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(54) Title: PACKAGED FABRIC CONDITIONER

(57) Abstract: A packaged fabric conditioner comprising a package and a fabric conditioner composition; the package having an internal volume of 35 ml to 2 liters and a package wall comprising a laminate structure, the laminate structure comprising at least two layers, and wherein the layers are bonded together by polyethylene extrusion; the fabric conditioner composition comprising 1.5 to 10 wt.% perfume.

PACKAGED FABRIC CONDITIONER

Field of the Invention

5 The present application is in the field of flexible packaging for fabric conditioners.

Background of the Invention

10 Fabric conditioners can be sold in flexible packaging, such as pouches. Flexible packaging is commonly formed from a laminate structure. Laminate structures comprise less plastic and provide lighter weight packaging than ridged plastics such as plastic bottles.

15 In the field of fabric conditioners, consumers are desiring higher levels of perfume. This presents a problem in compatibility with traditional flexible packaging materials. In particular, higher levels of perfume in a fabric conditioner can lead to delamination of laminate structures containing the fabric conditioner.

Summary of the Invention

20 It has been found that the selection of specific methods of bonding the layers of a laminate pack will reduce the delamination caused by high perfume levels.

Accordingly in a first aspect of the present invention is provided a packaged fabric conditioner comprising a package and a fabric conditioner composition;

25 the package having an internal volume of 35 ml to 2 liters and a package wall comprising a laminate structure, the laminate structure comprising at least two layers, and wherein the layers are bonded together by polyethylene extrusion;

the fabric conditioner composition comprising 1.5 to 10 wt.% perfume.

Detailed Description of the Invention

30 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.

- 5 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
- 10 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.

As used herein the term "laminate structure" refers to layers bonded together.

15 **Package**

The package described herein has a volume of 35 ml to 2 liters, preferably 50 ml to 1.5 liters, more preferably 100 ml to 1.25 liters.

- 20 The package may have any suitable dimensions. Preferably the width of the package is 100 mm to 400 mm. Preferably the height is 100 mm to 400 mm. Preferably the height is greater than the width.

- The package maybe in the form of a pouch, bag, sachet, gusseted pouch, stand-up pouch,
- 25 tubes, and other known flexible package in the art. The package may preferably have a base portion with allows the package to stand up right.

- The package may preferably have a means for re-sealing the package once open. For example, a neck and cap, preferably a screw cap. Alternatively a zip type opening or an opening sealable
- 30 by compression.

The package comprises a laminate structure. A laminate structure is formed from at least two layers of material. Preferably the laminate structure comprises 2 to 5 layers, most preferably 3 layers.

The material forming each layer may be the same or different. The layers of the laminate structure may be any suitable material. Preferably the layers are polymeric films, more preferably the layers comprise polymeric films selected from: Nylon, Polyethylene terephthalate (PET), metalised polyethylene terephthalate (MPET), Polyethylene (including HPDE and LLDPE) and combinations thereof, even more preferably Polyethylene terephthalate (PET), metalised polyethylene terephthalate (MPET), Polyethylene (including HPDE and LLDPE) and combinations thereof.

The laminate has at least an inner and an outer layer. The outer layer may be printed and may have a matt or gloss effect. The outer layer is preferably polyethylene terephthalate (PET). The inner layer is preferably a polyethylene layer, most preferably linear low density polyethylene (LLDPE). When more than two layers are present, preferably one of the internal layers comprises metalised polyethylene terephthalate (MPET), more preferably aluminum polyethylene terephthalate.

The polymeric films preferably comprise post-consumer recycled resin (PCR). The laminate structure as a whole preferably comprises 30 to 100 wt.% by weight of polymer, PCR.

The layers are bonded together by polyethylene extrusion. Polyethylene extrusion bonding is a known method of bonding polymeric films to form a laminate. When more than two layers are present, all layers are bonded together by polyethylene extrusion. This method of bonding improves the stability (e.g. prevention of delamination) of the packaging in the presence of high levels of perfume.

Preferably the thickness of the laminate structure is 80 to 300 microns, more preferably 100 to 250 microns. One suitable way to assess thickness of films and laminates is by a ProGage™ Thickness Tester, by Thwing-Albert Instrument Company (and in accordance to the manufacture's instructions).

Fabric conditioner

The fabric conditioner compositions described herein comprises 1.5 to 10 wt.% perfume. More preferably the comprise 2 to 8 wt.% perfume and most preferably 2.5 to 6 wt.% perfume.

Particularly preferred perfume components are blooming perfume components and substantive perfume components. Blooming perfume components are defined by a boiling point less than

250°C and a LogP or greater than 2.5. Substantive perfume components are defined by a boiling point greater than 250°C and a LogP greater than 2.5. Boiling point is measured at standard pressure (760 mm Hg). Preferably a perfume composition will comprise a mixture of blooming and substantive perfume components. The perfume composition may comprise other
5 perfume components.

