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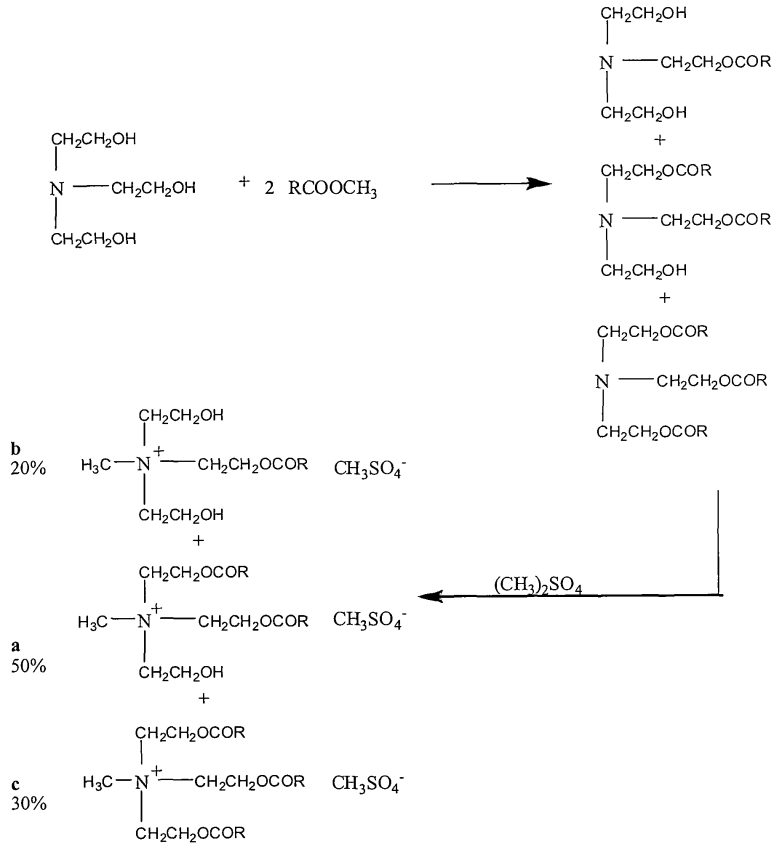
(54) **Use of fabric softener to minimize loss of reslient properties in a fabric**

(57) Use of fabric softener to minimize the loss of at least one resilience property of a fabric by contacting the fabric with fabric softener.

Figure 1. Synthesis of Triethanolamine Esterquat



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Description

BACKGROUND OF THE INVENTION

[0001] Over time and with repeated use and washing, elastic fabric may lose some of its resilience properties. The fabric may become more difficult to stretch, lose its shape, or lose the ability to recover from stretch.

BRIEF SUMMARY OF THE INVENTION

[0002] In various embodiments, the present invention provides for the use of fabric softener to minimize the loss of at least one resilience property of a fabric by contacting the fabric with fabric softener.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003]

Figure 1 shows the synthesis of a triethanolamine esterquat in certain embodiments of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0004] It has been found that use of fabric softeners may minimize the loss of at least one resilience property of a fabric by contacting the fabric with a fabric softener. In general, fabric may lose a degree of its resilience properties after washing and wearing. In some embodiments of the present invention, a fabric's loss of resilience properties after washing and wearing is minimized when the fabric is contacted with a fabric softener. In such instances, a fabric maintains a greater degree of one or more of its resilience properties after washing and wearing when contacted with a fabric softener, compared to a fabric after the same amount of washing and wearing but without contact with a fabric softener.

[0005] Each of the fabric to be treated, the treatment products, and use of the treatment are hereafter described.

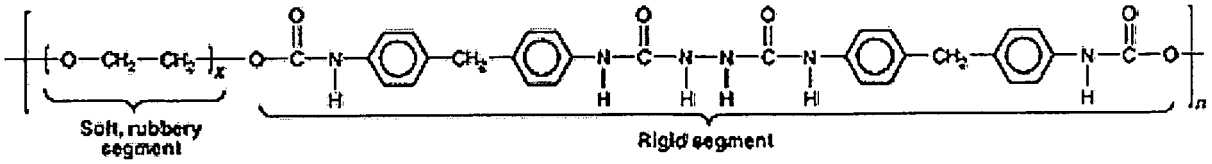
Fabric to Be Treated

[0006] The present invention relates to the treatment of various types of fabrics in a manner as described below. In some embodiments, a fabric to be treated may include natural fiber. In certain embodiments, a fabric may include synthetic fiber, and/or a combination of natural and synthetic fiber. In certain embodiments, a fabric may include cotton, such as cotton interlock knit. In certain embodiments, a fabric may include elastic fiber.

[0007] In some embodiments, a fabric may include spandex based or elastane based fiber. "spandex" or "elastane" are generic names that refer to a manufactured fiber in which the fiber forming substance is a long chain synthetic polymer compound. The term "spandex" is used in the United States, and the term "elastane" is used in Europe. In some embodiments, the manufactured fiber includes at least 85% of a segmented polyurethane. In some embodiments, a fabric may include elastane fibers mixed with other fibers such as cotton, polyamide, wool, polyester, or acrylics. In various embodiments, the fabric contains 0.5% by weight to 50% by weight, 1% to 35% by weight, or 1.5% to 30% by weight of elastane fibers.

