



(51) International Patent Classification:

D06M 15/507 (2006.01) *D06M 101/32* (2006.01)
D06M 13/325 (2006.01)

(21) International Application Number:

PCT/CN2012/076999

(22) International Filing Date:

15 June 2012 (15.06.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(71) Applicants (for all designated States except US): **RHODIA OPERATIONS** [FR/FR]; 40 rue de la Haie Coq, F-93306 Aubervilliers Cedex (FR). **RHODIA (CHINA) CO., LTD.** [CN/CN]; 3966, Jin Du Road, Xinzhuang Industrial Zone, Minhang District, Shanghai 201108 (CN).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **Jin, Dawei** [CN/CN]; 3966, Jin Du Road, Xinzhuang Industrial Zone, Minhang District, Shanghai 201108 (CN).

(74) Agent: **KING & WOOD MALLESONS LAWYERS**; 20th Floor, East Tower, World Financial Center, No. 1 Dongsanhuan Zhonglu, Chaoyang District, Beijing 100020 (CN).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: METHOD TO RECOVER OR INCREASE WATER ABSORBENCY OF POLYESTER TEXTILE

(57) Abstract: A method to recover or increase the water absorbency of a polyester textile, wherein a composition comprising at least a polyester soil release polymer and a quaternary ammonium softener is used to wash and/or rinse said polyester textile. This composition of the invention may be perfectly used during the water cycle(s) of the laundry or in the rinse cycle(s), notably used in the final rinse. A softener composition, notably is used in the rinsing cycles of the laundry, comprising a polyester soil release polymer and a quaternary ammonium softener.



METHOD TO RECOVER OR INCREASE THE WATER ABSORBENCY OF A POLYESTER TEXTILE

The present invention concerns then a method to recover or increase the water
5 absorbency of a polyester textile, wherein a composition comprising at least a polyester
soil release polymer and a quaternary ammonium softener is used to wash and/or rinse
said polyester textile. This composition of the invention may be perfectly used during
the water cycle(s) of the laundry or in the rinse cycle(s), notably used in the final rinse.
The invention concerns as well a softener composition, notably used in the rinsing
10 cycles of the laundry, comprising a polyester soil release polymer and a quaternary
ammonium softener.

PRIOR ART

Several textile properties would influence the thermal comfort of a garment or towel,
15 such as water absorbency, water vapor transmission, air permeability, and heat transfer.
For example, when the wearer is active, it is very important for the textile to have the
ability to absorb moisture from the skin. Whenever fibers absorb liquid water or
moisture vapor, heat is released, and therefore, water absorbency of fabrics is an
important factor that affects the wearer's thermal comfort. The ability of a fabric to carry
20 away water/moisture to maximize the evaporation of liquid moisture contributes to the
thermal comfort of a garment, especially for sportswear.

Synthetic fibers, such as polyester, nylon, and acrylic, have very low moisture regain,
and it exists several ways, notably of finishing and treatment to obtain a better body
25 moisture management and increase the moisture wicking phenomena. The main known
is to apply a topical treatment to a textile, such as a garment, made from hydrophobic
fibers, such as polyester, to give it the ability to absorb sweat. The hydrophilic finish or
treatment will allow this type of textile to absorb residue, while its hydrophobic (water-
hating) fibers will help it to dry fast, keeping the wearer more comfortable.

30 It is also known that static charges may accumulate on polyesters textile fabrics,
resulting in clinging and crackling. Fabric softeners are then usually employed to act as
anti-static agents by enabling synthetic fibers to retain sufficient moisture to dissipate
static charges.

Fabric softeners tend to be based on quaternary ammonium salts with one or two long alkyl chains, a typical compound being dipalmitoylethyl hydroxyethylmonium methosulfate. Other cationic compounds can be derived from imidazolium, substituted amine salts, or quaternary alkoxy ammonium salts. One of the most common compounds of the early formulations was dihydrogenated tallow dimethyl ammonium chloride (DHTDMAC). There are three main types of quaternary ammonium compounds used in the formulation of household fabric softeners: dialkyldimethyl ammonium compounds, diamido alkoxylated ammonium compounds, and imidazolinium compounds.