It is commonplace for a plurality of perfume components to be present in a free oil perfume composition. In the compositions for use in the present invention it is envisaged that there will be three or more, preferably four or more, more preferably five or more, most preferably six or
10 more different perfume components. An upper limit of 300 perfume components may be applied.

The fabric conditioners may further comprise 0.1 to 15 wt. % perfume microcapsules, more preferably 0.5 to 8 wt. % perfume microcapsules. The weight of microcapsules is of the material
15 as supplied.

The encapsulating materials, preferably comprise, but are not limited to; aminoplasts, proteins, polyvinyl acetates, polyurethanes, polyacrylates, polymethacrylates, polysaccharides, polyamides, polyolefins, gums, silicones, lipids, modified cellulose, polyphosphate, polystyrene,
20 polyesters or combinations thereof. More preferably the encapsulating materials comprise polyvinyl acetate, proteins, polysaccharides or combinations thereof.

A fabric conditioner is a composition comprising a fabric softening active. Preferably the fabric conditioners of the present invention comprise 1 to 40 wt. % fabric softening active, preferably 2
25 to 30 wt. % fabric softening active and more preferably 3 to 20 wt. % fabric softening active by weight of the composition.

The fabric softening actives may be any material known to soften fabrics. These may be polymeric materials or compounds known to soften materials. Examples of suitable fabric
30 softening actives include: quaternary ammonium compounds, silicone polymers, polysaccharides, clays, amines, fatty esters, fatty acids, fatty alcohols, dispersible polyolefins, polymer latexes and mixtures thereof. Preferably the fabric softening active is cationic or non-ionic, more preferably cationic.

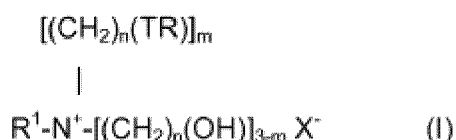
35 The preferred cationic softening actives for use in fabric conditioner compositions of the invention are quaternary ammonium compounds. The quaternary ammonium compound

preferably comprises at least one chain derived from fatty acids, more preferably at least two chains derived from a fatty acids. Generally 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 quaternary ammonium compound 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 quaternary ammonium compound 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.

Preferred quaternary ammonium fabric softening actives for use in compositions of the present invention are ester linked quaternary ammonium compounds or so called "ester quats". Particularly preferred materials are the 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 where the di-ester linked component comprises no more than 70 wt.% of the fabric softening compound, preferably no more than 60 wt.% e.g. no more than 55%, or even no more than 45% of the fabric softening compound and at least 10 wt.% of the monoester linked component.

A first group of quaternary ammonium compounds suitable for use in the present invention is represented by formula (I):

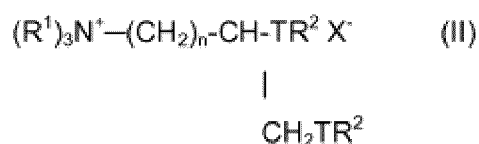


wherein each R is independently selected from a C5 to C35 alkyl or alkenyl group; R¹ represents a C1 to C4 alkyl, C2 to C4 alkenyl or a C1 to C4 hydroxyalkyl group; T may be either O-CO. (i.e. an ester group bound to R via its carbon atom), or may alternatively be CO-O (i.e. an ester group bound to R 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 present invention.

Also suitable are actives rich in the di-esters of triethanolammonium methylsulfate, otherwise referred to as "TEA ester quats".

A second group of quaternary ammonium compounds suitable for use in the invention is represented by formula (II):



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

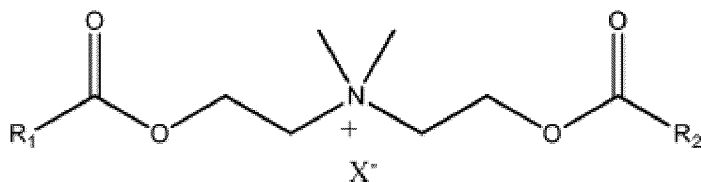
Preferred materials of this second group include 1,2 bis[tallowoyloxy]-3- trimethylammonium propane chloride, 1,2 bis[hardened tallowoyloxy]-3- trimethylammonium propane chloride, 1,2-bis[oleoyloxy]-3-trimethylammonium propane chloride, and 1,2 bis[stearoyloxy]-3-trimethylammonium propane chloride. Such 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 quaternary ammonium compounds suitable for use in the invention is represented by formula (III):



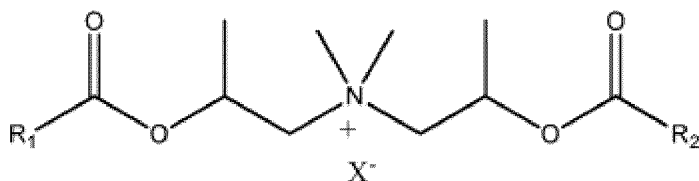
wherein each R¹ group is independently selected from C1 to C4 alkyl, or C2 to C4 alkenyl groups; and wherein each R² group is independently selected from C8 to C28 alkyl or alkenyl groups; and n, T, and X⁻ are as defined above. Preferred materials of this third group include bis(2-tallowoyloxyethyl)dimethyl ammonium chloride, partially hardened and hardened versions thereof.