[0008] A polymer that is spun into elastane fibers is typically a copolymer incorporating, for example, urethane linkages. Certain polymers to be treated may contain soft segments (i.e., lower melting) and hard segments (i.e., higher melting). Elastane fibers with poly(tetramethylene)ethers as the soft segments are marketed by Invista under the registered trademark LYCRA®. Elastane, Spandex and LYCRA® fibers are made of two types of segments - polyurethane to secure the strength and robustness of the fibers, and polyalkylene ethers to secure the elasticity.

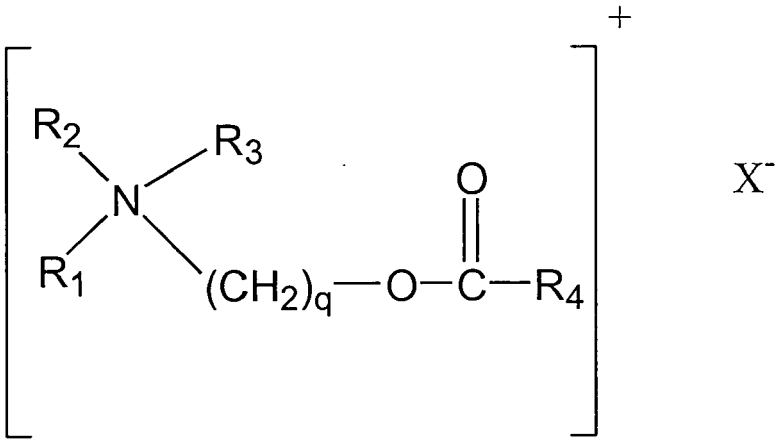
[0009] In various embodiments, soft segments may include polyalkylene ethers or polyesters. In some embodiments, hard segments may be derived from the reaction of an isocyanate and a chain extender. In some embodiments, hard segments may include a diamine.



Fabric softeners

[0010] Suitable fabric softeners for use in the present invention include one or more products containing an quaternary ammonium fabric softener. In certain embodiments, the fabric softener is an esterquat fabric softener. The fabric softener may be in any acceptable form, including, for example, a solid, liquid, powder, spray, sheet, bar, stick, tablet, mousse, or gel, or combination of any of the foregoing.

[0011] In certain embodiments, a fabric softener may be contacted with a fabric prior to washing, during washing, prior to drying, during drying, or after drying. In one embodiment, the fabric softener is an esterquat fabric softener having the following structure:

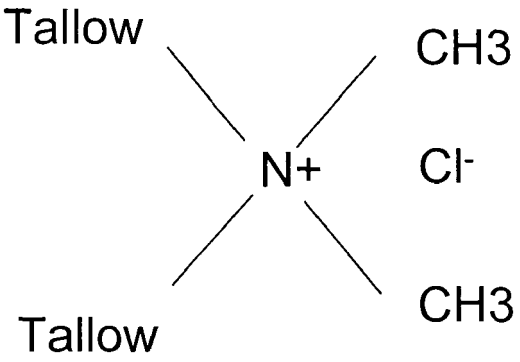


wherein

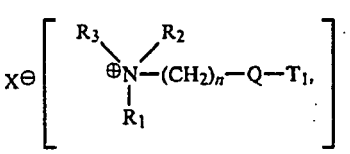
R_4 represents an aliphatic hydrocarbon group having 8 to 22 carbon atoms,
R_2 and R_3 each independently represent $\{(CH_2)_s$-R_5 wherein R_5 represents an alkoxy carbonyl group containing 8 to 22 carbon atoms, benzyl, phenyl, (C_1-C_4)-alkyl substituted phenyl, OH or H}; or
R_2 and R_3 are each independently represented by the structure defined by R_1;
R_1 represents $(CH_2)_tR_6$ where R_6 represents benzyl, phenyl, (C_1-C_4)-alkyl substituted phenyl, OH or H;
q, s, and t each independently, represent an integer 1 to 3; and
X^- is a softener anion.

[0012] In certain embodiments, the esterquat is produced by reacting two moles of fatty acid methyl ester with one mole of triethanolamine followed by quaternization with dimethyl sulfate, as described in United States Patent No. 3,915,867. The reaction products are approximately 50% diesterquat (a) material, 20% monoester (b) and 30% triester (c), as shown in Figure 1._In Figure 1, R is a C_8-C_{22} alkyl chain that may be saturated, non-saturated or partially saturated. It is commercially available from, e.g., Kao Corp. as TETRANYL AT1-75™. Furthermore, for the purposes of the present disclosure, the above reaction product mixture of triethanolamine esterquat is often referred to simply as esterquat.

[0013] In certain embodiments, the quaternary ammonium fabric softener is of the formula:

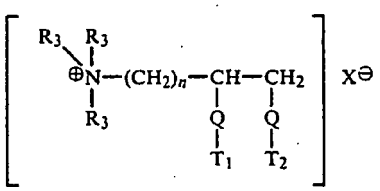


[0014] The two above-mentioned structures cover some typical cationic softeners, namely the ditallow dimethyl ammonium chloride (DTDMAC) and the group of esterquats.
In another embodiment, the fabric softener has one of Formulas (I) or (II) (as discussed in United States Patents Nos. 4,767,547 and 6,020,304):



(I)

or



(II)

[0015] In Formulas (I) and (II) above,

Q is chosen from:

-O-C(O)-,

-C(O)-O-,

-O-C(O)-O-,

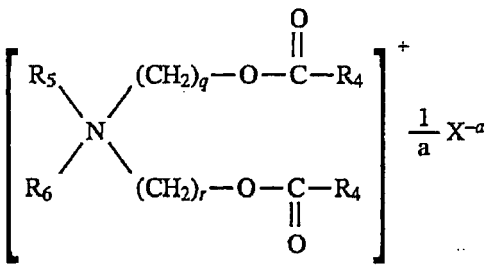
-NR^4-C(O)-,

-C(O)-NR^4-;

R^1 is $(CH_2)_n$-Q-T^2 or T^3;
R^2 is $(CH_2)_m$-Q-T^4 or T^5 or R^3 ;
R^3 is C_1-C_4 alkyl or C_1-C_4 hydroxyalkyl or H;
R_4 is H or C_1-C_4 alkyl or C_1-C_4 hydroxyalkyl;

T^1, T^2, T^3, T^4, T^5 are independently C_1-C_{22} alkyl or alkenyl;
n and m are integers from 1 to 4; and
X^- is a softener-compatible anion.