However, these fabric softeners have a high influence on water absorbency of polyester textile. Indeed, the repetitive use of fabric softeners during the laundering process may leave residue of softener on the fabrics, which may create a barrier to airflow and water vapor transmission of the coated fabric, leading to decrease the water absorbency of said polyester textiles, via a waterproof effect.

Because of the particular properties they hold, moisture management clothing requires some special care and it's always important, though it's a constraint and an inconvenience for end user, to check the care label, that gives specific instructions on washing and drying for such a clothing and mainly expressing to "*do not use softener*".

There is then a need to carrying out a washing, cleaning and rising composition comprising softeners that could be used on moisture management clothing without decreasing the water absorbency of said textiles while avoiding the disadvantages known in the prior art.

INVENTION

It appears now that it's perfectly possible to obtain a washing, cleaning and rising composition for polyester textiles that comprises softeners and would permit to recover or increase the hydrophilic ability of said polyester textiles and/or hydrophilic polyester textiles and then recover or augment the water absorbency of said textiles.

The present invention concerns then a method to recover or increase the water absorbency of a polyester textile, wherein a composition comprising at least a polyester soil release polymer and a quaternary ammonium softener is used to wash and/or rinse said polyester textile.

5

Increasing of the water absorbency of polyester textiles may notably mean to increase water absorbency of said textiles in comparison with the water absorbency of these textiles after a classical use of a rinsing cycle, in the laundry treatment, that comprises or does not comprise the use of softener. Recovering of the water absorbency of polyester textiles may notably mean to recover or regain water absorbency of said textiles in comparison with the water absorbency of these textiles after a classical use of a rinsing cycle, in the laundry treatment, that comprises the use of softener.

10

15

The invention also concerns the use of a composition comprising at least a polyester soil release polymer and a quaternary ammonium softener to recover or increase the water absorbency of a polyester textile. The present invention also recites the use of a composition comprising at least a polyester soil release polymer and a quaternary ammonium softener to recover or increase the hydrophilic ability from a polyester textile.

20

The invention concerns as well a softener composition, notably used in the rinsing cycles of the laundry, comprising a polyester soil release polymer and a quaternary ammonium softener.

25

Such an effect can be used by a synergistic blend of a polyester soil release polymer and a quaternary ammonium softener. The composition of the present inventions indeed permits to recover or increase water absorbency of polyester textiles contrary to it could have been suspected by the knowledge of the prior art in the field of laundry. This composition also permits to obtain a good level of soil release properties and anti-static properties.

30

This composition of the invention may be perfectly used during the water cycle(s) of the laundry or in the rinse cycle(s), notably used in the final rinse.

Polyester textiles are fabric textiles made of at least polyester yarns, thread and/or fibers. A textile or cloth is a flexible woven or non-woven material consisting of a network of natural or artificial fibres often referred to as thread or yarn. Textiles are usually formed by weaving, knitting, crocheting, knotting, or pressing fibres together (felt). Polyester fibres is used in all types of clothing, either alone or blended with other fibres, such as cotton.

Yarns, thread and/or fibers may have usual circular cross-sections or non-circular cross-section, such as for example multilobal (trilobal, pentalobal), hexagonal or irregular shapes. Yarns, thread and/or fibers may have a hollow shapes, for example produced with plug-in-orifice spinnerets, tube-in-orifice spinnerets or segment-arc spinnerets. In a specific embodiment, polyester textiles comprise yarns, thread and/or fibers having a non-circular cross-section.

According to an embodiment of the present invention, polyester textile may provide a hydrophilic finish or treatment. Hydrophilic finish or treatment relies on the chemical and molecular properties of water molecules. Hydrophilic finishes usually compensate for lower moisture and water absorption capacity in synthetic fiber materials.

Hydrophilic polyester textiles providing a hydrophilic finish or treatment may be obtained by several methods known in the prior art.

One of the main methods is to provide a hydrophilic compound to the yarns, threads or fibers, on themselves and/or on the final textile fabric. Hydrophilic compound may be applied by a dipping or a spraying method.

Hydrophilic compound may be for example a compound of formula $R-O-(CH_2CH_2O)_nH$, wherein R is a C_{12} to C_{18} alkyl group and n may be between 7 and 25.

