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(54) **Use of fabric conditioning compositions comprising a quaternary ammonium compound**

(57) The use of an ester-linked quaternary ammonium material in a fabric conditioning composition inhibits skew or twist and/or maintains the proportionality of fabrics treated with the composition.

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Description**Field of the Invention**

5 **[0001]** The present invention relates to the use of fabric conditioning compositions. More specifically, the invention relates to the use of fabric softening compositions comprising an ester-linked quaternary ammonium compound to provide shape benefits to fabrics.

Background of the Invention

10 **[0002]** It is well known to provide liquid fabric conditioning compositions which soften in the rinse cycle.

[0003] Such compositions comprise less than 7.5% by weight of softening active, in which case the composition is defined as "dilute", from 7.5% to about 30% by weight of active in which case the compositions are defined as "concentrated" or more than about 30% by weight of active, in which case the composition is defined as "super-concentrated".

15 **[0004]** Concentrated and super-concentrated compositions are desirable since these require less packaging and are therefore environmentally more compatible than dilute or semi-dilute compositions.

[0005] The use of ester-linked quaternary ammonium compounds is particularly desirable due to their inherent biodegradability. Furthermore, the use of substantially fully saturated quaternary ammonium fabric softening compounds is also desirable due to their excellent softening capabilities and because they are more stable to oxidative degradation (which can lead to malodour generation) than partially saturated or fully unsaturated quaternary ammonium softening compounds.

20 **[0006]** It is known that laundering of fabrics, especially in an automatic washing machine, can cause damage to fibres and can cause the treated fabrics to lose their new feel. It is believed that mechanical agitation causes the fibres to lose their ability to move relative to each other, which in turn affects the fabric elasticity and in addition can cause the overall fabric to distort out of its original shape.

25 **[0007]** For some fabrics, especially cottons, these problems are particularly noticeable.

[0008] In addition to softening, fabric conditioning compositions are known to provide benefits, such as anti-wrinkle benefits and even improved elasticity, to fabrics.

30 **[0009]** However, in an environment where automatic washing machines and tumble drying machines are ever more dominant, it is important to address the problem of keeping garments in a shape as close as possible to that of the new garment, in spite of the increased mechanical agitation that garments are subjected to.

[0010] In "Chemistry of the Textiles Industry", Blackie Academic & Professional, 1st Ed., reference is made to rinse conditioner benefits including improved elasticity of knitted cotton which can manifest itself as better "fit" and shape retention during wear.

35 **[0011]** However, this document only teaches that it is a general principle of softeners that they improve elasticity and makes no reference to specific softening agents, nor does this reference elucidate what shape retention is achieved using such conditioners.

[0012] WO 00/24851 (Procter and Gamble) discloses a fabric care composition comprising an effective amount of a fabric improving active based on oligosaccharide.

40 **[0013]** WO 00/42139 (Procter and Gamble) discloses a fabric care composition which comprises about 0.01 to 1% by weight of a fabric softening active, a solvent for improving deposition of the fabric softening active onto fabrics and adjunct materials. The composition is arranged to be directly applied to fabric, e.g. by pouring or spraying. Shape retention is referred to and means a reduction in the likelihood of a fabric treated with the composition wrinkling or losing its ironed shape than a comparable non-treated fabric.

45 **[0014]** WO 00/15748 discloses a fabric care composition for use in the rinse cycle comprising an amide-epichlorhydrin resin or derivative thereof and a silicone. The textile compatible carrier may comprise a cationic fabric softening compound.

[0015] The document discloses that the combination of the amide-epichlorhydrin resin or derivative thereof and the silicone provide dimensional stability, e.g. shrinkage benefits, shape retention and bagginess reduction.

50 **[0016]** Thus, the document teaches that complex mixtures are required to achieve the dimensional stability benefits.

[0017] GB 2259094 (Chemische Fabrik Kreussler & Co GMBH) discloses aftertreatments for washed textiles which comprise polyvinyl alcohol and/or polyvinyl acetate with at least one cationic protein hydrolysate for improving the feel of textiles and reducing shrinkage thereof.

55 **[0018]** Again, this document teaches that complicated adjunct ingredients are required to achieve the desired benefit.

[0019] WO 99/55953 (Procter & Gamble) discloses a fabric wrinkle control compositions comprising shape retention polymers.

[0020] WO 99/57236 (Procter & Gamble) discloses the application of saponins in the reduction of shrinkage on fabric.

[0021] WO 00/29969 (Procter & Gamble) discloses a fabric care composition containing a high molecular weight polyalkyleneimine in order to protect garments from mechanical damage.

[0022] WO 00/49126 (Procter & Gamble) discloses laundry detergent compositions comprising fabric enhancement polyamines.

[0023] WO 01/07556 (Procter & Gamble) discloses compositions comprising XET and a polysaccharide and/or oligosaccharide. The adjuncts are present in order to provide a variety of benefits including anti-shrinkage and shape-retention benefits.

Objects of the Invention

[0024] The present invention seeks to address one or more of the above-mentioned problems, and, to give one or more of the above-mentioned benefits desired by consumers.

[0025] It has surprisingly been found that use of an ester-linked quaternary ammonium fabric softening compound in a fabric conditioning composition can result in the reduction of undesirable twisting or skew of fibres, especially cotton and wool fibres.

