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(54) **USE OF POLYESTER TEREPHTHALATE TO REDUCE MALODOUR ON FABRICS**

(57) Use of a polyester terephthalate and use of a wash liquor containing said polyester terephthalate to reduce malodour on fabrics.

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Description

FIELD OF THE INVENTION

- 5 **[0001]** Use of a polyester terephthalate and use of a wash liquor containing said polyester terephthalate to reduce malodour on fabrics.

BACKGROUND OF THE INVENTION

- 10 **[0002]** Consumers use laundry detergent compositions during the laundry process. Such laundry detergent compositions provide cleaning, freshness and/or care benefits to the fabrics during the laundry operation.

- [0003]** Recently, of particular concern to some consumers, a developing need for laundry detergents is ensuring that malodours on fabrics are reduced to a minimum during the laundry process. Malodours are typically caused by adherence of hydrophobic soils such as body soils, cooking oils, and non-food oils onto fabrics, especially onto hydrophobic fabrics, followed by, optionally bacterial induced, chemical degradation, generating, and hence, releasing bad smelling volatiles materials.

- [0004]** However, achieving reduction of malodours onto fabrics during a washing process traditionally has required the addition of specific malodour reducing technologies to the detergent composition. Due to environmental appreciation and a desire to reduce carbon footprints, there is a trend to compact detergent formulations so to reduce resources required for shipping and packaging. This requirement for compaction is especially true in water-soluble unit dose articles. Therefore, traditionally formulators often face a trade-off of one benefit for another due to a required prioritization call of one active versus the other due to space constraints for actives within the formulation. Additionally, such malodour reducing technologies are added to fabric softening compositions which are added in the rinse step of a wash operation after the main wash operation. This has the disadvantage of requiring the user to use both a detergent composition for the main wash and a subsequent softener composition in the rinse step to achieve the malodour reduction benefits.

- [0005]** Therefore, there is a desire in the art to formulate actives that provide multiple benefits in laundry detergent compositions especially in compacted compositions such as water-soluble unit dose articles, with reduced or no trade-off of one benefit in preference of another.

- [0006]** Anionic polyester terephthalates are known as soil release (whiteness boosting) polymers on fabrics. However, it was surprisingly found, both under single as well as under multi-cycle testing, that anionic polyester terephthalates can also be used to reduce malodours on fabrics. Without wishing to be bound by theory, it is believed that the ethoxylate groups of the polyester terephthalate polymer are thought to create a hydrophilic layer on the fabric surface, especially on hydrophobic fabrics such as polyester, resulting in reduced (re-) adherence of hydrophobic soils on fabrics during the wash cycle or during subsequent use of the fabrics. Also, it was surprisingly found that anionic polyester terephthalates are less sensitive than other polyester terephthalates to being washed off again during the same or subsequent wash operation. Without wishing to be bound by theory, it is believed the anionic polyester terephthalate has a repulsive effect on the mainly anionically charged detergent surfactant system, so reducing instances of the polyester terephthalate being washed off the fabrics.

- [0007]** Therefore, the use according to the present invention provides the dual benefit of reduced malodour on fabrics and soil release (whiteness) benefits whilst minimizing the addition of actives. Furthermore, the malodour benefit was achieved without the additional use of a fabric softener.

SUMMARY OF THE INVENTION

- 45 **[0008]** A first aspect of the present invention is the use of a polyester terephthalate polymer to reduce malodour on a fabric, wherein the polyester terephthalate comprises a polyester terephthalate backbone and the polyester terephthalate backbone is grafted with one or more anionic groups.

BRIEF DESCRIPTION OF THE DRAWINGS

- 50 **[0009]** FIG.1 is a water-soluble unit dose article according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

- 55 Use of a polyester terephthalate polymer

- [0010]** An aspect of the present invention is the use of a polyester terephthalate polymer to reduce malodour on a fabric, wherein the polyester terephthalate comprises a polyester terephthalate backbone and the polyester terephthalate

backbone is grafted with one or more anionic groups. The polyester terephthalate is described in more detail below.