Hydrophilic compound may be for example a formulation containing a mixture of an alkoxyated ricinoleic acid derivative, a hydrogenated ricinoleic acid derivative, a C_{18} fatty acid and a polyalkoxylated polymethyl siloxane, as described on US5045387. Hydrophilic compound may also be for example a formulation containing a fatty acid

diethanolamide, a polyether-modified silicone, a sorbitan fatty acid ester and a metal salt of an alkyl sulfonate, as described on EP372890.

It can also be possible to provide a coating of a water-base or solvent polymer resin, such as for example polyacrylamide or polyurethane resins. The skilled artisan will select monomers and/or oligomers that provide the desired level of hydrophilicity to the coating. Polymer resins may comprises oligomer and/or monomer components including hydrophilic moieties in their structure, such as hydroxyl, polyether especially poly (ethylene glycol), polyester, amide, amine, carboxylic acid, sulfonate, phosphate, urethane, urea, polypeptide or polysaccharide moieties. For example, polyether-base, (especially poly (ethylene glycol)- based), polyester-based and hydroxyfunctional oligomers are especially desirable for use in a curable compositions used to make the coatings. Monomers such as poly (ethylene glycol) monoacrylate; poly (ethylene glycol) diacrylate; N vinyl-2-pyrrolidone; N, N-dimethylacrylamide ; N-hydroxy suceinimide ; 2-hydroxyethyl acrylate; acrylic acid; acrylated phosphates, styryl sulfonates; and sorbitol acrylate are especially useful in formulating the curable compositions.

Hydrophilic compound can also be a polysaccharide, or a modified polysaccharide.

An other method is to provide a hydrophilic treatment on the yarns, threads or fibers, on themselves and/or on the final textile fabric, for example via a plasma treatment.

Polyester textiles of the invention may be as example garments such as sportswear clothes notably used into the range of winter sports or summer sports, in the sleepwear market, or various household linens such as towels.

Suitable soil release polymer is conventionally copolymers or terpolymers of terephthalic acid with ethylene glycol and/or propylene glycol units, notably in various arrangements. Examples of such polymers are disclosed in the commonly assigned US4116885 and 4711730 and EP0272033.

Especially effective polymeric soil release agents are the block copolymers of polyalkylene terephthalate and polyoxyethylene terephthalate, and the block copolymers of polyalkylene terephthalate and polyethylene glycol. The polyalkylene

terephthalate block copolymers preferably comprise ethylene and/or propylene alkylene groups. Many of such soil release polymers are nonionic. More specifically, these polymers are comprised of repeating units of ethylene and/or propylene terephthalate and polyethylene oxide terephthalate, preferably at a molar ratio of ethylene
5 terephthalate units to polyethylene oxide terephthalate units of from about 25:75 to about 35:65, said polyethylene oxide terephthalate containing polyethylene oxide blocks having molecular weights of from about 300 to about 2000. The molecular weight of these polymeric soil release agents is in the range of from about 4,000 to about 55,000. Other useful soil release polymers include, but are not limited to,
10 polyester urethane, and acetic acid ethenyl esters; the polyethylene terephthalate/polyoxyethylene terephthalate (PET-POET) polymer being most preferable. Typically, molecular weight ranges of these polymers are from 500 to 120,000, preferably 2000 to 35,000 and most preferably 2000 to 25,000.

15 Another preferred polymeric soil release agent is a crystallizable polyester with repeat units of ethylene terephthalate containing from about 10% to about 15% by weight of ethylene terephthalate units together with from about 10% to about 50% by weight of polyoxyethylene terephthalate units, derived from a polyoxyethylene glycol of average molecular weight of from about 300 to about 6,000, and the molar ratio of ethylene
20 terephthalate units to polyoxyethylene terephthalate units in the crystallizable polymeric compound is between 2:1 and 6:1. Examples of this polymer include the commercially available materials Zelcon 4780 (from DuPont) and Milease T (from ICI).

Such soil release polymers are described in US4849257, this patent being incorporated
25 herein by reference. Another preferred nonionic soil release polymer is described in US07/676/682.