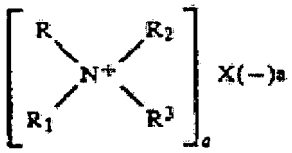
[0016] In another embodiment, the fabric softener has the following Formula (as discussed in United States Patents Nos. 5,501,806 and 5,939,377)



(II)

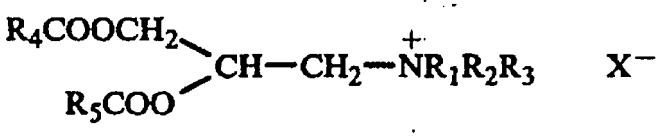
wherein each R_4 independently represents an aliphatic hydrocarbon group having from 8 to 22 carbon atoms, R_5 represents $(CH_2)s$-R_7 where R_7 represents an alkoxy carbonyl group containing from 8 to 22 carbon atoms, benzyl, phenyl, (C_1-C_4)-alkyl substituted phenyl, OH or H; R_6 represents $(CH_2)_t$ R_8 where R_8 represents benzyl, phenyl, (C_1-C_4) alkyl substituted phenyl, OH or H; q, r, s and t, each independently, represent a number of from 1 to 3; and X^{-a} is an anion of valence a.

[0017] In another embodiment, the fabric softener comprises a fatty acid ester quat of the following Formula (as discussed in United States Patent No. 5,133,885):



where one or two R groups represent an aliphatic ester residue of from 12 to 30 carbon atoms of formula $(CH_2)_n$ $OCOR_4$, and the remaining R groups represent lower aliphatic, aryl or hydroxyalkyl groups, X^- is an anion and "a" represents the ionic valence of the anion.

[0018] In another embodiment, the fabric softener has the formula (as discussed in United States Patent No. 4,137,180):



wherein R_1, R_2 and R_3 are each an alkyl or hydroxy alkyl group containing from 1 to 4 carbon atoms, or a benzyl group; R_4 and R_5 are each an alkyl or alkenyl chain containing from 11 to 23 carbon atoms; and X^- is a water soluble anion.

[0019] Various fabric conditioning compounds are discussed in U.S. Patent No. 4,137,180, which is incorporated herein in its entirety. Suitable cationic softeners are described in, for example, U.S. Patent Nos. 5,939,377; 6,020,304; 4,830,771; 5,501,806; 5,133,885; and 4,767,547.

[0020] In the above fabric softeners, typical counter ions that can be used include, for example, methyl sulfate, chloride, bromide, nitrate and the like.

[0021] The fabric softener can additionally contain a thickening agent to provide a desired viscosity to the fabric softener. In certain embodiments, the thickening agent is present at an amount of at least 0.001 weight percent of the composition.

[0022] In one embodiment, the thickener is the thickener described in WO 90/12862 (assigned to BP Chemicals Ltd.), which is a cross-linked cationic polymer that is derivable from a water soluble cationic ethylenically unsaturated monomer or blend of monomers, which is cross-linked by 5 to 45 ppm of a cross-linking agent comprising polyethylenic functions. More in particular, these cationic polymers are formed from monoethylenically unsaturated monomer that is either a water soluble cationic monomer or is a cationic blend of monomers that may contain cationic monomers alone or may contain a mixture of cationic and non-ionic monomers in the presence of a cross-linking agent. The preferred amount of cross-linking agent used in the polymerization is said to be selected in such a way that the Ionic Regain reaches a peak or plateau and preferably is between 10 and 25 ppm. A commercial product covered by WO 90/12862 is a cross-linked cationic copolymer of about 20 % acrylamide and about 80% of trimethylammonioethylmethacrylate salt cross-linked with 5-45 ppm methylene bis acrylamide (MBA). The cross-linked polymer is supplied in a liquid form as an inverse emulsion in mineral oil.

[0023] In another embodiment, the thickening agent is a water soluble cross-linked cationic polymer derived from the polymerization of from 5 to 100 mole percent of a cationic vinyl addition monomer, from 0 to 95 mole percent of acrylamide, and from 70 to 300 ppm of a difunctional vinyl addition monomer cross-linking agent. This polymer is described in United States Patent No. 4,806,345, EP 1399533 A1, and Research Disclosure page 136, no. 429116 of January 2000, all of which are incorporated herein by reference. In one embodiment, this polymer is available as SNF DP/EP 2037B from SNF Floerger, France, which is a cross-linked cationic copolymer of about 20% acrylamide and about 80% trimethyl-ammonioethylmethacrylate salt, and the cross-linking agent is methylene bisacrylamide (MBA).

Minimization of Resilience Property Loss By Contacting a Fabric with a Fabric softener

[0024] In general, a fabric may lose a degree of its resilience properties after washing and wearing. In some embodiments of the present invention, a fabric's loss of resilience properties after washing and wearing is minimized when the fabric is contacted with a fabric softener. In some embodiments, a fabric maintains a greater degree of its resilience properties after washing and wearing when contacted with a fabric softener, compared to a fabric after the same amount of washing and wearing but without contact with a fabric softener.

