is very finely dispersed. To this oil in water phase is added a predispersion of the Adogen 442 and the Etoduomeeen T13, which had been prepared by heating the two materials to 60 °C followed by the addition to water under stirring. The final product is obtained by adding the remaining ingredients to the mixture of the two dispersions.

Claims

1. A liquid aqueous fabric-treatment composition comprising a water-insoluble, cationic fabric-conditioning material and a fabric-substantive hydrocarbon material, characterized in that the weight ratio of water-insoluble, cationic material to hydrocarbon material is between 1:4 and 1:10, and wherein the total level of water-insoluble, cationic material and hydrocarbon material is more than 12% of the composition.
2. A composition according to Claim 1, characterized in that the weight ratio of water-insoluble, cationic material to hydrocarbon material is between 1:4 and 1:6.

3. A composition according to Claim 1 or 2 having a viscosity of less than 200 cPs at 110S⁻¹.

4. A composition according to Claims 1-3, comprising

40-86% water;

14-60% active material comprising the water-insoluble, cationic material and the hydrocarbon material.

5 5. A composition according to Claim 4, characterized in that the active material also comprises a water-soluble, cationic fabric-conditioning material.

6. A composition according to Claims 1-5, characterized in that it comprises :

64.5-87.5% water;

2.4-5.5% water-insoluble, cationic material;

10 9.6-29% fabric-substantive, hydrocarbon material;

0.5-10% water-soluble, cationic material.

7. Use of a composition according to one or more of the preceding claims in the rinse cycle of a fabric washing process

15 8. Fabric-treatment composition according to Claims 1-6, for use in the rinse cycle of a washing process.

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