The most preferred nonionic soil release agents are the REPEL-O-TEX line of soil release agents sold by Rhone-Poulenc Inc., Cranbury, N.J. These products include
30 REPEL-O-TEX SRP3, REPEL-O-TEX SRP4, REPEL-O-TEX QCJ product and REPEL-O-TEX QCX products. VELVETOL 251C is a 100% active hydrophilic polyester from which REPEL-O-TEX SRP3, SRP4, AND QCJ are manufactured at different polymer concentrations. The polymers have a molecular weight of from about 3,000 to about 10,000. REPEL-O-TEX QCJ product is a 15 weight percent active dispersion of the

above mentioned polymer for liquid laundry detergents, whereas SRP3 and SRP4 are diluted with sodium sulfate for powder detergent applications. The polymers of the REPEL-O-TEX products are nonionic polyester-polyether (PET-POET) transesterification co-polymers. The REPEL-O-TEX QCX is a higher molecular weight hydrophilic polyester polymer with a molecular weight range of from about 10,000 to about 35,000.

Polyester soil release polymer may be a polyether-polyester block copolymer. Preferably the polyether-polyester block copolymer is obtained with the following process:

- (a) transesterification reaction of at least one di(C₁-C₄)alkyl ester of aromatic dicarboxylic acid and at least one aliphatic diol or aliphatic polyol in an inert solvent, wherein the inert solvent has a boiling point higher than the boiling point of the alcohol by-product of the transesterification reaction;
- (b) polycondensation reaction of the product of step (a) and one or more selected from the group consisting of at least one polyether, at least one mono-alcohol, at least one mono-carboxylic acid and at least one ester, wherein the polyether has at least one terminal hydroxyl group.

This process is described in WO2011/000158.

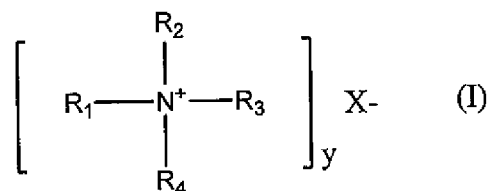
In one more preferred embodiment of the present invention, the di(C₁-C₄)alkyl ester of aromatic dicarboxylic acid is dimethyl terephthalate; the aliphatic diol is one or more selected from the group consisting of ethylene glycol and 1,2-propylene glycol; and the polyether is one or more selected from the group consisting of MPEG of MW 750, PEG of MW 600, PEG of MW 1000, PEG of MW 1500, MPEG-b-PPG of MW 750, PPG-b-PEG-b-PPG of MW 1000 and PPG-b-PEG-b-PPG of MW 1500, where MPEG is methoxy polyethylene glycol, PEG is polyethylene glycol, PPG is polypropylene glycol.

Soil release polymer may be under the form of solid or liquid state.

The polyester soil release polymer is optionally present in an amount of from 0 to 50 wt %, preferably from 0 to 10 wt %, more preferably 0.1 to 5 wt %, based on the weight of the total composition.

- 5 Preferred quaternary ammonium softeners are water dispersible.

Most preferred quaternary ammonium softeners are those ones of the general formula (I) :

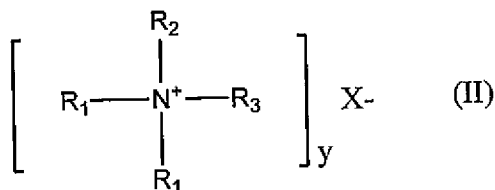


Wherein:

- R^1 , R^2 , R^3 and R^4 , which may be the same or different, is a C_1 - C_{30} hydrocarbon group, typically an alkyl, hydroxyalkyl or ethoxylated alkyl group, optionally interrupted with a heteroatom or an ester or amide group,
- X is an anion, for example halide, as Cl or Br, sulphate, alkyl sulphate or acetate,
- y is the valence of X.

Quaternary ammonium softeners are more preferably alkyl quat, such as dialkyl quat, or ester quat such as a dialkyl diester quat.

Dialkyl quat may be a compound of formula general (II):



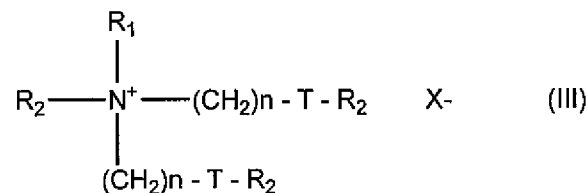
Wherein:

- R^1 is an aliphatic C_{16-22} hydrocarbon group,
- R^2 is a C_1 - C_3 alkyl group,

- R^3 is R^1 or R^2 ,
- X is an anion, for example halide, as Cl or Br, sulphate, alkyl sulphate or acetate,
- y is the valence of X.