[0025] As described above, use of a fabric softener minimizes the loss of at least one resilience property of a fabric. In some embodiments, resilience properties may include elastic properties. In some embodiments, resilience properties may include one or more of the following: a) ability to elongate, b) shape retention, c) elasticity, d) reduced creasing or e) reduced crumpling.

Minimize Loss of Ability to Elongate

[0026] In some embodiments, use of a fabric softener may minimize the loss of ability to elongate a fabric. Ability to elongate a fabric may be defined as the amount of force needed for a specified amount of elongation of the fabric. Ability to elongate a fabric may be measured in a row (*i.e.*, horizontal) direction or a column (*i.e.,* vertical) direction of the fabric. In some embodiments, use of a fabric softener results in less force needed for a specified amount of elongation of a fabric after washing and wearing, as compared to a fabric which was not contacted with a fabric softener and which was exposed to the same amount of washing and wearing. In various embodiments, a fabric with a minimized loss of ability to elongate is desirable for increased comfort, shape, and freedom of movement.

[0027] In some embodiments, use of a fabric softener on a knitted cotton/elastane blend or pure cotton fabric results in 20% to 60% less force needed for an 80% elongation of the fabric in a column direction after ten washes than a fabric washed ten times without a fabric softener. In some embodiments, use of a fabric softener on a knitted cotton/elastane blend or pure cotton fabric results in 20% to 45% less force needed for an 80% elongation of the fabric in a row direction after ten washes than the same type of fabric washed ten times without a fabric softener.

[0028] In some embodiments, use of a fabric softener on a Tactel® nylon/elastane blend fabric results in 20% to 60% less force needed for an 80% elongation of the fabric in a column direction after ten washes than a fabric washed ten times without a fabric softener. In some embodiments, use of a fabric softener on a knitted Tactel® nylon/elastane blend fabric results in 2% to 15% less force needed for an 80% elongation of the fabric in a row direction after ten washes than the same type of fabric washed ten times without a fabric softener.

[0029] In some embodiments, use of a fabric softener on a knitted Viscose Nylon/elastane blend fabric results in 20% to 60% less force needed for an 80% elongation of the fabric in a column direction after ten washes than a fabric washed ten times without a fabric softener. In some embodiments, use of a fabric softener on a knitted Viscose Nylon/elastane blend fabric results in 20% to 60% less force needed for an 80% elongation of the fabric in a row direction after ten washes than the same type of fabric washed ten times without a fabric softener.

[0030] In some embodiments, use of a fabric softener on a cotton interlock knit fabric results in 20% to 60% less force needed for an 80% elongation of the fabric in a column direction after ten washes than a fabric washed ten times without a fabric softener. In some embodiments, use of a fabric softener on a knitted cotton interlock fabric results in 20% to

55% less force needed for an 80% elongation of the fabric in a row direction after ten washes than the same type of fabric washed ten times without a fabric softener.

Minimize Loss of Shape Retention

[0031] In some embodiments, use of a fabric softener may minimize the loss of shape retention of a fabric. Shape retention may be defined as a fabric's stretch recovery, i.e., its ability to recover its original length and/or shape after stretching the fabric repeatedly. Shape retention may be measured in a row direction or a column direction of the fabric. In some embodiments, use of a fabric softener results in a fabric with greater stretch recovery after washing and wearing, as compared to a fabric which was not contacted with a fabric softener and which was exposed to the same amount of washing and wearing.

[0032] In some embodiments, use of a fabric softener on a cotton/elastane blend fabric results in 40% to 50% more elongation recovered in a column direction after five stretchings of the fabric after ten washes than a fabric washed ten times without a fabric softener. In some embodiments, use of a fabric softener on a cotton/elastane blend fabric results in 35% to 45% more elongation recovered in a row direction after five stretchings of the fabric after ten washes than a fabric washed ten times without a fabric softener.

[0033] In some embodiments, use of a fabric softener on a Tactel® nylon/elastane blend fabric results in 1% to 10% more elongation recovered in a column direction after five stretchings of the fabric after ten washes than a fabric washed ten times without a fabric softener. In some embodiments, use of a fabric softener on a Tactel® nylon/elastane blend fabric results in 20% to 30% more elongation recovered in a row direction after five stretchings of the fabric after ten washes than a fabric washed ten times without a fabric softener.

[0034] In some embodiments, use of a fabric softener on a Viscose Nylon/elastane blend fabric results in 30% to 40% more elongation recovered in a column direction after five stretchings of the fabric after ten washes than a fabric washed ten times without a fabric softener. In some embodiments, use of a fabric softener on a Viscose Nylon/elastane blend fabric results in 50% to 60% more elongation recovered in a row direction after five stretchings of the fabric after ten washes than a fabric washed ten times without a fabric softener.

[0035] In some embodiments, use of a fabric softener on a cotton interlock knit fabric results in 20% to 30% more elongation recovered in a column direction after five stretchings of the fabric after ten washes than a fabric washed ten times without a fabric softener. In some embodiments, use of a fabric softener on a cotton interlock knit fabric results in 30% to 40% more elongation recovered in a row direction after five stretchings of the fabric after ten washes than a fabric washed ten times without a fabric softener.