[0026] Furthermore, the use of an ester-linked quaternary ammonium fabric softening compound in a fabric conditioning composition can also be used to help maintain the proportionality of fabrics.

Statement of Invention

[0027] In a first aspect of the present invention there is provided the use of an ester-linked fabric softening agent in a fabric conditioning composition to inhibit skew or twisting of a fabric treated with the composition.

[0028] In a further aspect of the present invention, there is provided the use of an ester-linked fabric softening agent in a fabric conditioning composition to maintain the proportionality of fabric treated with the composition.

[0029] In the present invention, the term "comprising" means "including" or "consisting of". That is the steps, components, ingredients, or features to which the term "comprising" refers are not exhaustive.

Detailed Description of the Invention

[0030] In the context of the present invention, fabric skew, which is also referred to herein as twist, is defined as:

"a fabric condition resulting when filling yarns or knitted courses are angularly displaced from a line perpendicular to the edge or side of a fabric"

[0031] Annual Book of ASTM Standards, Vol. 07-02, textiles, 1992, page 169.

[0032] Other names common for skew or twist include spirality and torque.

[0033] Furthermore, in the present invention "proportionality" means:

"the degree to which a fabric retains its initial geometrical form independent of its surface area".

[0034] The compositions of the present invention are preferably rinse conditioner compositions, more preferably aqueous rinse conditioner compositions for use in the rinse cycle of a domestic laundry process.

Fabric Softening Material

[0035] The fabric softening material of the present invention comprises an ester-linked quaternary ammonium material which inhibits (i.e. prevents, slows or even reduces) twist/skew in a treated fabric and helps maintain proportionality of treated fabrics.

[0036] A particularly preferred fabric softening agent comprises at least one mono-ester linked component and at least one tri-ester linked component, since it has been found that ester-linked fabric softening agents can provide better results in terms of skew/twist inhibition than non ester-linked fabric softening agents, especially when the fabric treated comprises cotton.

[0037] By mono-, di- and tri-ester linked components, it is meant that the quaternary ammonium softening material comprises, respectively, a quaternary ammonium compound comprising a single ester-link with a fatty hydrocarbyl chain attached thereto, a quaternary ammonium compound comprising two ester-links each of which has a fatty hydrocarbyl chain attached thereto, and a quaternary ammonium compound comprising three ester-links each of which has a fatty hydrocarbyl chain attached thereto.

[0038] Below is shown typical levels of mono-, di- and tri-ester components in a fabric softening material used in the

compositions of the invention.

Component	% by weight of the raw material (TEA based softener with solvent)
Mono-ester	10-30
Di-ester	30-60
Tri-ester	10-30
Free fatty acid	0.2-1.0
Solvent	10-20

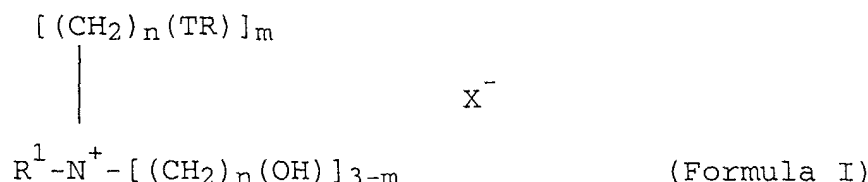
[0039] The level of the mono-ester linked component of the quaternary ammonium material used in the compositions of the invention is preferably between 8 and 40% by weight, based on the total weight of the raw material in which the quaternary ammonium material is supplied.

[0040] The level of the tri-ester linked component is preferably between 20 and 50% based on the total weight of the raw material in which the quaternary ammonium material is supplied.

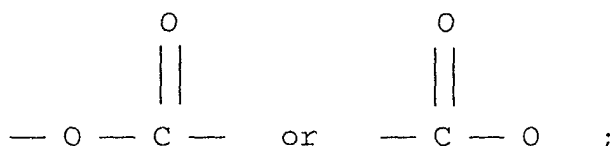
[0041] Preferably, the average chain length of the alkyl or alkenyl group is at least C₁₄, more preferably at least C₁₆. Most preferably at least half of the chains have a length of C₁₈.

[0042] It is generally preferred if the alkyl or alkenyl chains are predominantly linear.

[0043] The preferred ester-linked quaternary ammonium cationic softening material for use in the invention is represented by formula (I):



wherein each R is independently selected from a C₅₋₃₅ alkyl or alkenyl group, R¹ represents a C₁₋₄ alkyl or hydroxyalkyl group or a C₂₋₄ alkenyl group, T is



n is 0 or an integer selected from 1 to 4, m is 1, 2 or 3 and denotes the number of moieties to which it refers that pend directly from the N atom, and X is an anionic group, such as halides or alkyl sulphates, e.g. chloride, methyl sulphate or ethyl sulphate.

[0044] Especially preferred materials within this class are dialkyl and di-alkenyl esters of triethanol ammonium methyl sulphate. Commercial examples of compounds within this formula are Tetranyl® AHT-1 (di-hardened tallowyl ester of triethanol ammonium methyl sulphate 85% active), L1/90 (partially hardened tallow ester of triethanol ammonium methyl sulphate 90% active), and L5/90 (palm ester of triethanol ammonium methyl sulphate 90% active), all ex Kao corporation), Rewoquat WE18 and WE20 (both are partially hardened tallow ester of triethanol ammonium methyl sulphate 90% active), both ex Goldschmidt Corporation and Stepantex VK-90 (partially hardened tallow ester of triethanol ammonium methyl sulphate 90% active), ex Stepan Company).