5 Dialkyl quat is preferably di-(hardened tallow) dimethyl ammonium chloride.

In a preferred embodiment, quaternary ammonium softeners are compounds of formula (III) :



10

Wherein:

- R^1 group is independently selected from C_1 - C_4 alkyl group
- R^2 group is independently selected from C_1 - C_{30} alkyl or alkenyl group
- 15 - T is $-C(=O)-O-$
- n is an integer from 0 to 5
- X is an anion, for example a chloride, bromide or methosulphate ion.

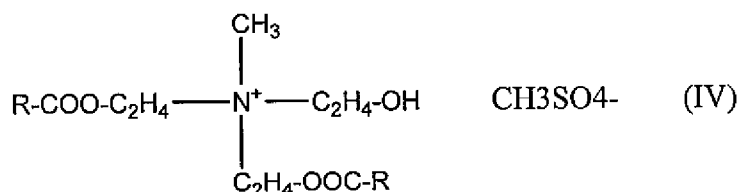
Particularly preferred quaternary ammonium fabric softening materials comprise two
 20 C_{12-28} alkyl or alkenyl groups connected to the nitrogen head group, preferably via at least one ester link. It is more preferred if the quaternary ammonium material has two ester links present.

Preferably, the average chain length of the alkyl or alkenyl group is at least C_{14} , more
 25 preferably at least C_{16} . Most preferably at least half of the chains have a length of C_{18} .

It is generally preferred if the alkyl or alkenyl chains are predominantly linear, although a degree of branching, especially mid-chain branching, is within the scope of the invention.

30

Ester quaternary ammonium compounds may be for example triethanolamine-based quaternary ammonium of formula (IV):



5

Wherein R is a C₁₂-C₂₀ alkyl chain.

Preferred quaternary ammonium softeners of the present invention are:

TET: Di(tallowcarboxyethyl)hydroxyethyl methyl ammonium methylsulfate

10 TEO: Di(oleocarboxyethyl)hydroxyethyl methyl ammonium methylsulfate,

TES : Distearyl hydroxyethyl methyl ammonium methylsulfate,

TEHT: Di(hydrogenated tallow-carboxyethyl)hydroxyethyl methyl ammonium methylsulfate,

TEP: Di(palmiticcarboxyethyl)hydroxyethyl methyl ammonium methylsulfate,

15

The quaternary ammonium softeners is optionally present in an amount of from 0.1 to 50 wt %, preferably from 1 to 25 wt %, more preferably 3 to 20 wt %, based on the weight of the total composition.

20

In said composition the weight ratio between soil release polymer and quaternary ammonium softener (soil release polymer / quaternary ammonium softener) may be comprised between 0.0001 and 10, preferably between 0.005 and 1, more preferably between 0.01 and 0.5.

25

Composition of the invention may also comprises classical additives used in the laundry compositions, such as detergent, dye transfer inhibiting agents, surfactants, bleaches, enzymes, perfumes, preservatives, biocides, viscosity control agents, grease removal agents, soil release agents, builders, sequestrants, optical brighteners, pH regulators, etc.

30

The compositions of the invention may be of any suitable physical form, for example, particulates, such as powders, granules, or tablets, liquids, pastes, gels or bars. According to one especially preferred embodiment of the invention, the composition is in particulate form, preferably powder form. The composition can be formulated for use
5 as hand wash or machine wash composition.

The compositions of the invention may be prepared by any suitable process. As example, a fabric softener composition may be prepared by conventional methods such as those disclosed in US5402542. Powders of low to moderate bulk density may be
10 prepared by spray-drying a slurry, and optionally postdosing (dry-mixing) further ingredients. "Concentrated" or "compact" powders may be prepared by mixing and granulating processes, for example, using a high-speed mixer/granulator, or other non-tower processes. Tablets may be prepared by compacting powders, especially "concentrated" powders. Liquid compositions may be prepared by admixing the
15 essential and optional ingredients in any desired order to provide compositions containing the ingredients in the requisite concentrations. The choice of processing route may be in part dictated by the stability or heat-sensitivity of the surfactants involved, and the form in which they are available.