[0011] A 'malodour' is any odour that a user finds unpleasant or undesirable. Preferably, the malodour comprises body soils, cooking oils and chemical degradation products thereof, non-food oils and chemical degradation products thereof, or mixtures thereof, preferably hydrolysable fatty acid esters and chemical degradation products thereof, hydrolysable triglyceride esters and chemical degradation products thereof or a mixture thereof. By 'degradation products thereof, we herein mean preferably aldehydes, ketones, epoxides, hydroxy compounds or a mixture thereof. Without wishing to be bound by theory, oils, especially vegetable oils are composed of glycerol molecules esterified by three fatty acids molecules. Each type of vegetable oils is characterized by its own specific fatty acids ratio content. Predominantly, fatty acids have 16 or 18 carbon atoms in straight aliphatic chains, and these chains can undergo degradation changes due to high levels of double bonds presented. They are quite sensitive to oxidative conditions and generate many degradation products including aldehydes, ketones, epoxides, hydroxy compounds, or mixtures thereof. Oxidative stress can also cause conjugated double bond system formation as well as of trans fatty acids.

[0012] The malodour may comprise body soils, cooking oils, non-food oils, or mixtures thereof, preferably hydrolysable fatty acid esters, hydrolysable triglyceride esters or a mixture thereof.

[0013] Those skilled in the art will be aware of suitable fabrics. Preferably, the fabrics comprise cotton, polycotton, polyester, or mixtures thereof, preferably the fabric comprises polyester.

[0014] The polyester terephthalate may be used to;

- a. reduce malodour on fabrics during a laundry wash operation, wherein the polyester terephthalate polymer is comprised within a wash liquor and the wash liquor is in contact with the fabric;
- b. reduce malodour on fabrics during use of said fabrics following a wash operation, wherein in the wash operation the polyester terephthalate polymer is comprised within a wash liquor and the wash liquor is in contact with the fabric and following contact the polyester terephthalate polymer is deposited onto the fabrics;
- c. reduce malodour on fabrics during a laundry wash operation, wherein the polyester terephthalate polymer is comprised on the fabric prior to the fabric being contacted with a wash liquor;
- d. or a mixture thereof.

[0015] Those skilled in the art will be aware of standard laundry wash operations. The wash operation may be a manual wash operation, an automatic wash operation, a semi-automatic wash operation or a mixture thereof. Without wishing to be bound by theory, a laundry wash operation involves making a wash liquor which is contacted with fabrics to be washed. The wash liquor may be prepared first and the fabrics then added, or the wash liquor can be created in a suitable container or drum of an automatic washing machine in which the fabrics have been placed first, i.e. the wash liquor is created around the fabrics.

[0016] Preferably the wash liquor may comprise between 1L and 64L, preferably between 2L and 32L, more preferably between 3L and 20L of water.

[0017] Preferably, the wash liquor is at a temperature of between 5°C and 90°C, preferably between 10°C and 60°C, more preferably between 12°C and 45°C, most preferably between 15°C and 40°C.

[0018] Preferably, washing the fabrics in the wash liquor takes between 5 minutes and 50 minutes, preferably between 5 minutes and 40 minutes, more preferably between 5 minutes and 30 minutes, even more preferably between 5 minutes and 20 minutes, most preferably between 6 minutes and 18 minutes to complete.

[0019] Preferably, the wash liquor comprises between 1kg and 20 kg, preferably between 3kg and 15kg, most preferably between 5 and 10 kg of fabrics.

[0020] The wash liquor may comprise water of any hardness preferably varying between 0 gpg to 40gpg.

[0021] Without wishing to be bound by theory, the polyester terephthalate polymer may be used to reduce malodours on fabrics during the wash operation, or on fabrics when in use following a wash operation (e.g. as they are being worn) or both. In the wash operation, the polyester terephthalate polymer may be added to the wash liquor separately to that of the fabrics, or may be present on the fabrics prior to them being contacted with the wash liquor, or both.

[0022] Preferably, the polyester terephthalate is present in the wash liquor, preferably at a concentration between 1ppm and 200ppm, preferably between 5ppm and 150ppm, most preferably between 10ppm and 100ppm.

[0023] Those skilled in the art will be aware of ways to prepare a wash liquor. Preferably, the wash liquor is prepared by diluting a laundry detergent composition in water, diluting a fabric softening composition in water, or a mixture thereof, and wherein the laundry detergent composition, the fabric softening composition, or a mixture thereof, comprises the polyester terephthalate polymer. Preferably, the polyester terephthalate polymer is comprised within a wash liquor and the wash liquor is in contact with the fabric. Those skilled in the art will be aware of how to make laundry detergent and fabric softening compositions. Preferred laundry detergent and fabric softening compositions are described in more detail below.

