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(54) **Use of fabric softening composition.**

(57) Use as a soil release agent in a fabric softening composition of at least 1% by weight of a quaternary ammonium material comprising a compound having two C₁₂₋₂₈ alkyl or alkenyl groups connected via an ester link to a hydrocarbon chain which is connected to the quaternary nitrogen atom.

The present invention relates to the use as a soil release agent in a fabric softening composition of a biodegradable quaternary ammonium material.

Rinse added fabric softener compositions are well known. Typically such compositions contain a water insoluble quaternary ammonium fabric softening agent dispersed in water at a level of softening agent up to 7% by weight in which case the compositions are considered dilute, or at levels from 7% to 50% in which case the compositions are considered concentrates. In addition to softening, fabric softening compositions desirably have other benefits. One is the ability to confer soil release properties to fabrics, particularly those woven from polyester fibres.

One of the problems associated with fabric softening compositions is the physical instability of such compositions when stored. This problem is accentuated by having a concentrated composition and by storage at low temperatures.

Concentrates and storage stability at low temperatures are, however, desired by the consumer. Physical instability manifests itself as a thickening on storage of the composition to a level where the composition is no longer pourable and can even lead to the formation of an irreversible gel. The thickening is very undesirable since the composition can no longer be conveniently used.

In the past physical stability of rinse added fabric softener compositions has been improved by the addition of viscosity control agents or anti-gelling agents. For example in EP 13780 (Procter and Gamble) viscosity control agents are added to certain concentrated compositions. The agents may include C₁₀-C₁₈ fatty alcohols. More recently in EP 280550 (Unilever) it has been proposed to improve the physical stability of dilute compositions comprising biodegradable, ester-linked quaternary ammonium compounds and fatty acid by the addition of nonionic surfactants.

With concentrated compositions comprising biodegradable ester-linked quaternary ammonium compounds the problem of physical instability is more acute than with traditional quaternary ammonium compounds.

In EP 0 040 562 (Lesieur Cotelle) a nonionic emulsifier/stabiliser is added to a concentrate comprising an ester-linked quaternary ammonium compound to form a viscous gel. The stabiliser is a C₁₂ to C₁₄ alcohol ethoxylated with 9 molecules of ethylene oxide. The degree of branching of the alcohol is not however mentioned.

Certain nonionic stabilising agents not only stabilise concentrated compositions comprising biodegradable quaternary ammonium compounds but are also environmentally friendly, in that they show acceptable biodegradability and are not substantially toxic in aquatic systems.

Soil release properties are generally imparted to fabrics by the use of separate soil-release agents, usually a high molecular weight polymer, in a detergent composition or separate treatment. For example in EP 0 398 133A (Procter & Gamble) there is disclosed a cationic polymeric soil release agent for use in a fabric conditioning composition.

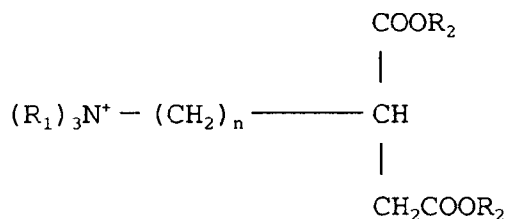
A disadvantage of such compositions is that the soil release agent increases the number of components in the formulation, increasing cost and making the product less environmentally acceptable.

We have now found that fabric softening compositions comprising biodegradable ester-linked quaternary ammonium compounds may confer soil release properties to fabrics without the use of a separate soil release agent.

According to the invention there is provided the use as a soil release agent in a fabric softening composition of a quaternary ammonium material comprising a compound having two C₁₂₋₂₈ alkyl or alkenyl groups connected via an ester link to the quaternary nitrogen atom.

Preferably the composition is a liquid comprising an aqueous base.

A preferred type of ester-linked quaternary ammonium material for use in the compositions according to the invention can be represented by the formula



wherein R₁, n and R₂ are as defined above.

Preferred materials of this class and their method of preparation are, for example, described in US 4 137 180 (Lever Brothers). Preferably these materials comprise small amounts of the corresponding monoester as described in US 4 137 180 for example 1-tallowoxy, 2-hydroxytrimethyl ammonium propane chloride.

Preferably the level of ester linked quaternary ammonium compounds is at least 1% by weight of the composition, more preferably more than 3% by weight of the composition; especially interesting are concentrated compositions which comprise more than 7% of ester-linked quaternary ammonium compound. The level of ester-linked quaternary ammonium compounds preferably is between 1% and 80% by weight, more preferably 3% to 50%, most preferably 8% to 50%.