Minimize Loss of Elasticity

[0036] In some embodiments, use of a fabric softener may minimize the loss of elasticity and/or endurance of a fabric. As used herein, elasticity may be defined as the ability of a material to deform under stress and to return to its original shape when the stress is removed. Furthermore, as used herein, endurance (also known as constant elasticity) may be defined as the consistency of force required to elongate a fabric after stretching the fabric repeatedly. Fabric with high elasticity and/or endurance may require the same or close to the same amount of force to elongate the fabric after repeated stretchings. Fabric which has experienced elasticity loss and/or endurance loss, for example after washing and wearing, may require less force to elongate the fabric after repeated stretchings. In some embodiments, use of a fabric softener results in a fabric with less elasticity loss and/or less endurance loss after washing and wearing, as compared to a fabric which was not contacted with a fabric softener and which was exposed to the same amount of washing and wearing.

[0037] In some embodiments, use of a fabric softener on a knitted cotton/elastane blend fabric results in 20% to 40% greater retention of required stretching force after five repeated stretchings in a column direction of the fabric after ten washes than a fabric washed ten times without a fabric softener. In some embodiments, use of a fabric softener on a knitted cotton/elastane blend fabric results in 40% to 60% greater retention of required stretching force after five repeated stretchings in a row direction of the fabric after ten washes than a fabric washed ten times without a fabric softener.

[0038] In some embodiments, use of a fabric softener on a knitted Tactel® nylon/elastane blend fabric results in 45% to 55% greater retention of required stretching force after five repeated stretchings in a column direction of the fabric after ten washes than a fabric washed ten times without a fabric softener.

[0039] In some embodiments, use of a fabric softener on a Viscose knitted Nylon/elastane blend fabric results in 40% to 50% greater retention of required stretching force after five repeated stretchings in a column direction of the fabric after ten washes than a fabric washed ten times without a fabric softener. In some embodiments, use of a fabric softener on a Viscose nylon/elastane blend fabric results in 50% to 60% greater retention of required stretching force after five repeated stretchings in a row direction of the fabric after ten washes than a fabric washed ten times without a fabric softener.

[0040] In some embodiments, use of a fabric softener on a cotton interlock knit fabric results in 15% to 25% greater retention of required stretching force after five repeated stretchings in a column direction of the fabric after ten washes than a fabric washed ten times without a fabric softener. In some embodiments, use of a fabric softener on a cotton interlock knit fabric results in 50% to 10% greater retention of required stretching force after five repeated stretchings in a row direction of the fabric after ten washes than a fabric washed ten times without a fabric softener.

Contacting Fabric with a Fabric softener

[0041] Fabric softeners may contact a fabric by various means. Any technique used in the art to contact a fabric softener to a fabric is suitable. In some embodiments, a fabric softener may be applied directly to a fabric. In some embodiments, a fabric softener may contact a fabric by spraying, rubbing, pouring, soaking, or rolling. In some embodiments, a fabric softener may be diluted with water, dispersed in water, or combined with one or more other fabric softeners.

[0042] A fabric softener may contact the fabric at any stage during a washing and drying cycle for the fabric. In some embodiments, a fabric softener may be contacted with a fabric in a dryer, for example in the form of a dryer sheet. In some embodiments, fabric softeners may be contacted to a fabric before washing. In some embodiments, fabric softeners may be contacted to a fabric during washing. In some embodiments, fabric softeners may be contacted to a fabric after washing.

Examples

[0043] The examples below used SOUPLINE™ fabric softener from Colgate Palmolive. This fabric softener contains about 13.5 weight % (based on the active weight of the material) of a mixture of 50% diesterquat (a) material, 20% monoester (b) and 30% triester (c) shown in Figure 1.

[0044] The following examples evaluate the effect of a fabric softener on resilience properties of various fabrics. The fabrics tested include elastane-containing fabrics (cotton/Lycra®, Tactel® nylon/Lycra® and Viscose nylon/Lycra®) and a fabric without elastane (cotton interlock knit)

[0045] The three tests are based on an European norm: EN 14704-01:

- Stretching Force (with lengthening max 80 %)
- Elongation not recovered after 5 cycles (after 30 minutes rest)
- Loss of Stretching Force due to fatigue.

[0046] Evaluations were carried out after ten cumulative washes on the fabrics with and without SOUPLINE fabric softener.

[0047] A Miele washing machine was used for the ten washes, with a water temperature of 40°C. 20 g of European Ariel liquid detergent was used for each wash. Each wash load contained 2.5 kg of fabric. After each wash, the fabric was on-line dried overnight.

[0048] In the following examples, column refers to the direction parallel to the stitches and row refers to the direction perpendicular to the stitches.

Example 1: Ability to Elongate

[0049] The following table shows the force in Newtons necessary to obtain an 80% elongation of a fabric in a column direction and a row direction:

Fabric		Untreated	Without Fabric Softener	With Fabric Softener
Cotton/ Lycra®	Column	12.7	12.6	7
	Row	2.8	4.6	2.9
Tactel nylon/ Lycra®	Column	5.6	8.3	4.2
	Row	3.1	3.3	2.9
Viscose nylon /Lycra®	Column	66.4	51.7	28.9
	Row	8.8	15.1	7
Cotton interlock knit	Column	146.8	12.0	6.3
	Row	2.7	3.2	1.6

[0050] The "Untreated" column displays the force necessary to obtain 80% elongation of a fabric before the fabric has been washed. The "Without Fabric Softener" column displays the force necessary to obtain 80% elongation of a fabric after the fabric has been washed ten times under the conditions described above, without fabric softener. The "With Fabric Softener" column displays the force necessary to obtain 80% elongation of a fabric after the fabric has been washed ten times under the conditions described above, with fabric softener.