[0024] Preferably, the wash liquor comprises a non-soap surfactant, preferably wherein the non-soap surfactant is present at a concentration of between 10ppm and 2000ppm, preferably between 50ppm and 1500ppm, most preferably

between 100ppm and 1000ppm. Where the wash liquor is prepared by diluting a laundry detergent composition, a fabric softening composition or mixture thereof in water, the non-soap surfactant may be present in the laundry detergent composition, fabric softening composition or mixture thereof.

[0025] Preferably, the non-soap surfactant comprises a non-soap anionic surfactant, a non-ionic surfactant or a mixture thereof, preferably wherein the weight ratio of the non-soap anionic surfactant to non-ionic surfactant is between 1:2 to 20:1, preferably from 1:1 to 15:1, more preferably from 1.5:1 to 15:1, most preferably from 3:1 to 15:1.

[0026] Preferably, the non-soap anionic surfactant comprises linear alkylbenzene sulphonate, alkyl sulphate, alkoxy-ylated alkyl sulphate or a mixture thereof, preferably wherein the weight ratio of linear alkylbenzene sulphonate to alkoxy-ylated alkyl sulphate is between 15:1 and 1:15, preferably 10:1 and 1:10, more preferably 5:1 and 1:5, even more preferably 4:1 and 1:4.

[0027] The non-ionic surfactant may be selected from a fatty alcohol alkoxylate, an oxo-synthesised fatty alcohol alkoxylate, Guerbet alcohol alkoxylates, alkyl phenol alcohol alkoxylates or a mixture thereof. The non-ionic surfactant may be added to the wash liquor via the laundry detergent composition, the fabric softening composition or a mixture thereof.

[0028] Preferably, the wash liquor comprises between 1 ppm and 1000 ppm, preferably between 5 ppm and 500 ppm, most preferably between 10 ppm and 250 ppm of soap preferably a fatty acid salt, more preferably an amine neutralized fatty acid salt, wherein preferably the amine is an alkanolamine more preferably selected from monoethanolamine, diethanolamine, triethanolamine or a mixture thereof, more preferably monoethanolamine.

[0029] Preferably, the wash liquor comprises an adjunct ingredient selected from hueing dyes, polymers, builders, dye transfer inhibiting agents, dispersants, enzyme stabilizers, catalytic materials, bleach, bleach activators, polymeric dispersing agents, anti-redeposition agents, suds suppressors, aesthetic dyes, opacifiers, perfumes, perfume delivery systems, structurants, hydrotropes, processing aids, pigments, amphoteric surfactants, cyclic diamines, zwitterionic polyamines, anti-oxidants, preservatives and mixtures thereof, preferably selected from fatty acid, neutralised fatty acid salt, carboxymethylcellulose, amphiphilic graft co-polymer, hydroxyethyl cellulose, modified hydroxyethylcellulose, an enzyme, sulphite, or a mixture thereof. The adjunct ingredient may be added to the wash liquor via the laundry detergent composition, the fabric softening composition or a mixture thereof.

[0030] Preferably, the enzyme is selected from protease, amylase, lipase, cellulase, mannanase, pectate lyase, xyloglucanase, keratinase or a mixture thereof.

[0031] The wash liquor may comprise a further polymer selected from the group comprising an alkoxyated polyethyleneimine, preferably an ethoxylated polyethyleneimine, a cationically modified polysaccharide, preferably a cationically modified hydroxyethylcellulose, a carboxymethylcellulose, preferably a hydrophobically modified carboxymethylcellulose, and an amphiphilic graft soil release polymer, preferably a polyethylene glycol graft polymer comprising a polyethylene glycol backbone and hydrophobic vinyl acetate side chains, or a mixture thereof.

[0032] Preferably, the wash liquor comprises a chelant, an anti-oxidant or a mixture thereof.

Laundry detergent composition

[0033] The polyester terephthalate polymer may be comprised in a laundry detergent composition. The laundry detergent composition may be a powder, a liquid or a mixture thereof.

[0034] The solid laundry detergent composition may comprise solid particulates or may be a single homogenous solid. Preferably, the solid laundry detergent composition comprises particles. This means the solid laundry detergent composition comprises individual solid particles as opposed to the solid being a single homogenous solid. The particles may be free-flowing or may be compacted, preferably free-flowing.

