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Declarations under Rule 4.17:

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- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

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(54) Title: LAUNDRY COMPOSITION

(57) Abstract: A method of preparing of preparing a fabric conditioner comprising quaternary ammonium compound and one or more organic acids or the salts thereof, wherein one or more organic acids or the salts thereof are added to water prior to the addition of a quaternary ammonium compound.

LAUNDRY COMPOSITION

Field of the Invention

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The present invention is concerned with methods of formulating fabric conditioners comprising preservatives.

Background of the Invention

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Fabric conditioner compositions commonly comprise preservatives. Preservatives prevent the growth of mould or bacteria in the products. Traditionally preservatives are added to the formulation at the end of the production process, along with other minor ingredients. However, it has been identified that when using certain classes of preservatives, particularly lactic acid, sodium benzoate, potassium sorbate, this method can lead to instability in the compositions.

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Summary of the Invention

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It has been found that by adding the preservative to the formulation before the fabric softening active, long-term stability is improved.

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Accordingly in a first aspect of the present invention is provided of preparing a fabric conditioner comprising quaternary ammonium compound and two or more organic acids or the salts thereof, wherein one or more organic acids or the salts thereof are added to water prior to the addition of a quaternary ammonium compound;

Wherein the organic acids or salts thereof are selected from lactic acid, sodium benzoate, potassium sorbate; and

Wherein the composition comprises at least 75 wt.% water.

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Detailed Description of the Invention

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These and other aspects, features and advantages will become apparent to those of ordinary skill in the art from a reading of the following detailed description and the appended claims. For the avoidance of doubt, any feature of one aspect of the present invention may be utilised in any other aspect of the invention. The word "comprising" is intended to mean "including" but not

necessarily "consisting of" or "composed of." In other words, the listed steps or options need not be exhaustive. It is noted that the examples given in the description below are intended to clarify the invention and are not intended to limit the invention to those examples per se.

Similarly, all percentages are weight/weight percentages unless otherwise indicated. Except in the operating and comparative examples, or where otherwise explicitly indicated, all numbers in this description indicating amounts of material or conditions of reaction, physical properties of materials and/or use are to be understood as modified by the word "about". Numerical ranges expressed in the format "from x to y" are understood to include x and y. When for a specific feature multiple preferred ranges are described in the format "from x to y", it is understood that all ranges combining the different endpoints are also contemplated.

The method described herein involves the addition of two or more organic acids or the salts thereof, most preferably two to five organic acids or the salts thereof. Salts of the acids may be formed prior to addition to the composition or may form in the composition.

Organic acids are molecules comprising an acid group and at least one carbon atom. Preferably the acid group is a carboxylic acid group. Preferably the organic acids comprise only carbon, oxygen and hydrogen. When in the form of a salt the organic acids will additionally comprise a counter ion (which may be inorganic), such as sodium or potassium. The presence of two or more organic acids or salts thereof provides enhanced or synergistic preservation.

The organic acids or salts thereof are selected from: lactic acid, sodium benzoate, potassium sorbate or combinations thereof. These acids provide improved preservation.

Preferably the fabric conditioner comprises 0.001 wt.% to 6 wt.% of the organic acids or salt thereof, by weight of the fabric conditioner. More preferably the fabric conditioner comprises 0.002 wt.% to 5 wt.% organic acid or salt thereof. Even more preferably 0.003 to 3 wt.% of the organic acids or salt thereof, by weight of the fabric conditioner.

The method described herein further involves the addition of a quaternary ammonium compound.

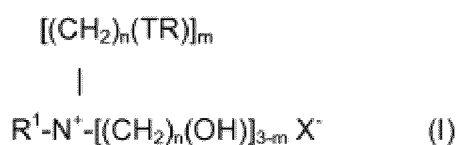
The quaternary ammonium compound (QAC) preferably comprises at least one chain derived from fatty acids, more preferably at least two chains derived from a fatty acid. Preferably the fatty acids are defined as aliphatic monocarboxylic acids having a chain of 4 to 28 carbons.