Iodine Value of the Parent Fatty Acyl group or Acid

[0045] The iodine value of the parent fatty acyl compound or acid from which the quaternary ammonium fabric softening material is formed is from 0 to 20, preferably from 0 to 5, more preferably from 0 to 2. Most preferably the iodine value of the parent fatty acid or acyl group from which the quaternary ammonium fabric softening material is formed is from 0 to 1. That is, it is preferred that the alkyl or alkenyl chains are substantially fully saturated.

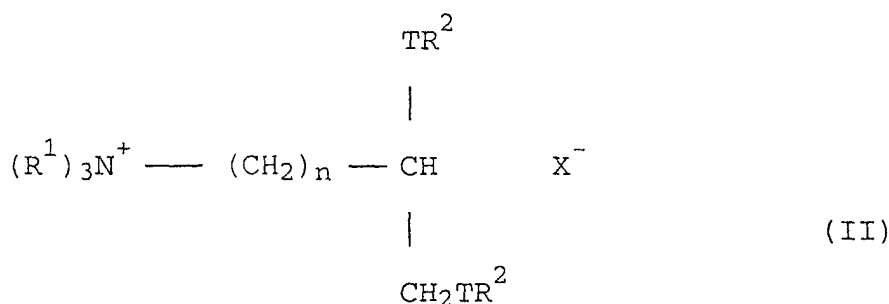
[0046] If there is any unsaturated quaternary ammonium fabric softening material present in the composition, the iodine value, referred to above, represents the mean iodine value of the parent fatty acyl compounds or fatty acids of all of the quaternary ammonium materials present.

[0047] In the context of the present invention, iodine value of the parent fatty acyl compound or acid from which the fabric softening material formed, is defined as the number of grams of iodine which react with 100 grams of the compound.

[0048] In the context of the present invention, the method for calculating the iodine value of a parent fatty acyl compound/acid comprises dissolving a prescribed amount (from 0.1-3 g) into about 15ml chloroform. The dissolved parent fatty acyl compound/fatty acid is then reacted with 25 ml of iodine monochloride in acetic acid solution (0.1 M). To this, 20 ml of 10% potassium iodide solution and about 150 ml deionised water is added. After addition of the halogen has taken place, the excess of iodine monochloride is determined by titration with sodium thiosulphate solution (0.1 M) in the presence of a blue starch indicator powder. At the same time a blank is determined with the same quantity of reagents and under the same conditions. The difference between the volume of sodium thiosulphate used in the blank and that used in the reaction with the parent fatty acyl compound or fatty acid enables the iodine value to be calculated.

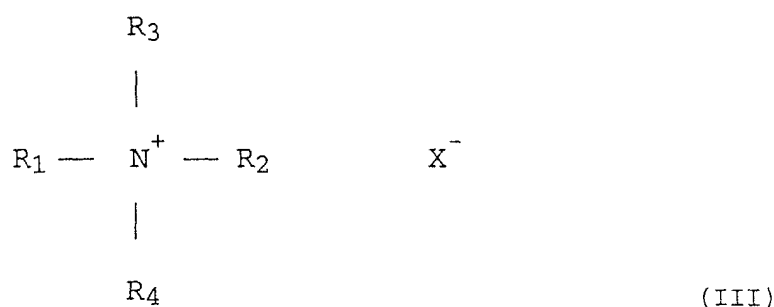
[0049] The quaternary ammonium fabric softening material of formula (I) is present in an amount from 2.5 to 80% by weight of quaternary ammonium material (active ingredient) based on the total weight of the composition, more preferably 3 to 60% by weight, most preferably 3 to 40% by weight.

[0050] Other suitable ester-linked quaternary ammonium fabric softening materials include those having following formula (II):



wherein R^1 , R^2 , T, n and X^- are as defined above.

[0051] Excluded from the present invention are quaternary ammonium materials having no ester linkages present. For instance, quaternary ammonium materials having formula (III) are excluded:



where R_1 to R_4 are not interrupted by ester-links, R_1 and R_2 are C_{8-28} alkyl or alkenyl groups; R_3 and R_4 are C_{1-4} alkyl or C_{2-4} alkenyl groups and X is as defined above.

Fatty Complexing Agent

[0052] The compositions of the present invention preferably comprise a fatty complexing agent. Especially suitable fatty complexing agents include fatty alcohols and fatty acids. Of these, fatty alcohols are most preferred.

[0053] It is particularly preferred that a fatty complexing agent is present when the quaternary ammonium compound is of formula (I).

[0054] Without wishing to be bound by theory, it is believed that the mono-ester quaternary ammonium species of the quaternary ammonium compound of formula (I) complexes with the fatty complexing material in preference to any nonionic surfactant present in the composition and frees the nonionic surfactant to fragment the structure of the composition, providing the composition with reduced particle size and thereby contributing to the surprising reduction in the viscosity of the concentrated composition.

[0055] It is also believed that the higher mono-ester levels present in compositions comprising quaternary ammonium materials based on formula (I) may destabilise the composition through depletion flocculation. By using the fatty complexing material to complex with the mono-ester component, depletion flocculation is significantly reduced.