[0035] The term 'liquid laundry detergent composition' refers to any laundry detergent composition comprising a liquid capable of wetting and treating a fabric, and includes, but is not limited to, liquids, gels, pastes, dispersions and the like. The liquid composition can include solids or gases in suitably subdivided form, but the liquid composition excludes forms which are non-fluid overall, such as powders, tablets or granules.

[0036] Preferably, the liquid laundry detergent composition has a pH between 6 and 10, more preferably between 6.5 and 8.9, most preferably between 7 and 8. The pH of the liquid laundry detergent composition may be measured as a 10% dilution in demineralized water at 20°C.

[0037] The liquid detergent composition preferably has a viscosity of between 100 and 1000 cPa.s, measured at a shear rate of 20/s at 20 °C on a TA instruments AR-G2 or AR2000 using a 40mm plate geometry and a 500 micron gap size.

[0038] The laundry detergent composition may be present in a water-soluble unit dose article and the water-soluble unit dose article comprises a water-soluble film.

[0039] The water-soluble unit dose article comprises a water-soluble film and a laundry detergent composition. The laundry detergent composition and the water-soluble film are described in more detail below.

[0040] The water-soluble unit dose article comprises the water-soluble film shaped such that the unit-dose article comprises at least one internal compartment surrounded by the water-soluble film, and wherein the laundry detergent

composition is present within said compartment. The unit dose article may comprise a first water-soluble film and a second water-soluble film sealed to one another such to define the internal compartment. The water-soluble unit dose article is constructed such that the laundry detergent composition does not leak out of the compartment during storage. However, upon addition of the water-soluble unit dose article to water, the water-soluble film dissolves and releases the contents of the internal compartment into the wash liquor.

[0041] The compartment should be understood as meaning a closed internal space within the unit dose article, which holds the detergent composition. During manufacture, a first water-soluble film may be shaped to comprise an open compartment into which the detergent composition is added. A second water-soluble film is then laid over the first film in such an orientation as to close the opening of the compartment. The first and second films are then sealed together along a seal region.

[0042] The unit dose article may comprise more than one compartment, even at least two compartments, or even at least three compartments. The compartments may be arranged in superposed orientation, i.e. one positioned on top of the other. In such an orientation the unit dose article will comprise three films, top, middle and bottom. Alternatively, the compartments may be positioned in a side-by-side orientation, i.e. one orientated next to the other. The compartments may even be orientated in a 'tyre and rim' arrangement, i.e. a first compartment is positioned next to a second compartment, but the first compartment at least partially surrounds the second compartment, but does not completely enclose the second compartment. Alternatively one compartment may be completely enclosed within another compartment.

[0043] Wherein the unit dose article comprises at least two compartments, one of the compartments may be smaller than the other compartment. Wherein the unit dose article comprises at least three compartments, two of the compartments may be smaller than the third compartment, and preferably the smaller compartments are superposed on the larger compartment. The superposed compartments preferably are orientated side-by-side.

[0044] In a multi-compartment orientation, the laundry detergent composition according to the present invention may be comprised in at least one of the compartments. It may for example be comprised in just one compartment, or may be comprised in two compartments, or even in three compartments.

[0045] Each compartment may comprise the same or different compositions. The different compositions could all be in the same form, or they may be in different forms.

[0046] The water-soluble unit dose article may comprise at least two internal compartments, wherein the liquid laundry detergent composition is comprised in at least one of the compartments, preferably wherein the unit dose article comprises at least three compartments, wherein the detergent composition is comprised in at least one of the compartments.

[0047] FIG. 1 discloses a water-soluble unit dose article (1) according to the present invention. The water-soluble unit dose article (1) comprises a first water-soluble film (2) and a second water-soluble film (3) which are sealed together at a seal region (4). The laundry detergent composition (5) is comprised within the water-soluble unit dose article (1).

[0048] The film of the present invention is soluble or dispersible in water. The water-soluble film preferably has a thickness of from 20 to 150 micron, preferably 35 to 125 micron, even more preferably 50 to 110 micron, most preferably about 76 micron.