20 The additives and ingredients that are described in this document can be introduced either way; either they are separately added in the slurry, either they are added separately in the post-addition. Preferably, as some of the soil release polymers have a waxy character at room temperature and are not easy to make into powder, the slurry route will be chosen.

25 The invention also relates to a process washing, cleaning or rinsing textiles involving diluting the composition of the invention. This process can be carried out in a domestic private context, or in an industrial, institutional or service context.

30 The invention will now be further illustrated by the following non limiting examples.

EXPERIMENTAL PART

The following products are used in the following examples:

- Liquid detergent formulation: same as used in the experimental part of US20060073994
- Ester quat: TEP: Di(palmiticcarboxyethyl)hydroxyethyl methyl ammonium methylsulfate; Fentacare TEP softener from Rhodia
- 5 - Dialkyl quat softener: Distearic dimethyl ammonium chloride from TCI
- Crystal Repel-O-TEX® from Rhodia. Polyether-polyester block copolymer according to WO2011/000158

2 kinds of fabrics are used in the trials:

- 10 - Polyester fabric with a hydrophilic coating: PET Fabric as described in EP2314176 with a high degree of moisture wicking
- Polyester fabric made of non round fibers: PET fibers which has a multi-grooved scalloped-oval cross-section as mentioned in US2005817740

15 **Softener compositions**

The softener compositions of the invention comprise water and 5 wt % of ester quat or dialkyl quat solution and/or 0.5 wt % of Crystal Repel-O-TEX®.

Procedure of treatment

- 20 3 wash cycles of polyester fabrics were made, each cycle is the following:
 - Wash with liquid detergent formulation for 20 minutes, pH=7 at 0.1 % dosage level -1 g/L. All the experiment are operated at 20°C
 - Rinse with water for 5 minutes
 - Rinse with softener composition for 5 minutes
- 25 - Dry in line

Vertical Wicking Test / Standard Migration Test Procedure

- Vertical wicking of the fabrics has been determined by measuring the wicking height against gravity along the warp and weft direction of the fabric. The test has been
- 30 conducted using a vertical wicking tester according to DIN 53924 method. A strip of fabric (200mm x 25mm) was suspended vertically with its lower end (30mm) immersed in a reservoir of distilled water, to which 1% reactive dye (Prussian blue) was added for tracking the movement of water and at a regular time interval, the height reached by

water in the fabric was measured with respect to the clamped scale by capturing images at regular interval by a fixed camera.

Results

- 5 On polyester fabric with a hydrophilic coating, results are mentioned in Table 1 :

Table 1

Softener composition	Wicking Height (cm/ 10 min.)
None (water)	35
Ester quat softener	100
Crystal Repel-O-TEX®	130
Ester quat + Crystal Repel-O-TEX®	160
Dialkyl quat + Crystal Repel-O-TEX®	115

- 10 It appears then that the composition of the present invention comprising a polyester soil release polymer and a quaternary ammonium softener permits to increase the water absorbency of a hydrophilic polyester textile providing a hydrophilic finish or treatment.

On polyester fabric made of non round fibers, results are mentioned in Table 2:

15

Table 2

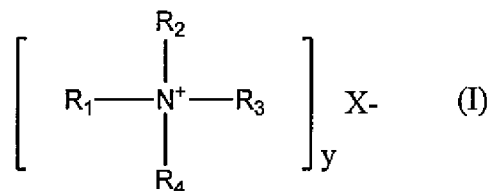
Softener composition	Wicking Height (cm/ 10 min.)
None (water)	59
Dialkyl softener	0
Dialkyl softener + Crystal Repel-O-TEX®	44
Ester quat softener + Crystal Repel-O-TEX®	80

- 20 It appears then that the composition of the present invention comprising a polyester soil release polymer and a quaternary ammonium softener permits to recover the water absorbency of a polyester textile, notably to remove the loss of water absorbency induced by the softener alone.