The softening composition may be stabilised at low temperatures by the addition of nonionic stabilisers. Suitable nonionic stabilisers which can be used include the condensation products of $C_8 - C_{22}$ primary linear alcohols with 10 to 20 moles of ethylene oxide. The alcohols may be saturated or unsaturated. In particular Genapol T-110, Genapol T-150, Genapol T-200, Genapol C-200 all ex Hoeschst AG, Lutensol AT18 ex BASF, Genapol O-100 and Genapol O-150 ex Hoechst, or fatty alcohols for example Laurex CS, ex Albright and Wilson or Adol 340 ex Sherex. Preferably the nonionic stabiliser has an HLB of between 10 and 20, more preferably 12 and 20.

Advantageously the nonionic stabiliser is biodegradable and has low aquatic toxicity. Use of less than 10 moles of ethylene oxide results in an acceptable acute aquatic toxicity value of > 1 mg/l EC_{50} 48 hours for daphnia and algae and EC_{50} 96 hours for fish, especially if the HLB of the nonionic is less than 12.

Preferably, the level of nonionic stabiliser is within the range from 0.1 to 10% by weight, more preferably from 0.5 to 5% by weight, most preferably from 1 to 4% by weight. The mole ratio of the quaternary ammonium compound to the nonionic stabilising agent is within the range from 40:1 to about 1:1, preferably within the range from 18:1 to about 3:1.

The composition can also contain fatty acids for example $C_8 - C_{24}$ alkyl or alkenyl monocarboxylic acids or polymers thereof. Preferably saturated fatty acids are used, in particular, hardened tallow $C_{16} - C_{18}$ fatty acids. Preferably the fatty acid is non-saponified, more preferably the fatty acid is free for example oleic acid, lauric acid or tallow fatty acid.

The level of fatty acid material is preferably more than 0.1% by weight, more preferably more than 0.2% by weight. Especially preferred are concentrates comprising from 0.5 to 20% by weight of fatty acid, more preferably 1% to 10% by weight. The weight ratio of quaternary ammonium material to fatty acid material is preferably from 10:1 to 1:10.

The compositions of the invention preferably have a pH of more than 2.0, more preferably less than 5.

The composition can also contain one or more optional ingredients, selected from non-aqueous solvents, pH buffering agents, perfumes, perfume carriers, fluorescers, colourants, hydrotropes, antifoaming agents, antiredeposition agents, enzymes, optical brightening agents, opacifiers, anti-shrinking agents, anti-wrinkle agents, anti-spotting agents, germicides, fungicides, anti-oxidants, anti-corrosion agents, drape imparting agents, antistatic agents and ironing aids.

The composition may also contain nonionic fabric softening agents such as lanolin and derivatives thereof.

The invention will now be illustrated by the following non-limiting examples. In the examples all percentages are expressed by weight.

Example 1

Liquid fabric softening compositions were made as follows.

The cationic fabric softening agent, fatty acid and nonionic stabilising agent where appropriate were pre-mixed and heated together to form a clear melt. The molten mixture thus formed was added over a period of at least one minute, to water at 70°C to 80°C with constant stirring to form a dispersion. The soil release properties imparted to polyester test pieces by treatment with the compositions was assessed by measuring the change in reflectance following staining and a subsequent wash in a proprietary detergent composition. The pieces were first rinsed for 5 minutes in 1 litre of 14°FH water containing 0.67 ml of either composition. The pieces were then line dried and stained with 100 micro litres of olive oil containing 0.06% sudan red dye. The stain was allowed to spread for a minimum of two days following which the reflectance of the stained piece (R_1) was measured using an ICS micromatch. The pieces were then washed, rinsed and line dried using 5q/1 New System Persil Automatic in. 14°FH water for a 15 minute wash cycle. The reflectance of the pretreated, washed piece (R_2) was measured and the percentage detergency calculated according to the following equation:

$$\% \text{ Detergency} = \frac{Ks_1 - Ks_2}{Ks_1} \times 100$$

$$\text{where } Ks_1 = \frac{(1 - R_1)^2}{2R_1} \text{ and } Ks_2 = \frac{(1 - R_2)^2}{2R_2}$$

The higher the percentage detergency, the greater the soil release benefit.

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	<u>Composition</u>	% by weight	
		<u>A</u>	<u>B</u>
	Arquad 2HT ¹	-	12.8
10	HT TMAPC ²	11.6	-
	Fatty acid ³	1.9	3.2
	Tallow 11EO ⁴	2.5	-
15	Water and minors to balance		
	% Detergency	30	21

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Notes

Formulation B corresponds to a commercially available fabric softening composition, COMFORT sold in the UK by Lever.