[0049] Preferably, the film has a water-solubility of at least 50%, preferably at least 75% or even at least 95%, as measured by the method set out here after using a glass-filter with a maximum pore size of 20 microns:

5 grams \pm 0.1 gram of film material is added in a pre-weighed 3L beaker and 2L \pm 5ml of distilled water is added. This is stirred vigorously on a magnetic stirrer, Labline model No. 1250 or equivalent and 5 cm magnetic stirrer, set at 600 rpm, for 30 minutes at 30°C. Then, the mixture is filtered through a folded qualitative sintered-glass filter with a pore size as defined above (max. 20 micron). The water is dried off from the collected filtrate by any conventional method, and the weight of the remaining material is determined (which is the dissolved or dispersed fraction). Then, the percentage solubility or dispersability can be calculated.

[0050] Preferred film materials are preferably polymeric materials. The film material can, for example, be obtained by solution casting, blow-moulding, extrusion or blown extrusion of the polymeric material, as known in the art.

[0051] Preferred polymers, copolymers or derivatives thereof suitable for use as pouch material are selected from polyvinyl alcohols, polyvinyl pyrrolidone, polyalkylene oxides, acrylamide, acrylic acid, cellulose, cellulose ethers, cellulose esters, cellulose amides, polyvinyl acetates, polycarboxylic acids and salts, polyaminoacids or peptides, polyamides, polyacrylamide, copolymers of maleic/acrylic acids, polysaccharides including starch and gelatine, natural gums such as xanthum and carragum. More preferred polymers are selected from polyacrylates and water-soluble acrylate copolymers, methylcellulose, carboxymethylcellulose sodium, dextrin, ethylcellulose, hydroxyethyl cellulose, hydroxypropyl methylcellulose, maltodextrin, polymethacrylates, and most preferably selected from polyvinyl alcohols, polyvinyl alcohol copolymers and hydroxypropyl methyl cellulose (HPMC), and combinations thereof. Preferably, the level of polymer in the pouch material, for example a PVA polymer, is at least 60%. The polymer can have any weight average molecular weight, preferably from about 1000 to 1,000,000, more preferably from about 10,000 to 300,000 yet more preferably from about 20,000 to 150,000.

[0052] Mixtures of polymers and/or copolymers can also be used as the pouch material, especially mixtures of polyvinylalcohol polymers and/or copolymers, especially mixtures of polyvinylalcohol homopolymers and/or anionic polyvi-

nylalcohol copolymers preferably selected from sulphonated and carboxylated anionic polyvinylalcohol copolymers especially carboxylated anionic polyvinylalcohol copolymers. Most preferably the water soluble film comprises a blend of a polyvinylalcohol homopolymer and a carboxylated anionic polyvinylalcohol copolymer.

[0053] Preferred films exhibit good dissolution in cold water, meaning unheated distilled water. Preferably such films exhibit good dissolution at temperatures of 24°C, even more preferably at 10°C. By good dissolution it is meant that the film exhibits water-solubility of at least 50%, preferably at least 75% or even at least 95%, as measured by the method set out here after using a glass-filter with a maximum pore size of 20 microns, described above.

[0054] Preferred films are those supplied by Monosol under the trade references M8630, M8900, M8779, M8310.

[0055] The film may be opaque, transparent or translucent. The film may comprise a printed area.

[0056] The area of print may be achieved using standard techniques, such as flexographic printing or inkjet printing.

[0057] The film may comprise an aversive agent, for example a bittering agent. Suitable bittering agents include, but are not limited to, naringin, sucrose octaacetate, quinine hydrochloride, denatonium benzoate, or mixtures thereof. Any suitable level of aversive agent may be used in the film. Suitable levels include, but are not limited to, 1 to 5000ppm, or even 100 to 2500ppm, or even 250 to 2000rpm.

[0058] Alternatively, the polyester terephthalate may be present in a fabric softening composition. which is diluted by a factor of between 300 and 3000 fold in water to create the wash liquor.

Fabric softening composition

[0059] The softening composition may be in any suitable form. The softening composition may be a powder, a liquid or a mixture thereof.

[0060] The softening composition may comprise solid particulates or may be a single homogenous solid. Preferably, the solid softening composition comprises particles. This means the solid softening composition comprises individual solid particles as opposed to the solid being a single homogenous solid. The particles may be free-flowing or may be compacted, preferably free-flowing.

[0061] The term 'liquid laundry softening composition' refers to any laundry softening composition comprising a liquid capable of wetting and treating a fabric, and includes, but is not limited to, liquids, gels, pastes, dispersions and the like. The liquid composition can include solids or gases in suitably subdivided form, but the liquid composition excludes forms which are non-fluid overall, such as powders, tablets or granules.