[0056] In other words, the fatty component at the increased levels, as required by the present invention, "neutralises" the mono-ester component of the quaternary ammonium material. The applicants also believe that the complexing of the mono-ester linked component (which does not contribute to softening) with the fatty complexing material thereby provides a material which does contribute to softening.

[0057] Preferred fatty acids include hardened tallow fatty acid (available under the tradename Pristerene, ex Uniqema).

[0058] Preferred fatty alcohols include hardened tallow alcohol (available under the tradenames Stenol and Hydrenol, ex Cognis and Laurex CS, ex Albright and Wilson) and behenyl alcohol, a C_{22} chain alcohol, available as Lanette 22 (ex Henkel).

[0059] The fatty complexing agent is preferably present in an amount greater than 1.5% to 15% by weight based on the total weight of the composition. More preferably, the fatty component is present in an amount of from 1.6 to 10%, most preferably from 1.7 to 5%, e.g. 1.8 to 4% by weight.

[0060] If the quaternary ammonium compound is of formula (I), then the weight ratio of the mono-ester component of the quaternary ammonium fabric softening material to the fatty complexing agent is preferably from 5:1 to 1:5, more preferably 4:1 to 1:4, most preferably 3:1 to 1:3, e.g. 2:1 to 1:2.

Calculation of Mono-ester Linked Component of the Quaternary Ammonium Material of formula (I)

[0061] The quantitative analysis of mono-ester linked component of the quaternary ammonium material is carried out through the use of Quantitative ^{13}C NMR spectroscopy with inverse gated 1H decoupling scheme.

[0062] The sample of known mass of the quaternary ammonium raw material is first dissolved in a known volume of $CDCl_3$ along with a known amount of an assay material such as naphthalene. A ^{13}C NMR spectrum of this solution is then recorded using both an inverse gated decoupling scheme and a relaxation agent. The inverse gated decoupling scheme is used to ensure that any Overhauser effects are suppressed whilst the relaxation agent is used to ensure that the negative consequences of the long t_1 relaxation times are overcome (i.e. adequate signal-to-noise can be achieved in a reasonable timescale).

[0063] The signal intensities of characteristic peaks of both the carbon atoms in the quaternary ammonium material and the naphthalene are used to calculate the concentration of the mono-ester linked component of the quaternary ammonium material. In the quaternary ammonium material, the signal represents the carbon of the nitrogen-methyl group on the quaternary ammonium head group. The chemical shift of the nitrogen-methyl group varies slightly due to the different degree of esterification; characteristic chemical shifts for the mono-, di- and tri-ester links are 48.28, 47.97 and 47.76 ppm respectively. Any of the peaks due to the naphthalene carbons that are free of interference from other components can then be used to calculate the mass of mono-ester linked component present in the sample as follows: -

$$\text{Mass}_{MQ} \text{ (mg/ml)} = \frac{(\text{mass}_{Naph} \times I_{MQ} \times N_{Naph} \times M_{MQ})}{(I_{Naph} \times N_{MQ} \times M_{Naph})}$$

where Mass_{MQ} = mass mono-ester linked quaternary ammonium material in mg/ml, mass_{Naph} = mass naphthalene in mg/ml, I = peak intensity, N = number of contributing nuclei and M = relative molecular mass. The relative molecular

mass of naphthalene used is 128.17 and the relative molecular mass of the mono-ester linked component of the quaternary ammonium material is taken as 526.

[0064] The weight percentage of mono-ester linked quaternary ammonium material in the raw material can thus be calculated:

$$\% \text{ of mono-ester linked quaternary ammonium material in the raw material} = (\text{mass}_{\text{MQ}} / \text{mass}_{\text{HT-TEA}}) \times 100$$

where $\text{mass}_{\text{HT-TEA}}$ = mass of the quaternary ammonium material and both mass_{MQ} and $\text{mass}_{\text{HT-TEA}}$ are expressed as mg/ml.

[0065] For a discussion of the NMR technique, see "100 and More Basic NMR Experiments", S Braun, H-O Kalinowski, S Berger, 1st edition, pages 234-236.

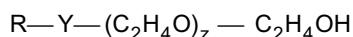
Nonionic Surfactant

[0066] It is preferred that the compositions further comprise a nonionic surfactant. Typically these can be included for the purpose of stabilising the compositions.

[0067] Suitable nonionic surfactants include addition products of ethylene oxide and/or propylene oxide with fatty alcohols, fatty acids and fatty amines.

[0068] Any of the alkoxyated materials of the particular type described hereinafter can be used as the nonionic surfactant.

[0069] Suitable surfactants are substantially water soluble surfactants of the general formula:



where R is selected from the group consisting of primary, secondary and branched chain alkyl and/or acyl hydrocarbyl groups; primary, secondary and branched chain alkenyl hydrocarbyl groups; and primary, secondary and branched chain alkenyl-substituted phenolic hydrocarbyl groups; the hydrocarbyl groups having a chain length of from 8 to about 25, preferably 10 to 20, e.g. 14 to 18 carbon atoms.