Fatty acids may be derived from various sources such as tallow or plant sources. Preferably the fatty acid chains are derived from plants. Preferably the fatty acid chains of the QAC comprise from 10 to 50 wt. % of saturated C18 chains and from 5 to 40 wt. % of monounsaturated C18 chains by weight of total fatty acid chains. In a further preferred embodiment, the fatty acid chains of the QAC comprise from 20 to 40 wt. %, preferably from 25 to 35 wt. % of saturated C18 chains and from 10 to 35 wt. %, preferably from 15 to 30 wt. % of monounsaturated C18 chains, by weight of total fatty acid chains.

The preferred quaternary ammonium fabric softening actives for use in the method described herein are so called "ester quats" or ester-linked quaternary ammonium compounds.

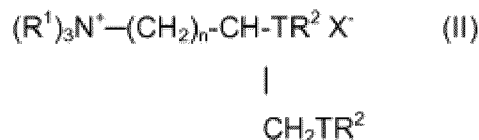
Particularly preferred materials are ester-linked triethanolamine (TEA) quaternary ammonium compounds comprising a mixture of mono-, di- and tri-ester linked components. Typically, TEA-based fabric softening compounds comprise a mixture of mono, di- and tri ester forms of the compound. Preferably the di-ester linked component comprises no more than 70 wt.% of the fabric softening compound, more preferably no more than 60 wt.% e.g., even more preferably no more than 55%, and most preferably no more than 45% of the fabric softening compound. Preferably the monoester component comprises at least 10 wt.% of the fabric softening compound.

A first group of quaternary ammonium compounds (QACs) suitable for use in the method described herein are represented by formula (I):



wherein each R is independently selected from a C5 to C35 alkyl or alkenyl group; R¹ represents a C1 to C4 alkyl, C2 to C4 alkenyl or a C1 to C4 hydroxyalkyl group; T may be either O-CO. (i.e. an ester group bound to R via its carbon atom), or may alternatively be CO-O (i.e. an ester group bound to R via its oxygen atom); n is a number selected from 1 to 4; m is a number selected from 1, 2, or 3; and X⁻ is an anionic counter-ion, such as a halide or alkyl sulphate, e.g. chloride or methylsulphate. Di-esters variants of formula I (i.e., m = 2) are preferred and typically have mono- and tri-ester analogues associated with them. Such materials are particularly suitable for use in the method described herein.

A second group of QACs suitable for use in the method described herein are represented by formula (II):



wherein each R^1 group is independently selected from C1 to C4 alkyl, hydroxyalkyl or C2 to C4 alkenyl groups; and wherein each R^2 group is independently selected from C8 to C28 alkyl or alkenyl groups; and wherein n , T , and X^- are as defined above.

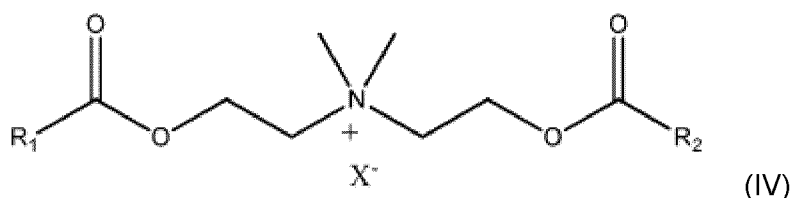
Preferred materials of this second group include 1,2 bis[tallowoyloxy]-3- trimethylammonium propane chloride, 1,2 bis[hardened tallowoyloxy]-3- trimethylammonium propane chloride, 1,2- bis[oleoyloxy]-3-trimethylammonium propane chloride, and 1,2 bis[stearoyloxy]-3- trimethylammonium propane chloride. Such materials are described in US 4, 137,180 (Lever Brothers). Preferably, these materials also comprise an amount of the corresponding mono- ester.