[0062] The fabric softening composition may comprise a softening active selected from quaternary ammonium compounds, amines, fatty esters, sucrose esters, silicones, dispersible polyolefins, polysaccharides, fatty acids, softening oils, polymer latexes, softening clays and combinations thereof, preferably wherein the fabric softening active is selected from the group consisting of quaternary ammonium compounds and mixtures thereof, more preferably ester quats, most preferably wherein the fabric softening active is selected from the group consisting of diester quats, more preferably Diethylester Dimethyl Ammonium Chloride (DEEDMAC).

[0063] When formulated in a fabric softening composition, preferably, the softening composition comprises between 2% and 25%, preferably between 4% and 20%, more preferably between 5% and 15%, most preferably between 5% and 13% by weight of the softening composition of the softening active.

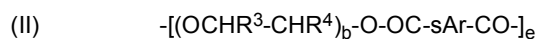
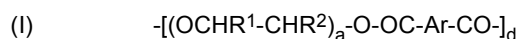
[0064] The laundry softening composition preferably further comprises perfume or perfume capsule technology, aiming at delivering scent to the treated fabrics. The laundry softening composition may comprise further ingredients, as typically recognized by a skilled person in the art.

Polyester terephthalate polymer

[0065] The polyester terephthalate is a polyester terephthalate backbone grafted with one or more anionic groups, more preferably, an anionic polyester of propylene terephthalate.

[0066] Suitable anionic polyesters are those that are derived from terephthalic acid, 5-sulfoisophthalic acid or the salt of 5-sulfoisophthalic acid, from ethylene glycol or polyethylene glycol, propylene glycol or polypropylene glycol and polyalkyleneglycol monoalkyl ether, and optionally from further monomers having 3 to 6 functions capable of polycondensation, in particular acid, alcohol or ester functions.

[0067] Preferably, the polyester terephthalate comprises the combination of structural units (I) to (III):



wherein:

a, b and c are from 1 to 200;

d, e and f are from 1 to 50;

Ar is a 1,4-substituted phenylene;

sAr is 1,3-substituted phenylene substituted in position 5 with SO₃Me;

Me is Li, K, Mg/2, Ca/2, Al/3, ammonium, mono-, di-, tri-, or tetraalkylammonium wherein the alkyl groups are (C₁-C₂₂) alkyl or (C₂-C₁₀) hydroxyalkyl, or mixtures thereof;

R¹, R², R³, R⁴, R⁵ and R⁶ are independently selected from H or (C₁-C₁₈)n- or iso-alkyl preferably methyl; and R⁷ is a linear or branched (C₁-C₁₈) alkyl, or a linear or branched (C₂-C₃₀) alkenyl, or a cycloalkyl group with 5 to 9 carbon atoms, a (C₆-C₃₀) aryl group or a (C₆-C₅₀) arylalkyl group preferably phenyl or benzyl.

[0068] Preferably, the polyester terephthalate comprises the structural units (I) to (III) wherein;

R¹ to R⁶ independently are H or methyl,

R⁷ is methyl,

a, b and c are a number from 1 to 20, preferably a and b are 1 and c is a number from 2 to 10,

d is a number between 1 and 25, preferably between 1 and 10, more preferably between 1 and 5,

e is a number between 1 and 30, preferably between 2 and 15, more preferably between 3 and 10, and

f is a number between 0.05 and 15, preferably between 0.1 and 10, more preferably between 0.25 and 3.

[0069] The polyester terephthalates according to the invention generally have a number average molecular weight in the range of 700 to 50000 g/mol, preferably 800 to 25000 g/mol, more preferably 1000 to 15000 g/mol, most preferably 1200 to 12000 g/mol.

[0070] Suitable anionic polyester terephthalate soil release polymers are sold by Clariant under the TexCare® series of polymers, e.g. TexCare® SRA300.

[0071] The laundry detergent preferably comprises between 0.1% and 10% preferably between 0.5 and 5% by weight of the detergent composition of the anionic polyester terephthalate soil release polymer. The anionic polyester terephthalate is present in the wash liquor, preferably at a concentration between 1ppm and 200ppm, preferably between 5ppm and 150ppm, more preferably between 10ppm and 100ppm.