[0070] In the general formula for the ethoxylated nonionic surfactant, Y is typically:

--O-- , --C(O)O-- , --C(O)N(R)-- or --C(O)N(R)R--

in which R has the meaning given above or can be hydrogen; and Z is at least about 8, preferably at least about 10 or 11.

[0071] Preferably the nonionic surfactant has an HLB of from about 7 to about 20, more preferably from 10 to 18, e.g. 12 to 16.

[0072] Examples of nonionic surfactants follow. In the examples, the integer defines the number of ethoxy (EO) groups in the molecule.

A. Straight-Chain, Primary Alcohol Alkoxylates

[0073] The deca-, undeca-, dodeca-, tetradeca-, and pentadecaethoxylates of n-hexadecanol, and n-octadecanol having an HLB within the range recited herein are useful viscosity/dispersibility modifiers in the context of this invention. Exemplary ethoxylated primary alcohols useful herein as the viscosity/dispersibility modifiers of the compositions are C_{18} EO(10); and C_{18} EO(11). The ethoxylates of mixed natural or synthetic alcohols in the "tallow" chain length range are also useful herein. Specific examples of such materials include tallow alcohol-EO(11), tallow alcohol-EO(18), and tallow alcohol-EO (25), coco alcohol-EO(10), coco alcohol-EO(15), coco alcohol-EO(20) and coco alcohol-EO(25).

B. Straight-Chain, Secondary Alcohol Alkoxylates

[0074] The deca-, undeca-, dodeca-, tetradeca-, pentadeca-, octadeca-, and nonadeca-ethoxylates of 3-hexadecanol, 2-octadecanol, 4-eicosanol, and 5-eicosanol having an HLB within the range recited herein are useful viscosity and/or dispersibility modifiers in the context of this invention. Exemplary ethoxylated secondary alcohols useful herein as the viscosity and/or dispersibility modifiers of the compositions are: C_{16} EO(11); C_{20} EO(11); and C_{16} EO(14).

C. Alkyl Phenol Alkoxylates

[0075] As in the case of the alcohol alkoxylates, the hexa- to octadeca-ethoxylates of alkylated phenols, particularly

monohydric alkylphenols, having an HLB within the range recited herein are useful as the viscosity and/or dispersibility modifiers of the instant compositions. The hexa- to octadeca-ethoxylates of p-tri-decylphenol, m-pentadecylphenol, and the like, are useful herein. Exemplary ethoxylated alkylphenols useful as the viscosity and/or dispersibility modifiers of the mixtures herein are: p-tridecylphenol EO(11) and p-pentadecylphenol EO(18).

[0076] As used herein and as generally recognized in the art, a phenylene group in the nonionic formula is the equivalent of an alkylene group containing from 2 to 4 carbon atoms. For present purposes, nonionics containing a phenylene group are considered to contain an equivalent number of carbon atoms calculated as the sum of the carbon atoms in the alkyl group plus about 3.3 carbon atoms for each phenylene group.

D. Olefinic Alkoxylates

[0077] The alkenyl alcohols, both primary and secondary, and alkenyl phenols corresponding to those disclosed immediately hereinabove can be ethoxylated to an HLB within the range recited herein and used as the viscosity and/or dispersibility modifiers of the instant compositions.

E. Branched Chain Alkoxylates

[0078] Branched chain primary and secondary alcohols which are available from the well-known "OXO" process can be ethoxylated and employed as the viscosity and/or dispersibility modifiers of compositions herein.

F. Polyol Based Surfactants

[0079] Suitable polyol based surfactants include sucrose esters, also referred to herein as oily sugar derivatives, such sucrose tetraoleates, alkyl polyglucosides such as stearyl monoglucosides and stearyl triglucoside and alkyl polyglycerols.

[0080] Suitable oily sugar derivatives, their methods of manufacture and the preferred amounts of such components are described in WO-A1-01/46361 on page 5 line 16 to page 11 line 20, the disclosure of which is incorporated herein.

[0081] It has been found that when the fabric softening agent is partially replaced by a sucrose polyester in the composition or a sucrose polyester is present in addition to an fabric softening agent already present, inhibition of skew/twist and dimensional proportionality of fabrics can be further improved.

[0082] The above nonionic surfactants are useful in the present compositions alone or in combination, and the term "nonionic surfactant" encompasses mixed nonionic surface active agents.

[0083] The nonionic surfactant is present in an amount from 0.01 to 10%, more preferably 0.1 to 5%, most preferably 0.35 to 3.5%, e.g. 0.5 to 2% by weight, based on the total weight of the composition.

Polymeric Rheology Modifiers

[0084] It is preferred that the compositions further comprise one or more polymeric rheology modifiers. Especially preferred polymeric rheology modifiers are as defined in US 6271192 from column 3 line 48 to column 5 line 50, the contents of which are incorporated herein, since it has been surprisingly found that such polymeric materials can improve shape retention characteristics of fabrics.

Perfume

[0085] The compositions of the invention preferably comprise one or more perfumes.

[0086] The hydrophobicity of the perfume and oily perfume carrier are measured by ClogP. ClogP is calculated using the "ClogP" program (calculation of hydrophobicities as logP (oil/water)) version 4.01, available from Daylight Chemical Information Systems Inc of Irvine California, USA.

[0087] It is well known that perfume is provided as a mixture of various components.