[0051] The results in the table above demonstrate that use of the fabric softener made the fabric easier to stretch: less force was needed for the same elongation. For clothing, a minimized loss of a fabric's ability to elongate after washing and wearing is often desirable because it means better comfort, shape and freedom of movement.

Example 2 - Shape Retention

[0052] The following table shows the elongation not recovered after five stretchings and 30 minutes rest. The values of the elongation not recovered are displayed as percentages:

Fabric		Untreated	Without Fabric Softener	With Fabric Softener
Cotton/ Lycra®	Column	3.9	7.5	4.3
	Row	3.3	6.0	3.5
Tactel® nylon/ Lycra®	Column	2.1	2.4	2.3
	Row	1.6	1.6	1.2
Viscose nylon /Lycra®	Column	8.6	10.1	6.5
	Row	4.6	10.5	4.5
Cotton interlock knit	Column	32.4	17.1	12.9
	Row	5.2	10.0	6.4

[0053] The "Untreated" column displays the percent of elongation not recovered after five stretchings and 30 minutes rest, before the fabric is washed. The "Without Fabric Softener" column displays the percent of elongation not recovered after five stretchings and 30 minutes rest after the fabric has been washed ten times under the conditions described above, without fabric softener. The "With Fabric Softener" column displays the percent of elongation not recovered after five stretchings and 30 minutes rest after the fabric has been washed ten times under the conditions described above, with fabric softener.

[0054] The results show that the lengthening not recovered is lower with fabric softener treatment than with without it. Use of fabric softener is shown to protect stretch recovery and therefore shape retention, and is safe to the elastane containing fabrics. On cotton interlock knit, SOUPLINE™ treatment is also superior to treatment without SOUPLINE™.

Example 3: Elasticity

[0055] The following table shows the loss of stretching force after five stretchings compared with the first stretching. The loss of stretching force is displayed as a percentage:

Fabric		Untreated	Without Fabric Softener	With Fabric Softener
Cotton/ Lycra®	Column	18.3	19.7	14.5
	Row	11.3	17.1	9.8
Tactel® nylon/ Lycra®	Column	11.4	18.2	8.7
	Row	9.8	4.8	7.2
Viscose nylon /Lycra®	Column	15.8	19.6	10.6
	Row	12.2	17.3	8.1
Cotton interlock knit	Column	19.8	25.3	20.2
	Row	13.3	15.1	11.4

[0056] The "Untreated" column displays the loss of stretching force after five stretchings compared with the first stretching before the fabric is washed. The "Without Fabric Softener" column displays the loss of stretching force after five stretchings compared with the first stretching after the fabric has been washed ten times under the conditions described above, without fabric softener. The "With Fabric Softener" column displays the loss of stretching force after five stretchings compared with the first stretching after the fabric has been washed ten times under the conditions described above, with fabric softener.

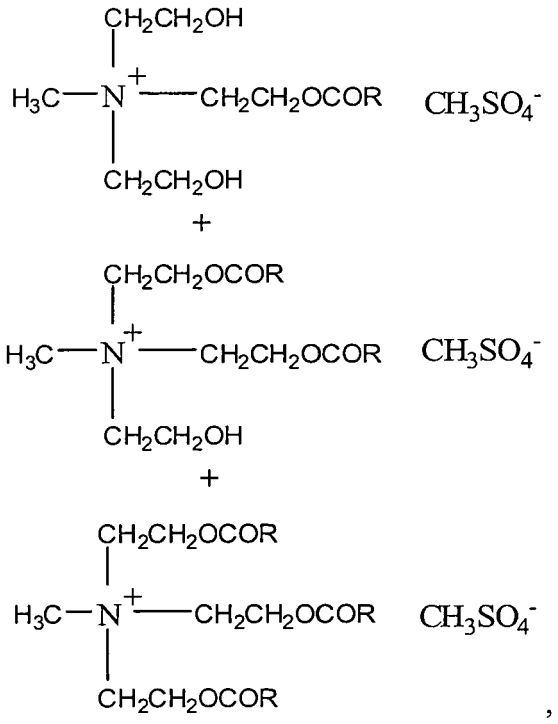
[0057] The data demonstrates that the loss of stretching force of a fabric after washing is far lower when fabrics are treated with fabric softener, with the exception of Tactel® nylon/Lycra® row. In general then, use of a fabric softener is shown to increase the resistance to elasticity loss after washing for elastane- and non elastane- containing fabrics.

Claims

1. The use of fabric softener to minimize the loss of at least one resilience property of a fabric by contacting the fabric with fabric softener, wherein the fabric softener comprises a quaternary ammonium fabric softener.

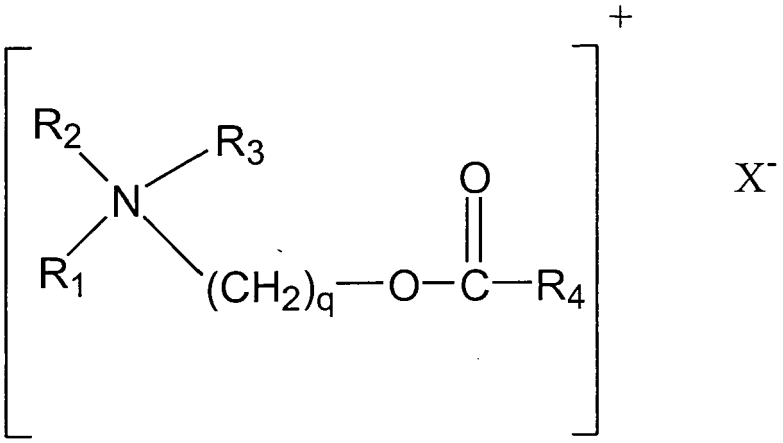
2. The use of fabric softener according to any preceding claim, wherein the fabric softener comprises an esterquat.