A third group of QACs suitable for use in the method described herein are represented by formula (III):

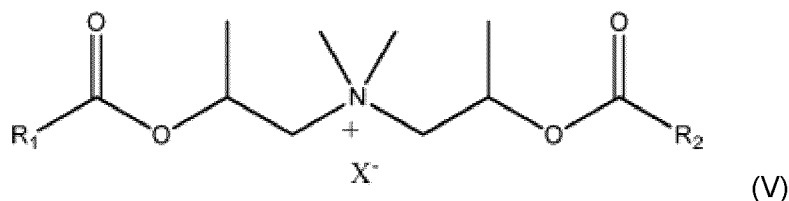


wherein each R^1 group is independently selected from C1 to C4 alkyl, or C2 to C4 alkenyl groups; and wherein each R^2 group is independently selected from C8 to C28 alkyl or alkenyl groups; and n , T , and X^- are as defined above. Preferred materials of this third group include bis(2-tallowoyloxyethyl)dimethyl ammonium chloride, partially hardened and hardened versions thereof.

A fourth group of QACs are represented the by the formula (IV):



A fifth group of QACs suitable for use in the method described herein are represented by formula (V)



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R_1 and R_2 are independently selected from C10 to C22 alkyl or alkenyl groups, preferably C14 to C20 alkyl or alkenyl groups. X^- is as defined above.

The iodine value of the quaternary ammonium fabric conditioning material is preferably from 0 to 80, more preferably from 0 to 60, and most preferably from 0 to 45. The iodine value may be chosen as appropriate. Essentially saturated material having an iodine value of from 0 to 5, preferably from 0 to 1 may be used in the method described herein. Such materials are known as "hardened" quaternary ammonium compounds.

A further preferred range of iodine values is from 20 to 60, preferably 25 to 50, more preferably from 30 to 45. A material of this type is a "soft" triethanolamine quaternary ammonium compound, preferably triethanolamine di-alkylester methylsulfate. Such ester-linked triethanolamine quaternary ammonium compounds comprise unsaturated fatty chains.

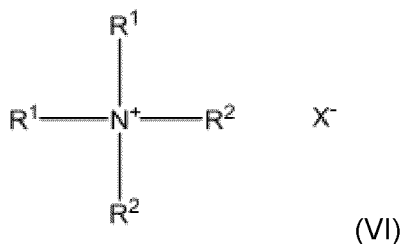
If there is a mixture of quaternary ammonium materials present in the composition, the iodine value, referred to above, represents the mean iodine value of the parent fatty acyl compounds or fatty acids of all the quaternary ammonium materials present. Likewise, if there are any saturated quaternary ammonium materials present in the composition, the iodine value represents the mean iodine value of the parent acyl compounds of fatty acids of all of the quaternary ammonium materials present.

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Iodine value as used in the context of the method described herein refers to, the fatty acid used to produce the QAC, the measurement of the degree of unsaturation present in a material by a method of nmr spectroscopy as described in Anal. Chem., 34, 1136 (1962) Johnson and Shoolery.

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A further type of quaternary ammonium compound may be a non-ester quaternary ammonium material represented by formula (VI):



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wherein each R¹ group is independently selected from C1 to C4 alkyl, hydroxyalkyl or C2 to C4 alkenyl groups; R² group is independently selected from C8 to C28 alkyl or alkenyl groups, and X⁻ is as defined above.

- 10 Preferably the fabric conditioners produced in the method of the method described herein comprise more than 1 wt. % quaternary ammonium compound, more preferably more than 2 wt. % quaternary ammonium compound, most preferably more than 3 wt. % quaternary ammonium compound by weight of the composition. Preferably the fabric conditioners produced in the method described herein comprise less than 18 wt. % quaternary ammonium compound, more
- 15 preferably less than 17 wt. % quaternary ammonium compound, most preferably less than 16 wt. % quaternary ammonium compound by weight of the composition. Suitably the fabric conditioners comprise 1 to 18 wt. % quaternary ammonium compound, preferably 2 to 17 wt. % quaternary ammonium compound and more preferably 3 to 16 wt. % quaternary ammonium compound by weight of the composition.