[0088] It is preferred that at least a quarter (by weight) or more, preferably a half or more of the perfume components have a ClogP of 2.0 or more, more preferably 3.0 or more, most preferably 4.5 or more, e.g. 10 or more.

[0089] Suitable perfumes having a ClogP of 3 or more are disclosed in US 5500137.

[0090] The perfume is preferably present in an amount from 0.01 to 10% by weight, more preferably 0.05 to 5% by weight, most preferably 0.5 to 4.0% by weight, based on the total weight of the composition.

Liquid Carrier

[0091] The liquid carrier employed in the instant compositions is preferably water due to its low cost relative availa-

bility, safety, and environmental compatibility. The level of water in the liquid carrier is more than about 50%, preferably more than about 80%, more preferably more than about 85%, by weight of the carrier. The level of liquid carrier is greater than about 50%, preferably greater than about 65%, more preferably greater than about 70%. Mixtures of water and an organic solvent having a low molecular weight, e.g. less than 100, are particularly desirable. Suitable low molecular weight solvents include C₂-C₅ alcohols, e.g. ethanol, propanol, isopropanol, butanol or pentanol. Low molecular weight alcohols including dihydric (glycol, etc.) trihydric (glycerol, etc.), and polyhydric (polyols) alcohols are also suitable carriers for use in the compositions of the present invention.

Co-active Softeners

[0092] Co-active softeners for the cationic surfactant may also be incorporated in an amount from 0.01 to 20% by weight, more preferably 0.05 to 10%, based on the total weight of the composition. Preferred co-active softeners include fatty esters, and fatty N-oxides.

[0093] Preferred fatty esters include fatty monoesters, such as glycerol monostearate. If GMS is present, then it is preferred that the level of GMS in the composition, is from 0.01 to 10 wt%, based on the total weight of the composition.

Other Polymeric Viscosity Control Agents

[0094] It is useful, though not essential, if the compositions comprise one or more polymeric viscosity control agents. Suitable polymeric viscosity control agents include nonionic and cationic polymers, such as hydrophobically modified cellulose ethers (e.g. Natrosol Plus, ex Hercules), cationically modified starches (e.g. Softgel BDA and Softgel BD, both ex Avebe). A particularly preferred viscosity control agent is a copolymer of methacrylate and cationic acrylamide available under the tradename Flosoft 200 (ex SNF Floerger).

[0095] Nonionic and/or cationic polymers are preferably present in an amount of 0.01 to 5wt%, more preferably 0.02 to 4wt%, based on the total weight of the composition.

Further Optional Ingredients

[0096] Other optional nonionic softeners, bactericides, soil-releases agents may also be incorporated in the compositions of the invention.

[0097] The compositions may also contain one or more optional ingredients conventionally included in fabric conditioning compositions such as pH buffering agents, perfume carriers, fluorescers, colourants, hydrotropes, antifoaming agents, antiredeposition agents, polyelectrolytes, enzymes, optical brightening agents, anti-shrinking agents, anti-wrinkle agents, anti-spotting agents, antioxidants, shape retention polymers, sunscreens, anti-corrosion agents, drape imparting agents, anti-static agents, ironing aids and dyes.

Product Form

[0098] In its undiluted state at 20°C the product comprises an aqueous liquid.

[0099] The compositions are preferably aqueous lamellar phase dispersions of the quaternary ammonium softening material.

Product Use

[0100] The composition is preferably used in the rinse cycle of a home textile laundering operation, where, it may be added directly in an undiluted state to a washing machine, e.g. through a dispenser drawer or, for a top-loading washing machine, directly into the drum. Alternatively, it can be diluted prior to use. The compositions may also be used in a domestic hand-washing laundry operation.

[0101] It is also possible, though less desirable, for the compositions of the present invention to be used in industrial laundry operations, e.g. as a finishing agent for treating new clothes prior to sale to consumers.

Preparation

[0102] The compositions of the invention may be prepared according to any suitable method.

[0103] In a first preferred method, the quaternary ammonium material, fatty complexing agent, nonionic stabilising agent and perfume are heated together until a co-melt is formed. Water is then heated and the co-melt is added to water with stirring. The mixture is then allowed to cool. In an alternative method, the perfume can be added to the mixture after the co-melt is formed, e.g. at any time during the cooling stage.

Fabrics To Be Treated

[0104] The fabrics which may be treated include those which comprise cellulosic fibres, preferably from 1% to 100% cellulosic fibres (more preferably 5% to 100% cellulosic fibres, most preferably 40% to 100%). The fabric may be in the form of a garment, in which case the method of the invention may represent a method of laundering a garment. When the fabric contains less than 100% cellulosic fibres, the balance comprises other fibres or blends of fibres suitable for use in garments such as polyester, for example. Preferably, the cellulosic fibres are of cotton or regenerated cellulose such as viscose.

[0105] Surprisingly, it has been found that ester-linked quaternary ammonium softening compounds provide better skew/twist reduction results than non-ester linked quaternary ammonium softening compounds when the material comprises 40 to 100% cellulosic fibres.

Examples

[0106] The invention will now be illustrated by the following nonlimiting examples. Further modifications will be apparent to the person skilled in the art.

[0107] Samples of the invention are represented by a number. Comparative samples are represented by a letter.

[0108] All values are % by weight of the active ingredient unless stated otherwise.

