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**Fabric softening composition.**

A fabric softening composition comprising at least 1% by weight of a water insoluble cationic fabric softening agent and a nonionic stabilising agent wherein the water insoluble cationic fabric softening agent is a quaternary ammonium material which comprises a compound having two C<sub>12-28</sub> alkyl or alkenyl groups connected to the quaternary nitrogen atom via an ester link wherein the nonionic stabilising agent is selected from predominantly linear C<sub>8</sub> to C<sub>22</sub> alcohols alkoxyated with 10 or more moles of alkylene oxide and the nonionic stabilising agent has a clear phase at a 1% concentration in water somewhere in the range of 0°C and 45°C and a Krafft point less than 30°C.

The present invention relates to fabric softening compositions, in particular the invention relates to aqueous dispersions of biodegradable fabric softening compositions comprising a water insoluble cationic fabric softening agent and a nonionic stabilising agent suitable as rinse-added fabric softener compositions.

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 or high temperatures.

Concentrates and storage stability at low or high temperature are however desired by the consumer. Physical instability manifests 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 & Gamble) viscosity control agents are added to certain concentrated compositions. The agents may include C<sub>10-18</sub> 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 concentrate comprising an ester-linked quaternary ammonium compound to form a viscous gel. The stabiliser is a C<sub>12-14</sub> 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.

We have found that the high temperature stability of compositions containing biodegradable quaternary ammonium compounds may be improved by the use of selected nonionic stabilising agents.

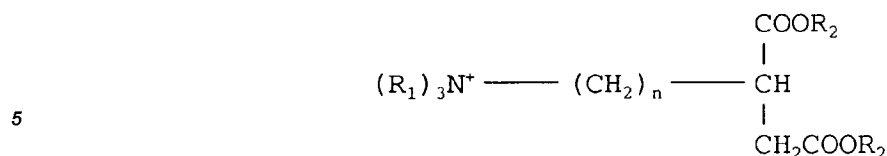
Thus, according to one aspect of the invention there is provided a fabric softening composition comprising a water insoluble cationic fabric softening agent and a nonionic stabilising agent wherein the water insoluble cationic fabric softening agent is a quaternary ammonium material which comprises a compound having two C<sub>12-18</sub> alkyl or alkenyl groups connected to the quaternary nitrogen atom via an ester link and the nonionic stabilising agent is a predominantly linear C<sub>8</sub> to C<sub>22</sub> alcohol alkoxyated with 10 or more moles of alkylene oxide, and in that the nonionic stabilising agent has a clear phase at a 1% concentration in water somewhere in the range of 0°C and 45°C and a Krafft point less than 30°C.

Such compositions show improved high temperature stability, in particular stability at 37°C.

The nonionic surfactant preferably has a krafft point of less than 10°C, most preferably less than 5°C. Krafft point is a term well known in the art, for example from R J Hunter 'Foundations of Colloid Science', Oxford University Press, Volume 1 1989 page 571. In general terms the krafft point of a stabilising material is the temperature below which the solubility of the material is low and no micelles are apparent. At temperatures above the krafft point the solution is clear, at temperatures below it the solution is cloudy. Thus a solution of a material with a krafft point of 5°C will be clear between at least 5°C and 45°C, while a material with a krafft point of 45°C will be cloudy between 0°C and 45°C and only clear above 45°C.

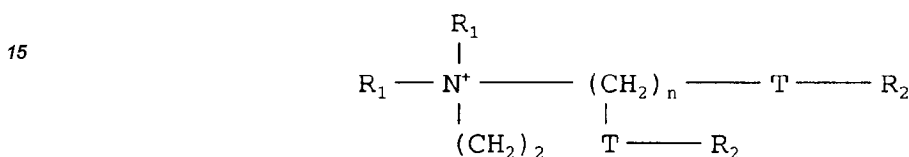
Preferably the compositions of the invention are liquids comprising an aqueous base.

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



10 wherein each R<sub>1</sub> group is independently selected from C<sub>1-4</sub> alkyl, alkenyl or hydroxyalkyl groups; and wherein each R<sub>2</sub> group is independently selected from C<sub>8-28</sub> alkyl or alkenyl groups;

A second preferred type of quaternary ammonium material can be represented by the formula:



wherein R<sub>1</sub>, n and R<sub>2</sub> are as defined above.

T is



and

30 n is an integer from 0-5.

Preferred materials 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.

35 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 is preferably between 1% and 80% by weight, more preferably 3% to 50%, most preferably 8% to 50%.

40 Suitable nonionic stabilisers which can be used include the condensation products of C<sub>8</sub> - C<sub>22</sub> primary or secondary predominantly linear alcohols with 10 or more moles of ethylene oxide, preferably 15 to 20 moles of ethylene oxide. The alcohols may be saturated or unsaturated. In particular Genapol T-150, Genapol T-200, Genapol C-200 all ex Hoechst AG, Lutensol AT18 ex BASF, Genapol C-100 Genapol C-150 & Genapol T-350 ex Hoechst. Dobanol 91-2.5, Dobanol 91-5, Dobanol 91-6, Dobanol 91-8 ex Shell. Preferably the nonionic stabiliser has an HLB of between 10 and 20, more preferably 12 and 20.