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The method described here involves adding ingredients to water. The fabric conditioner produced in the method preferably comprises at least 75 wt.% water, i.e. 75 to 98 wt.% water by weight of the composition.

- 25 The method described herein may involve that addition of further ingredients suitable for use in a fabric conditioner. Among such materials there may be mentioned: non-ionic surfactants (such as the addition products of ethylene oxide and/or propylene oxide with fatty alcohols, fatty acids and fatty amines), fatty alcohols, fatty acids, antifoams, insect repellents, shading or hueing dyes, preservatives (e.g. bactericides), pH buffering agents, perfume carriers,
- 30 hydrotropes, anti-redeposition agents, soil-release agents, polyelectrolytes, anti-shrinking agents, anti-wrinkle agents, anti-oxidants, dyes, colorants, sunscreens, anti-corrosion agents,

draped imparting agents, anti-static agents, sequestrants and ironing aids. The products of the method described herein may contain pearlisers and/or opacifiers. A preferred sequestrant is HEDP, an abbreviation for Etidronic acid or 1-hydroxyethane 1,1-diphosphonic acid. Such ingredients may be added at any stage of the preparation method i.e. before the organic acids, or between the addition of the organic acids and the quaternary ammonium compound, or after the addition of the quaternary ammonium compound.

Preferably the method involves the addition of perfume ingredients. Perfume ingredients may be free perfumes and/or encapsulated perfumes (perfume microcapsules). The encapsulating materials, preferably comprise, but are not limited to; aminoplasts, proteins, polyurethanes, polyacrylates, polymethacrylates, polysaccharides, polyamides, polyolefins, gums, silicones, lipids, modified cellulose, polyphosphate, polystyrene, polyesters or combinations thereof. More preferably the encapsulating materials comprise aminoplast, such as melamine formaldehyde or urea formaldehyde microcapsules, proteins and/or polysaccharides. The fabric conditioners produced in the method described herein comprise preferably 0.5 to 20 wt.% perfume ingredients by weight of the composition, more preferably 1 to 15 wt.% perfume materials, most preferably 2 to 10 wt. % perfume materials.

Free perfume and/or perfume microcapsules may be added at any stage of the preparation method i.e. before the organic acids, or between the addition of the organic acids and the quaternary ammonium compound, or after the addition of the quaternary ammonium compound. When both free perfume and perfume microcapsules are present, they may be added at the same stage of the method or at different stages of the method. Preferably free perfume is added after the quaternary ammonium compound. Preferably the free perfume is added after the mixture is cooled below 40°C.

The method described herein involves preparing a fabric conditioner, wherein at least one organic acid or the salts thereof are added to water prior to the addition of a quaternary ammonium compound. Preferably the quaternary ammonium compound is pre-melted prior to addition to the water, more preferably the quaternary ammonium compound is pre-melted at 55-70°C prior to addition to the water. The method described herein may be carried out in batch processing (for example all mixing taking place in one vessel) or continuous processing (for example ingredients being added sequentially along a feed pipe). Mixing is preferably employed in the method. Mixing may be by any suitable means, for example a paddle stirrer in a tank or a static mixer in a feed pipe. Preferably the formulation is stirred after the addition of the

quaternary ammonium compound, mixing may additionally take place at other stages of the method. The water used in the method is preferably maintained at a temperature of 20°C to 55°C, more preferably 30°C to 50°C.

5 Examples

Table 1: Example formulations

	wt.% active	
	1	2
Partially hardened triethanol amine quaternary ammonium compound	6	15
Cetearyl Alcohol	0.5	-
Lactic Acid 88%	0.1	0.1
Sodium Benzoate	0.1	0.2
Perfumes	0.95	2.2
Minors: Antifoam, salt, sequestrant, etc.	<1	<1
Water	To 100	To 100

Process A:

10 Water was heated to 43°C and the minors added with stirring. A premix of the quaternary ammonium compound and fatty alcohol was prepared at ~65°C and the premix added with stirring. The formulation was then cooled to 37°C and the perfume added. Cooling continued and the sodium benzoate and lactic acid added with stirring at 33°C.