[0072] The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

EXAMPLES

Examples:

[0073] The impact of a single variable addition of an anionically modified polyester terephthalate soil release polymer (Texcare SRA300) according to the invention on top of a nonaqueous soluble unit dose laundry detergent, towards amount of remaining malodor at the end of a full scale washing test has been assessed according to the protocol described herein.

Test Products:

[0074] The following compositions were prepared by mixing of the individual components, followed by enclosing in a water soluble PVA film, supplied by the Monosol company, to obtain water soluble unit dose laundry pouches. Each unit dose laundry pouch comprised 29.932g of the detergent compositions. Texcare SRA300 was added separately to the wash as a 20% active aqueous solution.

Wt%	Comparative Example 1	Example 1A	Example 1B	Example 1C
C1415EO7	3.0	3.0	3.0	3.0
C1214EO9	0.9	0.9	0.9	0.9
HLAS	22.8	22.8	22.8	22.8
C1215AE2.5S	15.5	15.5	15.5	15.5

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(continued)

	Wt%	Comparative Example 1	Example 1A	Example 1B	Example 1C
5	Citric acid	0.9	0.9	0.9	0.9
	C1218 Fatty acid	6.3	6.3	6.3	6.3
	Enzymes (amylase, protease, mannanase)	0.1	0.1	0.1	0.1
10	Ethoxylated polyethyleneimine (PEI600EO20)*	3.4	3.4	3.4	3.4
	Amphiphilic graft polymer**	2.3	2.3	2.3	2.3
15	DTPA chelant	0.9	0.9	0.9	0.9
	Brightener 49	0.2	0.2	0.2	0.2
	Hueing dye	0.03	0.03	0.03	0.03
	1,2-propanediol	11.9	11.9	11.9	11.9
20	glycerol	4.0	4.0	4.0	4.0
	dipropyleneglycol	4.2	4.2	4.2	4.2
	MEA	8.4	8.4	8.4	8.4
25	water	10.6	10.6	10.6	10.6
	Hydrogenated Castor Oil	0.1	0.1	0.1	0.1
	Perfume, dye & minors	Balance till 100	Balance till 100	Balance till 100	Balance till 100
30	Texcare SRA300 added separately	-	0.1g active in wash	0.5g active in wash	1g active in wash

35	Wt%	Comparative Example 2	Example 2A	Example 2B	Example 2C
	C1415EO7	3.0	3.0	3.0	3.0
	C1214EO9	0.9	0.9	0.9	0.9
40	HLAS	22.8	22.8	22.8	22.8
	C1215AE2.5S	15.5	15.5	15.5	15.5
	Citric acid	0.9	0.9	0.9	0.9
	C1218 Fatty acid	6.3	6.3	6.3	6.3
45	Enzymes (amylase, protease, mannanase)	0.1	0.1	0.1	0.1
	Ethoxylated polyethyleneimine (PEI600EO20)*	3.4	3.4	3.4	3.4
50	Amphiphilic graft polymer**	2.3	2.3	2.3	2.3
	DTPA chelant	0.9	0.9	0.9	0.9
	Brightener 49	0.2	0.2	0.2	0.2
55	Hueing dye	0.03	0.03	0.03	0.03
	1,2-propanediol	11.9	11.9	11.9	11.9
	glycerol	4.0	4.0	4.0	4.0

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(continued)

Wt%	Comparative Example 2	Example 2A	Example 2B	Example 2C
dipropyleneglycol	4.2	4.2	4.2	4.2
MEA	8.4	8.4	8.4	8.4
water	10.6	10.6	10.6	10.6
Hydrogenated Castor Oil	0.1	0.1	0.1	0.1
Perfume, dye & minors	Balance to 100%	Balance to 100%	Balance to 100%	Balance to 100%
Texcare SRA300 added separately	-	0.25g active in wash	0.33g active in wash	0.41g active in wash
*ethoxylated polyethyleneimine having an average degree of ethoxylation of 20 per EO chain and a polyethyleneimine backbone with MW of about 600 **polyethylene glycol graft polymer comprising a polyethylene glycol backbone (Pluriol E6000) and hydrophobic vinyl acetate side chains, comprising 40% by weight of the polymer system of a polyethylene glycol backbone polymer and 60% by weight of the polymer system of the grafted vinyl acetate side chains				

Malodor cocktail:

[0075] The following malodor cocktail compositions were prepared by mixing of the individual components (supplied by Sigma Aldrich, purity grade >95% - Artificial Body Soil by Accurate Product Development). The malodor cocktail is stored at a temperature below 0°C. Malodor cocktails are re-equilibrated at room temperature prior to application on test swatches.