[0109] Sample 1 is an aqueous dispersion of 5% by weight dialkyl dimethyl ammonium chloride (available as Arquad 2HT ex Akzo), the balance being water.

[0110] Sample 2 is an aqueous dispersion of 3.75% by weight of triethanolamine methyl sulphate (available as Tetranyl AHT1 ex. Kao), 1.25% by weight of sucrose tetraerucate (available as Ryoto ER290), and 0.75% by weight of Coco 20EO (available as Genapol C200, ex Clariant), the balance being water.

[0111] Sample 3 is an aqueous dispersion of 5% by weight of triethanolamine methyl sulphate (available as Tetranyl AHT-1, ex Kao), the balance being water.

[0112] Sample 4 is dilute Comfort, purchased in UK, January 2001.

[0113] Samples 1 and 3 were prepared by heating the cationic softening active to above its melting temperature, adding the melt to heated water, stirring the mixture and allowing it to cool.

[0114] Sample 2 was prepared by heating the cationic softening active, the sugar ester softening active and ethoxylated nonionic surfactant to above the melting temperature of the cationic softening material, adding the melt to heated water, stirring the mixture and allowing it to cool.

Wash Conditions

[0115] A cotton load was composed of cotton interlock monitors and cotton sheeting as ballast to a weight of 2.5 kg. The load was washed in a Zanussi Jetstream 1200 on a 40°C cotton cycle using 108 g Persil (trade name) Non-Biological Powder and then rinsed in either a 91 g dose of samples 1 to 3 or just water.

[0116] The wool load was composed of wool monitors and knitted acrylic as ballast to a weight of 1.5 kg. The load was washed in a Zanussi Jetstream 1200 on a 40°C wool cycle using 85 g Persil Silk and Wool (trade name) powder and a 91 g dose of 5% active cationic dispersion.

[0117] The garment load was composed of the garment together with wool monitors and knitted acrylic as ballast to a weight of 1.5 kg. The load was washed in a Miele 820 on a 40°C wool cycle using 85 g Persil Silk and Wool (trade name) powder and a 91 g dose of 5% active cationic dispersion.

[0118] The monitors/garments were either dried using a Miele Novotronic T436 tumble dryer or were line dried or dried flat as indicated.

[0119] All monitors were evaluated for their proportionality and skew/twist. The garment was evaluated for its skew/twist.

Example 1; Evaluation of Proportionality of Treated Fabrics

Proportionality was evaluated as follows:

[0120] Monitors (approx. 35 x 35 cm) were cut and conditioned at 20°C and 65% R.H. for 24 hours. The cloths were then marked with a 20 x 20 square in indelible marker pen and their dimensions recorded (1,2,3,4, Fig 1).

[0121] The monitors were then washed and conditioned before each one was re-measured (1',2',3',4', Fig 2).

Figure 1

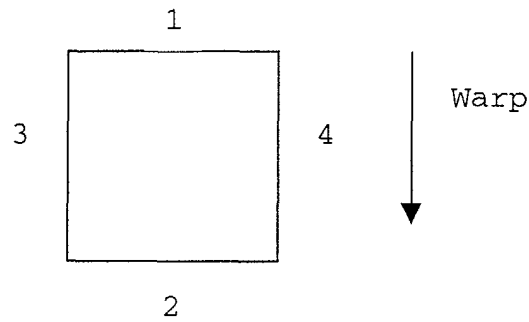
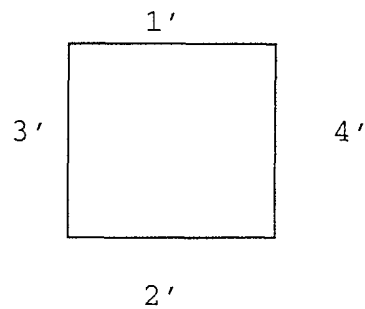


Figure 2



[0122] The proportionality was compared after each wash with the dimensions of the original square, based on the following formula:

Proportionality = ratio of sides after a specified number of washes minus the original ratio of the sides.

where the ratio of sides = $(1+2)/(3+4)$ for the unwashed monitor and $(1'+2')/(3'+4')$ for the washed monitor.

[0123] A result of 0 denotes that proportionality is maintained whereas a higher number denotes that the monitor is more out of shape.

[0124] The results for 100% cotton interlock monitors which were dried under various conditions following laundry treatment are given in tables 1 and 2 below:

Table 1;

Line Dried Monitors		
Rinse Treatment	Wash Number	Proportionality
Water	Wash 1	0.1048
Sample 1	Wash 1	0.0843
Sample 2	Wash 1	0.0785
Sample 3	Wash 1	0.0856

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Table 1; (continued)

Line Dried Monitors		
Rinse Treatment	Wash Number	Proportionality
Water	Wash 5	0.1706
Sample 1	Wash 5	0.1482
Sample 2	Wash 5	0.1377
Sample 3	Wash 5	0.1381

Table 2;

Machine Tumble Dried Monitors		
Rinse Treatment	Wash Number	Proportionality
Water	Wash 1	0.1199
Sample 1	Wash 1	0.0923
Sample 2	Wash 1	0.0900
Sample 3	Wash 1	0.0948
Water	Wash 5	0.1831
Sample 1	Wash 5	0.1386
Sample 2	Wash 5	0.1372
Sample 3	Wash 5	0.1381

Example 2; Evaluation of Skew of Treated Fabrics

[0125] Skew measurements were made using AATCC method 179 - 1995. The measure was performed on the same monitors as those used to measure proportionality.