3. The use of fabric softener according to any preceding claim, wherein the fabric softener comprises a mixture of:



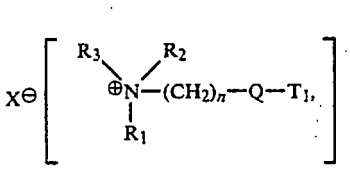
wherein R is a C_8-C_{22} saturated, non-saturated or partially saturated alkyl chain.

4. The use of fabric softener according to any preceding claim, wherein the fabric softener comprises



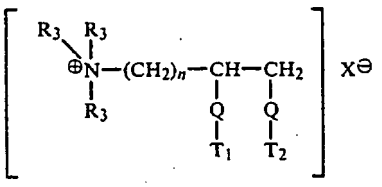
wherein R_4 represents an aliphatic hydrocarbon group having 8 to 22 carbon atoms,
R_2 and R_3 each independently represent {$(CH_2)_s$-R_5 wherein R_5 represents an alkoxy carbonyl group containing 8 to 22 carbon atoms, benzyl, phenyl, (C_1-C_4)-alkyl substituted phenyl, OH or H}; or
R_2 and R_3 are each independently represented by the structure defined by R_1;
R_1 represents $(CH_2)_tR_6$ where R_6 represents benzyl, phenyl, (C_1-C_4)-alkyl substituted phenyl, OH or H;
q, s, and t each independently, represent an integer 1 to 3; and
X^- is a softener anion.

5. The use of fabric softener according to any preceding claim, wherein the fabric softener comprises a composition chosen from the following:



(I)

or



(II)

wherein Q is chosen from

-O-C(O)-,

-C(O)-O-,

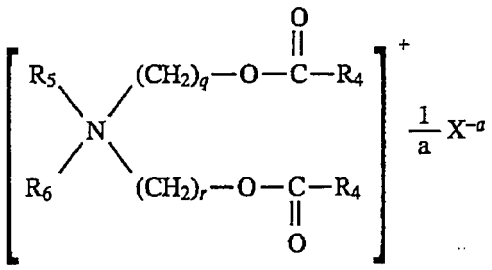
-O-C(O)-O-,

-NR^4-C(O)-,

-C(O)-NR^4-;

R^1 is $(CH_2)_n$-Q-T^2 or T^3;
R^2 is $(CH_2)_m$-Q-T^4 or T^5 or R^3 ;
R^3 is C_1-C_4 alkyl or C_1-C_4 hydroxyalkyl or H;
R_4 is H or C_1-C_4 alkyl or C_1-C_4 hydroxyalkyl;
T^1, T^2, T^3, T^4, T^5 are independently C_{11}-C_{22} alkyl or alkenyl;
n and m are integers from 1 to 4; and
X^- is a softener-compatible anion.

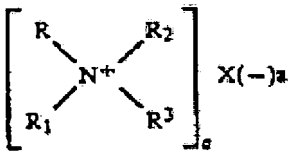
6. The use of fabric softener according to any preceding claim, wherein the fabric softener comprises a composition according to the following:



(II)

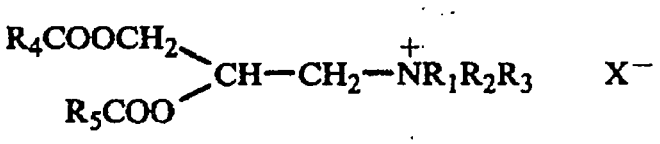
wherein each R_4 independently represents an aliphatic hydrocarbon group having from 8 to 22 carbon atoms, R_5 represents $(CH_2)s$-R_7 where R_7 represents an alkoxy carbonyl group containing from 8 to 22 carbon atoms, benzyl, phenyl, $(C_1$-$C_4)$-alkyl substituted phenyl, OH or H; R_6 represents $(CH_2)_t$ R_8 where R_8 represents benzyl, phenyl, $(C_1$-$C_4)$ alkyl substituted phenyl, OH or H; q, r, s and t, each independently, represent a number of from 1 to 3; and X^{-a} is an anion of valence a.

7. The use of fabric softener according to any preceding claim, wherein the fabric softener comprises a fatty acid ester quat of the following formula:



where one or two R groups represent an aliphatic ester residue of from 12 to 30 carbon atoms of formula $(CH_2)_n$ $OCOR_4$, and the remaining R groups represent lower aliphatic, aryl or hydroxyalkyl groups, X^- is an anion and "a" represents the ionic valence of the anion.

8. The use of fabric softener according to any preceding claim, wherein the fabric softener comprises a composition according to the following



wherein R_1, R_2 and R_3 are each an alkyl or hydroxy alkyl group containing from 1 to 4 carbon atoms, or a benzyl group; R_4 and R_5 are each an alkyl or alkenyl chain containing from 11 to 23 carbon atoms; and X^- is a water soluble anion.

9. The use of fabric softener according to any preceding claim, wherein the resilience property comprises one or more properties chosen from shape retention, ability to elongate, and elasticity.