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1. Arquad 2HT is dihardened tallow dimethyl ammonium chloride ex Akzo Chemie.
- 35 2. HT TMAPC is 1,2 dihardened tallowoxy-3-trimethyl-ammonio propane chloride ex Hoescht.
3. is hardened tallow fatty acid, Pristerine 4916 ex Unichema.
- 40 4. is tallow alcohol ethoxylated with 11 moles of ethylene oxide of HLB 13.

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These results show that known compositions comprising conventional quaternary ammonium compositions (Composition B) show a smaller soil release benefit than compositions according to the invention (Composition A).

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Example 2

Liquid fabric softening compositions as given below were made as described in Example 1. The soil release properties of the compositions were measured as described in Example 1 excepting that the pieces were first rinsed in 1 litre of 14°FH water containing 2ml of either composition.

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	<u>Composition</u>	<u>% by weight</u>	
		<u>A</u>	<u>B</u>
5	Arquad 2HT ¹	-	5
	HT TMAPC ²	5	-
	Fatty acid ³	0.63	-
	Water to balance		
10	% Detergency	53	41

Notes

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1, 2 and 3 are in Example 1.

20 These results show that compositions comprising ester-linked quaternaries show a soil release benefit greater than that obtained from compositions comprising conventional quaternary and that the benefit is seen in the absence of a nonionic stabilising agent.

Example 3

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Example 2 was repeated with a composition which did not contain any nonionic to show that the improved soil release benefit is due entirely to the use of the biodegradable ester linked quaternary ammonium compound.

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	<u>Composition</u>	<u>% by weight</u>	
		<u>A</u>	<u>B</u>
	Arquad 2HT ¹	5	-
35	HT TMAPC ²	-	5
	HTFA ³	0.8	0.8
	Nonionic	-	-
	water to balance		
40	% Detergency	82.2	92.5

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Notes

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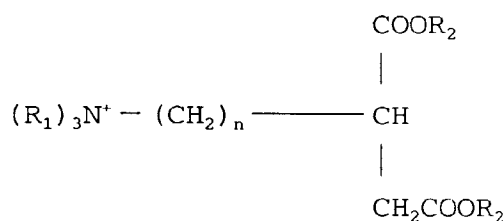
1, 2 and 3 are as in example 1.

This example clearly demonstrates the superior soil release behaviour of use of the softening composition according to the invention. The difference is statistically significant; P<0.05.

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Claims

1. Use as a soil release agent in a fabric softening composition of at least 1% by weight of a quaternary ammonium material comprising a compound having two C₁₂₋₂₈ alkyl or alkenyl groups connected via an ester link to a hydrocarbon chain which is connected to the quaternary nitrogen atom.
2. Use of a quaternary ammonium material as claimed in claim 1 wherein the fabric softening composition comprises a nonionic stabilising agent which is
 - i. a linear C₈ to C₂₂ alcohol alkoxylated with 10 to 20 moles of alkylene oxide or
 - ii. a C₁₀ to C₂₀ alcohol or mixtures thereof.
3. Use of a quaternary ammonium material as claimed in claim 1 or claim 2 wherein the fabric softening composition comprises a fatty acid material.
4. Use of a quaternary ammonium material as claimed in claim 2 wherein the composition comprises from 0.1 to 10% by weight of the nonionic stabilising agent.
5. Use of a quaternary ammonium material as claimed in claim 3 wherein the composition also comprises more than 0.1% by weight of a fatty acid material.
6. Use of a quaternary ammonium material as claimed in any preceding claim wherein the composition comprises from 3% to 50% by weight of the quaternary ammonium material, from 0.5% to 5% by weight of the nonionic stabilising agent and from 0.5 to 20% by weight of fatty acid material.
7. Use of a quaternary ammonium material as claimed in any one of claims 2 to 6 wherein the nonionic stabilising agent has an HLB of between 10 and 20.
8. Use of a quaternary ammonium material as claimed in claim 7 wherein the nonionic stabilising agent has an HLB of between 12 and 20.
9. Use of a quaternary ammonium material as claimed in any preceding claim wherein the quaternary ammonium material is represented by the formula:



wherein R₁, n and R₂ are as defined above.



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 30 2453

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	EP-A-0 042 187 (PROCTER & GAMBLE) * Claims * ---	1	C 11 D 1/62 C 11 D 1/835
A	EP-A-0 234 311 (HENKEL) * Claims * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			C 11 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22-06-1992	Examiner GOLLER P.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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