A particular example of the third group of quaternary ammonium compounds is represented by the formula (IV):



5

A fourth group of quaternary ammonium compounds suitable for use in the invention are represented by formula (V):



10

R1 and R2 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 compositions of the invention. Such materials are known as "hardened" quaternary ammonium compounds.

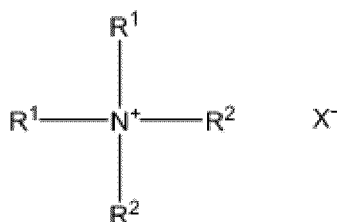
A further preferred range of iodine values is from 20 to 60, preferably 25 to 50, more preferably from 30 to 45. A material of this type is a "soft" triethanolamine quaternary ammonium compound, preferably triethanolamine di-alkylester methylsulfate. Such ester-linked triethanolamine quaternary ammonium 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 of the quaternary ammonium materials present. Likewise, if there is 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.

Iodine value as used in the context of the present invention 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.

5

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



10 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.

The fabric conditioners of the present invention may further comprise a cationic polymer. This refers to polymers having an overall positive charge.

15

The cationic polymer may be naturally derived or synthetic. Examples of suitable cationic polymers include: acrylate polymers, cationic amino resins, cationic urea resins, and cationic polysaccharides, including: cationic celluloses, cationic guar and cationic starches.

20 The cationic polymer of the present invention may be categorised as a polysaccharide-based cationic polymer or non-polysaccharide based cationic polymers.

Suitable cationic polymers include cationically charged protein polymers and polyquaternium series polymers such as PQ-37.

25 The compositions may comprise other ingredients of fabric conditioner liquids as will be known to the person skilled in the art. A non-limiting list of such ingredients include: solvents, antifoams, anti-malodour ingredients, insect repellents, shading or hueing dyes, preservatives (e.g. bactericides), pH buffering agents, perfume carriers, hydrotropes, anti-redeposition agents, soil-release agents, dye transfer inhibitors, polyelectrolytes, anti-shrinking agents, anti-wrinkle
30 agents, anti-oxidants, dyes, colorants, sunscreens, anti-corrosion agents, drape imparting

agents, anti-static agents, oils (e.g. plant based oils and mineral oils), plant extracts, waxes, sugar-esters, silicones, sequestrants, ironing aids, pearlisers or opacifiers.

5 **Examples**

Example 1

Table 1: Example packaging structures

	A	1
Outer layer	Polyethylene terephthalate (PET)	Polyethylene terephthalate (PET) ¹⁰
Bonding	adhesive lamination	Polyethylene (PE) extrude lamination
Middle layer	MPET	MPET
Bonding	adhesive lamination	Polyethylene (PE) extrude lamination
Inner layer	Linear low-density polyethylene (LLDPE)	Linear low-density polyethylene (LLDPE)

15 Packaging structure 1 was demonstrated to be more stable in the presence of a fabric conditioner composition comprising perfume than composition A.

Example 2

20 Pouches were made up with the following packaging structures:

Table 2: Example packaging structures

	B	C	2
Outer layer	PET (10um)	Nylon (15um)	PET (10um)
Bonding	MPET / adhesive lamination (10um)	MPET / adhesive lamination (10um)	Polyethylene (PE) extrude lamination (15um)
Middle layer	LLDPE (90um)	LLDPE (140um)	MPET (10um)
Bonding	-	-	Polyethylene (PE) extrude lamination (15um)
Inner layer	-	-	LLDPE (90um)

PET = polyethylene terephthalate

MPET = metallised PET

25 LLDPE = linear low-density polyethylene

The pouches were filled with the following test formulation:

Table 3: Test formulation for pouch testing

Ingredient	Inclusion level (weight %)
Triethanol amine quaternary surfactant	6.5
Silicone antifoam emulsion	0.010
Hydroxyethane Diphosphonic Acid	0.005
Hydrochloric acid	0.0324
1,2 Benzisothiazolin-3-one	0.016
Alcohol ethoxylate 25EO (Lutensol AT 25)	0.540
Copolymer of Acrylamide & DMAEMA-Methyl Chloride (Flosoft 555)	0.090
Calcium chloride	0.025
Free perfume	5.000
Perfume microcapsules	0.300
Water	90.9816

5 The pouches were placed on store at 65°C for 2 weeks. Following this the packs were removed and dissected to enable visual assessment of the internal structure. Packs exhibiting any evidence of a wrinkled internal structure were deemed to have suffered delamination. Packs exhibiting a dark spot / region in one or more discrete points were deemed to have suffered de-

10 metallisation.