45 Preferably, the level of nonionic stabiliser is within the range of 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.

50 The composition can also contain fatty acids for example C<sub>8</sub> - C<sub>24</sub> alkyl or alkenyl monocarboxylic acids or polymers thereof. Preferably saturated fatty acids are used, in particular, hardened tallow C<sub>16-18</sub> 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.

55 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 between 2 and

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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, anti-tirededposition 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 to water at 70°C to 80°C over a period of at least one minute, with constant stirring to form a dispersion.

The viscosity of the compositions was measured by Haake rotoviscometer following 1 and 3 months storage at ambient temperature or at 37°C.

The Krafft point was measured by preparing a 1% solution of the nonionic stabilising agent in distilled water and storing the solution at 5°C for 5 days. The solution was then heated gradually with stirring until the solution became clear. The temperature at which the solution became clear was taken as the Krafft point.

EP 0 523 922 A2

Composition	A	B	C	D	E	F	G
HT TMAPC <sup>1</sup>	11.58	11.58	11.58	11.58	11.58	11.58	11.58
Fatty Acid <sup>2</sup>	1.93	1.93	1.93	1.93	1.93	1.93	1.93
Tallow 11EO <sup>3</sup>		2.5					
Tallow 15EO <sup>4</sup>			1.5				
Tallow 18EO <sup>5</sup>				1.5			
Tallow 20EO <sup>6</sup>					1.5		
Coco 10EO <sup>7</sup>						1.5	
Arosurf 66-e10 <sup>8</sup>							1.5
Water and Minors			-----	Balance	-----		
Viscosity at <u>110s<sup>-1</sup>mPas</u>	A	B	C	D	E	F	G
1 month Ambient	164	87	42	17	44	31	80
1 month 37°C	161	427	28	24	41	58	53
3 months Ambient	178	72	35	-	39	35	-
3 months 37°C	175	735	53	-	38	162	-
Krafft point °C	-	45	<5	<5	<5	35	<5
Clear phase at 1% concentration in water between 0°C and 45°C.	-	No	Yes	Yes	Yes	No	Yes

Notes

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1. HT TMAPC is a 1,2 dihardened tallowyloxy-3-trimethyl-ammonio propane chloride ex Hoescht.

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2. is hardened tallow fatty acid, Pristerine 4916 ex Unichema.

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3. is tallow alcohol ethoxylated with 11 moles of ethylene oxide.

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4. is tallow alcohol ethoxylated with 15 moles of ethylene oxide.

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5. is tallow alcohol ethoxylated with 18 moles of ethylene oxide.

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6. is tallow alcohol ethoxylated with 20 moles of ethylene oxide.

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7. is coco alcohol ethoxylated with 10 moles of ethylene oxide.

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These results show that addition of selected nonionic stabilising agents to compositions comprising ester linked quaternary ammonium compounds counteracts destabilisation at high temperature to give stable concentrated compositions.

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To show that the Krafft point is critical a composition similar to B was prepared with Genapol T-110 (NR), a narrow range tallow alcohol ethoxylate, ethoxylated with 11 moles ethylene oxide. This has a Krafft point <5°C and gave a stable product. Other ethoxylates with Krafft points <5°C have also been tested and all give stable products, in contrast to ethoxylates with higher Krafft points.

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**Claims**

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1. A fabric softening composition comprising at least 1% by weight of a water insoluble cationic fabric softening agent and a nonionic stabilising agent wherein the water insoluble cationic fabric softening agent is a quaternary ammonium material which comprises a compound having two C<sub>12-28</sub> alkyl or alkenyl groups connected to the quaternary nitrogen atom via an ester link characterised in that the nonionic stabilising agent is selected from predominantly linear C<sub>8</sub> to C<sub>22</sub> alcohols alkoxyated with 10 or more moles of alkylene oxide and the nonionic stabilising agent has a clear phase at a 1% concentration in water somewhere

in the range of 0°C and 45°C and a Krafft point less than 30°C.

2. A composition as claimed in claim 1 wherein the nonionic stabilising agent has a Krafft point less than 5°C.
- 5 3. A composition as claimed in claim 1 or claim 2 wherein the composition comprises from 0.1 to 10% by weight of the nonionic stabilising agent.
- 10 4. A composition as claimed in any preceding claim wherein the composition also comprises more than 0.1% by weight of a fatty acid material.
- 15 5. A composition 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.
- 20 6. A composition as claimed in any preceding claim wherein the nonionic stabilising agent has an HLB of between 10 and 20.
7. Process for making a liquid fabric softening composition as claimed in any of claims 1 to 6 comprising the steps of
  - i. mixing and heating the cationic fabric softening agent and nonionic stabilising agent to form a melt and
  - ii. dispersing the melt in water.

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