Figure 3



Original

After Washing

[0126] Skew is calculated using Option 1 from the AATCC method 179, as described in Textile Testing and Analysis, B.J. Collier and H.H. Epps, Merrill Prentice Hall, New Jersey, 1999 pages 174-175 wherein:

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$$\text{Degree of skew/twist} = 100[2(A'C'-B'D')/(A'C'+B'D')]$$

[0127] Skew to the left gives positive data, whereas negative data represents a skew to the right. For the purpose of this evaluation, the degree of skew is most important.

Therefore, all results are given as positive readings irrespective of the direction of skew.

[0128] The results are given in the following tables. Samples 1 to 4 are as described above.

Table 3;

Machine Tumble Dried, 100% Cotton Interlock Monitors		
Rinse Treatment	Wash Number	Degree of Skew
Water	Wash 1	3.8390
Sample 1	Wash 1	3.3554
Sample 2	Wash 1	2.6892
Sample 3	Wash 1	2.8566
Water	Wash 5	5.6742
Sample 1	Wash 5	5.0999
Sample 2	Wash 5	4.9091
Sample 3	Wash 5	3.6710

Table 4;

Line Dried, Woven Wool Monitors		
Rinse Treatment	Wash Number	Degree of Skew
Water	Wash 1	2.5839
Sample 1	Wash 1	1.8590
Sample 2	Wash 1	1.7212
Sample 3	Wash 1	1.5959
Water	Wash 5	1.9015
Sample 1	Wash 5	0.6627
Sample 2	Wash 5	1.4250
Sample 3	Wash 5	0.8493

[0129] A pullover comprising 50% wool, 40% acrylic and 10% polyacrylamide (purchased from Marks & Spencer (tradename), U.K.) was also evaluated for skew using the method of evaluation described above.

Table 5;

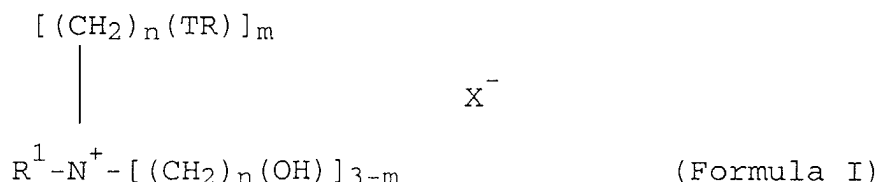
Dried Flat, Pullover		
Rinse Treatment	Wash Number	Degree of Skew
Water	Wash 5	12.87
Sample 4	Wash 5	0.39
Water	Wash 10	4.40
Sample 4	Wash 10	0.38

[0130] The results in these tables demonstrate that the degree of skew is significantly reduced when the monitor/garment is treated with a fabric softening composition comprising a quaternary ammonium fabric softening compound

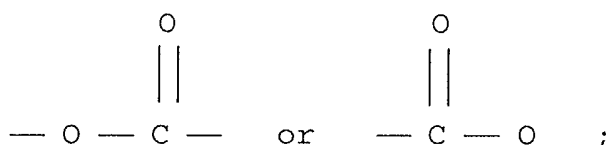
as the active ingredient.

Claims

1. Use of an ester-linked quaternary ammonium compound in a fabric conditioning composition to inhibit skew or twist in a fabric treated with the fabric conditioning composition.
2. Use of an ester-linked quaternary ammonium compound in a fabric conditioning composition to maintain proportionality of fabrics treated with the fabric conditioning composition.
3. Use as claimed in either claim 1 or claim 2 wherein the quaternary ammonium compound comprises a di-ester linked quaternary ammonium material.
4. Use as claimed in any one of claims 1 to 3 wherein the quaternary ammonium compound comprises a mixture of mono-, di- and tri-ester linked quaternary ammonium materials.
5. Use as claimed in any one of claims 1 to 4 wherein the quaternary ammonium cationic softening material is represented by formula (I):



wherein each R is independently selected from a C₅₋₃₅ alkyl or alkenyl group, R¹ represents a C₁₋₄ alkyl or hydroxyalkyl group or a C₂₋₄ alkenyl group, T is



n is 0 or an integer selected from 1 to 4, m is 1, 2 or 3 and denotes the number of moieties to which it refers that pend directly from the N atom, and X is an anionic group, such as halides or alkyl sulphates, e.g. chloride, methyl sulphate or ethyl sulphate.

6. Use as claimed in any one of claims 1 to 5 wherein the fabric treated comprises 40 to 100% cellulosic fibres.
7. Use as claimed in any one of claims 1 to 6 wherein the composition further comprises an oily sugar derivative.
8. Use as claimed in any one of claims 1 to 7 wherein the composition further comprises one or more polymeric rheology modifiers.
9. Use as claimed in any one of claims 1 to 8 wherein the composition further comprises a fatty complexing agent for the quaternary ammonium material.
10. Use as claimed in any one of claims 1 to 9 wherein the quaternary ammonium material is present in an amount

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from 2.5% to 80% by weight based on the total weight of the composition.

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European Patent
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EUROPEAN SEARCH REPORT

Application Number
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