What is claimed is:

1. Method to recover or increase the water absorbency of a polyester textile, wherein a composition comprising at least a polyester soil release polymer and a quaternary ammonium softener is used to wash and/or rinse said polyester textile.
5
2. Method according to claim 1, wherein polyester textile comprises yarns, thread and/or fibers having non-circular cross-section.
- 10 3. Method according to claim 1 or 2, wherein polyester textile provides a hydrophilic finish or treatment.
4. Method according anyone of claims 1 to 3, wherein polyester soil release polymer is a copolymer or terpolymer of terephthalic acid with ethylene glycol and/or propylene glycol units.
15
5. Method according anyone of claims 1 to 3, wherein polyester soil release polymer is a block copolymer of polyalkylene terephthalate and polyoxyethylene terephthalate, and the block copolymers of polyalkylene terephthalate and polyethylene glycol.
20
6. Method according anyone of claims 1 to 3, wherein polyester soil release polymer is a polyether-polyester block copolymer obtained with the following process:
(a) transesterification reaction of at least one di(C₁-C₄)alkyl ester of aromatic dicarboxylic acid and at least one aliphatic diol or aliphatic polyol in an inert solvent, wherein the inert solvent has a boiling point higher than the boiling point of the alcohol by-product of the transesterification reaction;
25
(b) polycondensation reaction of the product of step (a) and one or more selected from the group consisting of at least one polyether, at least one mono-alcohol, at least one mono-carboxylic acid and at least one ester, wherein the polyether has
30 at least one terminal hydroxyl group.
7. Method according anyone of claims 1 to 6, wherein the quaternary ammonium softener corresponds to the general formula (I) :

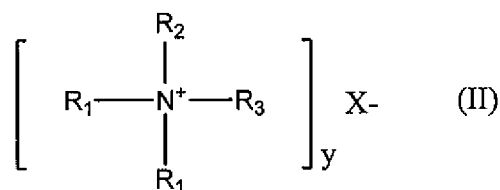
15



Wherein:

- R^1 , R^2 , R^3 and R^4 , which may be the same or different, is a C_1 - C_{30} hydrocarbon group, optionally interrupted with a heteroatom or an ester or amide group,
- X is an anion,
- y is the valence of X.

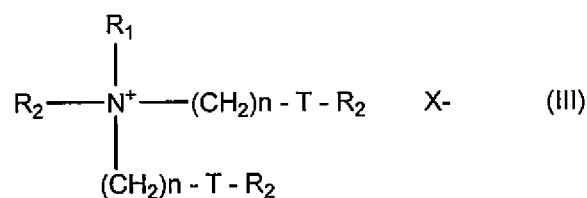
8. Method according anyone of claims 1 to 6, wherein the quaternary ammonium softener corresponds to the general formula (II) :



Wherein:

- R^1 is an aliphatic C_{16-22} hydrocarbon group,
- R^2 is a C_1 - C_3 alkyl group,
- R^3 is R^1 or R^2 ,
- X is an anion,
- y is the valence of X.

9. Method according anyone of claims 1 to 6, wherein the quaternary ammonium softener corresponds to the general formula (III) :

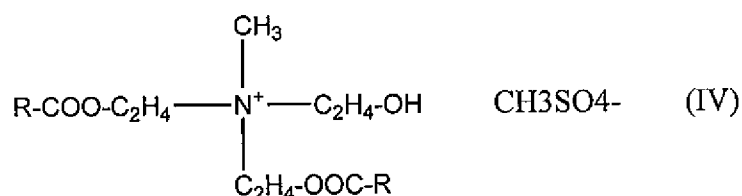


Wherein:

- R^1 group is independently selected from C_1 - C_4 alkyl group
- R^2 group is independently selected from C_1 - C_{30} alkyl or alkenyl group
- T is $-C(=O)-O-$
- 5 - n is an integer from 0 to 5,
- X is an anion.

10. Method according anyone of claims 1 to 6, wherein the quaternary ammonium softener corresponds to the general formula (IV) :

10



Wherein R is a C_{12} - C_{20} alkyl chain.

- 15 11. Method according anyone of claims 1 to 6, wherein the quaternary ammonium softener is chosen in the group consisting of:

TET: Di(tallowcarboxyethyl)hydroxyethyl methyl ammonium methylsulfate

TEO: Di(oleocarboxyethyl)hydroxyethyl methyl ammonium methylsulfate,

TES : Distearyl hydroxyethyl methyl ammonium methylsulfate,

- 20 TEHT: Di(hydrogenated tallow-carboxyethyl)hydroxyethyl methyl ammonium methylsulfate,

TEP: Di(palmiticcarboxyethyl)hydroxyethyl methyl ammonium methylsulfate.