15 Process 1:

Water was heated to 43°C and the minors added with stirring. The sodium benzoate and lactic acid were added with stirring. A premix of the quaternary ammonium compound and fatty alcohol was prepared at ~65°C and the premix added with stirring. The formulation was then cooled to 37°C and the perfume added. Cooling continued with stirring until 33°C.

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Each formulation (1 and 2) were prepared by processes 1 and A. The storage stability of the resulting formulations was assessed by their viscosities.

Viscosity was assessed using with a Thermo Scientific Haake RheoStress 1 Model; using a
25 cone & plate (C60/1° geometry) for 30 seconds at 106s⁻¹ shear rate, at a temperature of 25°C.

Table 2: Formula 1 stability

Weeks	Viscosity after 20°C storage (106s ⁻¹)		Viscosity after 40°C storage (106s ⁻¹)	
	Process A	Process 1	Process A	Process 1
0	37	34	37	34
4	-	-	72	30
12	64	36	86	58
16	62	32	-	-
26	75	35	-	-

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Table 3: Formula 2 stability

Weeks	Viscosity after 40°C storage (106s ⁻¹)	
	Process A	Process 1
0	58	49
4	154	56
8	514	149

- 10 Formulations prepared using process 2 maintained their initial viscosity for a longer period of time. These formulations were more stable on storage.

CLAIMS

1. A method of preparing a fabric conditioner comprising quaternary ammonium compound and one or more organic acids or the salts thereof, wherein two or more organic acids or the salts thereof are added to water prior to the addition of a quaternary ammonium compound;
Wherein the organic acids or salts thereof are selected from lactic acid, sodium benzoate, potassium sorbate, and combinations thereof; and
Wherein the composition comprises at least 75 wt.% water.
2. A method according to claim 1, wherein at least two organic acids or the salts thereof are added to water prior to the addition of a quaternary ammonium compound.
3. A method according to any preceding claim, wherein the organic acids comprises carboxylic acids.
4. A method according to any preceding claim, wherein the organic acids or salts thereof comprise the combination of lactic acid and sodium benzoate or the combination of lactic acid and potassium sorbate.
5. A method according to any preceding claim, wherein the composition comprises 0.001 wt.% to 5 wt.% organic acid or salt thereof.
6. A method according to any preceding claim, wherein the quaternary ammonium compound is an ester-linked quaternary ammonium compound.
7. A method according to any preceding claim, wherein the quaternary ammonium compound is pre-melted prior to addition to the water.
8. A method according to any preceding claim, wherein the water is maintained at a temperature of 20°C to 55°C.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2024/050732

A. CLASSIFICATION OF SUBJECT MATTER INV. C11D1/62 C11D3/00 C11D3/20 C11D11/00 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) C11D D06M		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2022/115442 A1 (COLGATE PALMOLIVE CO [US]) 2 June 2022 (2022-06-02) claims examples -----	1-8
A	US 2014/189962 A1 (TOVAR PESCADOR JOSE JAVIER [MX] ET AL) 10 July 2014 (2014-07-10) example -----	1-8
A	GB 1 599 171 A (PROCTER & GAMBLE) 30 September 1981 (1981-09-30) examples 1,10 claims ----- -/-	1-8
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
<p>* Special categories of cited documents :</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance;; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>		
Date of the actual completion of the international search 12 March 2024		Date of mailing of the international search report 26/03/2024
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Neys, Patricia

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2024/050732

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2020/099249 A1 (UNILEVER PLC [GB]; UNILEVER NV [NL]; CONOPCO INC DBA UNILEVER [US]) 22 May 2020 (2020-05-22) example 1 claims -----	1-8
A	WO 2019/142194 A1 (SHARON LABORATORIES LTD [IL]) 25 July 2019 (2019-07-25) table 12 claims 1-19, 28 page 15, paragraph 134 - paragraph 135 -----	1-8

INTERNATIONAL SEARCH REPORT

Information on patent family members

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PCT/EP2024/050732

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