For each pack composition 5 packs were assessed and the results obtained are shown below:

Table 4: Pouch results for de-lamination and de-metallisation, number of samples out of 5 exhibiting failure:

Pack	B	C	2
De-lamination	5/5	2/5	0/5
De-metallisation	0/5	5/5	0/5

20 The use of Polyethylene (PE) extrude lamination in place of adhesive lamination led to a reduced level of de-lamination and / or de-metallisation when compositions comprising high levels of perfume were stored in packaging articles made from example packaging structures according to the invention.

CLAIMS

1. A packaged fabric conditioner comprising a package and a fabric conditioner composition;

the package having an internal volume of 35 ml to 2 liters and a package wall comprising a laminate structure, the laminate structure comprising at least two layers, and wherein the layers are bonded together by polyethylene extrusion;

the fabric conditioner composition comprising 1.5 to 10 wt.% perfume.
2. A packaged fabric conditioner according to claim 1, wherein the laminate structure comprises 2 to 5 layers.
3. A packaged fabric conditioner according to any preceding claim, wherein the width of the package is 100 mm to 400 mm and the height of the package is 100 mm to 400 mm.
4. A packaged fabric conditioner according to any preceding claim, wherein the layers of the laminate structure are polymeric films.
5. A packaged fabric conditioner according to any preceding claim, wherein the layers comprise polymeric films selected from: Polyethylene terephthalate (PET), metalised polyethylene terephthalate (MPET), Polyethylene (including HPDE and LLDPE) and combinations thereof.
6. A packaged fabric conditioner according to any preceding claim, wherein the inner layer comprises polyethylene.
7. A packaged fabric conditioner according to any preceding claim, wherein the outer layer comprises polyethylene terephthalate.
8. A packaged fabric conditioner according to any preceding claim, wherein the laminate structure comprises 2 to 5 layers.
9. A packaged fabric conditioner according claim 8, wherein the laminate structure comprises an internal layer comprising metalised polyethylene terephthalate (MPET).

10. A packaged fabric conditioner according to any preceding claim, wherein the thickness of the laminate structure is 80 to 300 microns.
11. A packaged fabric conditioner according to any preceding claim, wherein the laminate structure comprises 30 to 100 wt.% by weight of polymer, post-consumer recycled plastic (PCR).
12. A packaged composition according to any preceding claim, wherein the fabric conditioner composition comprises 1 to 40 wt.% quaternary ammonium compounds.
13. A packaged composition according to any preceding claim, wherein the fabric conditioner composition further comprises microcapsules.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2024/081859

A. CLASSIFICATION OF SUBJECT MATTER INV. C11D3/00 B65D37/00 C11D17/04 C11D3/50 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 B65D 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	EP 2 588 318 B1 (UNILEVER NV [NL]; UNILEVER PLC [GB]; UNILEVER HINDUSTAN [IN]) 24 December 2014 (2014-12-24) paragraph [0049]; claims 1-10 -----	1 - 13
A	US 4 134 838 A (HOOPER DAVID C ET AL) 16 January 1979 (1979-01-16) column 20, line 55 - column 21, line 10; claims 1-12 -----	1 - 13
A	GB 2 500 917 A (RECKITT & COLMAN OVERSEAS [GB]) 9 October 2013 (2013-10-09) page 10, line 1 - line 4 -----	1 - 13
A	US 2021/130066 A1 (BOHACHE JOSEPH [US] ET AL) 6 May 2021 (2021-05-06) paragraph [0090]; claims 1-15 ----- - / - -	1 - 13
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "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) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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 "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 "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 "&" document member of the same patent family		
Date of the actual completion of the international search 7 January 2025		Date of mailing of the international search report 31/01/2025
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 Richards, Michael

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2024/081859

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	WO 2024/028159 A1 (UNILEVER IP HOLDINGS B V [NL]; UNILEVER GLOBAL IP LTD [GB] ET AL.) 8 February 2024 (2024-02-08) claims 1-14 -----	1 - 13
A,P	WO 2024/028160 A1 (UNILEVER IP HOLDINGS B V [NL]; UNILEVER GLOBAL IP LTD [GB] ET AL.) 8 February 2024 (2024-02-08) claims 1-13 -----	1 - 13

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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