- 25 12. Method according anyone of claims 1 to 11, wherein the weight ratio between soil release polymer and quaternary ammonium softener is comprised between 0.0001 and 10.

- 30 13. Use of a composition comprising at least a polyester soil release polymer and a quaternary ammonium softener to recover or increase the water absorbency of a polyester textile.

14. Use of a composition comprising at least a polyester soil release polymer and a quaternary ammonium softener to recover or increase the hydrophilic ability from a polyester textile.

5 15. Softener composition, notably used in the rinsing cycles of the laundry, comprising a polyester soil release polymer and a quaternary ammonium softener.

16. Softener composition according to claim 15, wherein the weight ratio between soil release polymer and quaternary ammonium softener is comprised between 0.0001 and

10 10.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2012/076999

A. CLASSIFICATION OF SUBJECT MATTER

See the extra sheet

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)

IPC: D06M15/-, D06M13/-, C11D1/62

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)

WPI, EPODOC, CNTXT, CNABS, polyester?, quaternary, ammonium, softener?, terephtha+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN1066680A (PROCTER & GAMBLE CO.) 02 Dec. 1992(02.12.1992) description, page 5, paragraphs 1-2, page 11, paragraph 3, page 17, lines 16-20, pages 18-19, embodiments 1-3	1-5,7-8,11-16
Y		9-10
Y	CN1419006A (AKZO NOBEL NV.) 21 May 2003(21.05.2003) claim 1	9-10
A	description, pages 1-26	1-8,11-16
A	US2008/0005852A1(NANO-TEX INC.) 10 Jan.2008(10.01.2008) paragraphs [0017]-[0080]	1-16

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	“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
“A” document defining the general state of the art which is not considered to be of particular relevance	“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
“E” earlier application or patent but published on or after the international filing date	“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
“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)	“&” document member of the same patent family
“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	

Date of the actual completion of the international search
28 Feb.2013(28.02.2013)Date of mailing of the international search report
28 Mar. 2013 (28.03.2013)Name and mailing address of the ISA/CN
The State Intellectual Property Office, the P.R.China
6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China
100088
Facsimile No. 86-10-62019451

Authorized officer

MA, Hua

Telephone No. (86-10)82246905

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2012/076999

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

The same technical feature among the independent claims 1,13-15 is the composition comprising at least a polyester soil release polymer and a quaternary ammonium softener. However, D1 discloses the same composition. It follows that the same technical feature of claims 1,13-15 doesn't make a contribution over the prior art and can not be considered as a special technical feature within the meaning of Rule 13.2 PCT. The application, hence does not meet the requirements of unity of invention as defined in Rule 13.1 PCT.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/076999

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN1066680A	02.12.1992	WO92/17523A1	15.10.1992
		AU1753292A	02.11.1992
		TW200550A	21.02.1993
		PT100298A	30.07.1993
		JP06506251A	14.07.1994
CN1419006A	21.05.2003	NZ242150A	27.04.1995
		WO97/42279A1	13.11.1997
		EP0900260A1	10.03.1999
		US5916863A	29.06.1999
		CN1221447A	30.06.1999
		BR9708898A	03.08.1999
		US6004913A	21.12.1999
		JP2000-509445A	25.07.2000
		MX9809180A1	01.02.1999
		KR20000010945A	25.02.2000
		EP0900260B1	31.10.2001
		DE69707864E	06.12.2001
		ES2165607T3	16.03.2002
		TW524907A	21.03.2003
		MX209114B	22.07.2002
		CN1097090C	25.12.2002
		CN1176264C	17.11.2004
		KR100467354B	16.05.2005
		IN9700896A	29.09.2006
		IN207964B	27.07.2007
		JP4420359B2	24.02.2010
US2008/0005852A1	10.01.2008	None	

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2012/076999

Continuation of :A. CLASSIFICATION OF SUBJECT MATTER

D06M15/507(2006.01) i

D06M13/325(2006.01) i

D06M101/32(2006.01) n