10. The use of fabric softener according to any preceding claim, wherein the fabric comprises a natural fiber.

11. The use of fabric softener according to any preceding claim, wherein the fabric comprises a synthetic fiber.

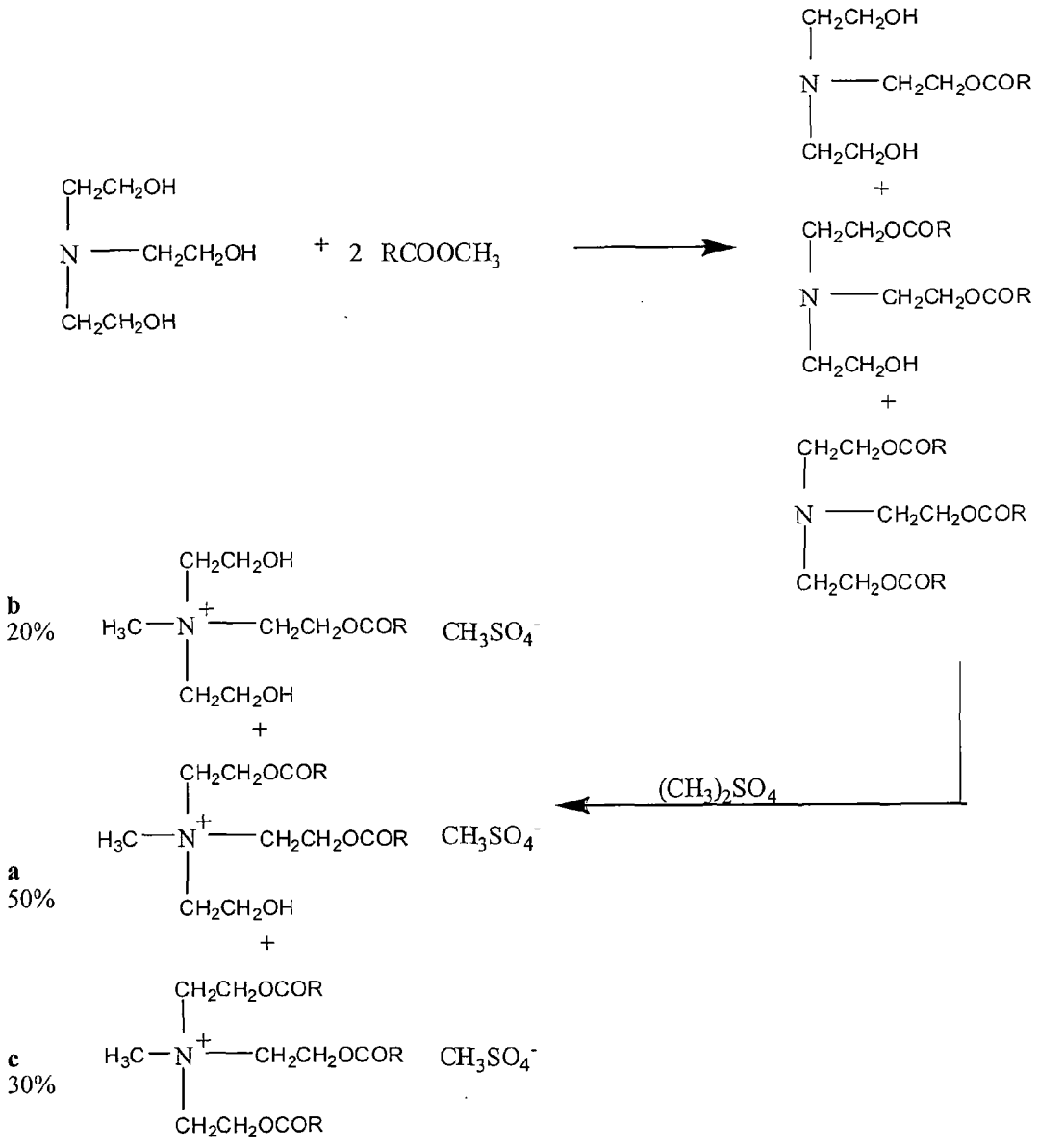
12. The use of fabric softener according to any preceding claim, wherein the fabric comprises a cotton interlock knit.

13. The use of fabric softener according to any preceding claim, wherein the fabric comprises an elastic fiber.

14. The use of fabric softener according to any preceding claim, wherein the fabric comprises an elastane based fiber.

15. The use of fabric softener according to any preceding claim, wherein the fabric softener contacts the fabric at any stage during a washing and drying cycle for the fabric.

Figure 1. Synthesis of Triethanolamine Esterquat



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EUROPEAN SEARCH REPORT

Application Number
EP 07 25 3281

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FLICK W: "Products for The Textile Industry" TEXTILE FINISHING CHEMICALS, XX, XX, 1990, page 587, XP008087858 * the whole document * -----	1,2	INV. C11D3/30 D06M13/463
X	JUODSNUKYTE D ET AL: "Influence of fabric softeners on performance stability of the textile materials" MATERIALS SCIENCE EDITORIAL BOARD OF JOURNAL MATERIALS SCIENCE LITHUANIA, vol. 11, no. 2, 2005, pages 179-182, XP009095848 ISSN: 1392-1320 * the whole document * -----	1-15	
X	TRUNCYTE D ET AL: "The change of handle properties of knitted farics influenced by washing process" MEDZIAGOTYRA - MATERIALS SCIENCE, KAUNO TECHNOLOGIJOS UNIVERSITETAS,, LT, vol. 12, no. 2, 2006, pages 158-161, XP008087855 ISSN: 1392-1320 * the whole document * -----	1-15	TECHNICAL FIELDS SEARCHED (IPC) C11D D06M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 February 2008	CULMANN, J

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REFERENCES CITED IN THE DESCRIPTION

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