Malodor Premix:

[0076]

Material	CAS #	% Composition
Iso Valeric acid	503-74-2	12.00
Undecanal	112-44-7	0.20
Undecanoic Acid	112-37-8	62.80
Skatole	83-34-1	1.00
Decanoic Acid	334-48-5	22.00
Ethyl undecanoate	627-90-7	2.00

COMPONENT	WEIGHT NEEDED (g)
Malodor Premix	11.7
Artificial Body Soil	17.55
Squalene (cas # 111-02-4)	17.55
After weighing add 135 mL Di-propylene glycol monomethyl ether (CAS: 34590-94-8) using a glass graduated cylinder	

Testing Protocol:

Wash Test:

[0077] 2x5 inch de-sized polycotton (50/50) test swatches, as supplied by Accurate Product Development, global

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materials supplier located in Cincinnati, Ohio, are pre-conditioned with test product prior to soiling. Herefore a single unit dose of the test product is placed first towards the back of the drum of a Duet 9200 front-loading washing machine, followed by addition of half of the ballast load size (1.95kg), the test swatches (16 pieces) and the remaining half of the ballast load size (1.95kg). A normal cycle is run at 77°F washing temperature, 60°F rinsing temperature and 7 gpg water hardness. This pre-conditioning step is repeated 4 times, followed by drying the test swatches together with 4 clean, dry hand towels for 20 minutes in a Maytag Double Stack dryer.

[0078] Malodor sensors are freshly prepared by applying the malodor cocktail to the pre-conditioned test swatches, using an Integra Viaflo Automatic Pipette attached with a 96-channel head (8x12) and 300µl pipette tips. 3 rows of 12 tips are filled with product, each tip providing 15µl of malodor cocktail on the pre-conditioned test swatches). 16 soiled swatches, i.e. the malodor sensors, are placed together and wrapped up in an Aluminium foil straight after completion of the malodor cocktail addition. These malodor sensors are stored at room temperature under a fume hood for use on the same day in a washing test.

[0079] For the washing test a single unit dose of the test product is placed first towards the back of the drum of a Duet 9200 front-loading washing machine, followed by addition of half of the ballast load size (1.95kg), the malodor soiled test swatches (16 pieces) and the remaining half of the ballast load size (1.95kg). A normal cycle is run at 77°F washing temperature, 60°F rinsing temperature and 7 gpg water hardness, followed by drying the malodor soiled test swatches together with 4 clean, dry hand towels for 20 minutes in a Maytag Double Stack dryer. 10 malodor sensor swatches are consequently stored overnight in a heat-sealed mylar bag for sensory evaluation, 6 malodor sensor swatches are equally stored overnight and sent for analytical evaluation. This washing test is repeated 4 times, such that 64 test swatches are obtained.

Evaluation:

Sensory Evaluation:

[0080] The 40 malodor sensor swatches per test leg (10 internal replicates per wash x 4 external replicate washes) are consequently assessed for remaining malodor intensity. One of the test designs recommended by ASTM (E1958) for finding differences in measurable attributes is using a trained sensory expert panel, also called descriptive analysis panel. The malodor sensor swatches are assessed by 9 trained external (i.e. non-employees) sensory expert panelists, who grade on malodor intensity and were trained on how to grade the prepared fabrics for dry fabric malodor intensity using their typical 0 (no malodor left) -100 (strong malodor left) scale. The malodor assessment is conducted 2-fold, i.e. before and after rubbing the malodor sensor swatches. All samples were labeled with a blinded 3-digit code, and presentation order was randomized.

Pre-rub assessment:

[0081] The test swatches are folded in 2 and opposite ends of the half-folded swatches are stretched with 2 hands. The left and right side of the test swatch are consequently sniffed, prior to flipping over the top end of the test swatch to assess the opposite side of the test swatch by sniffing again the left and right side. A remaining malodor intensity grade on a zero (no malodor left) to 100 (strong malodor left) scale is consequently provided. All 40 test swatches are assessed first for pre-rub, prior to move to post-rub assessment. A break of 2 minutes is provided in-between different test swatch evaluations. The average pre-rub malodor intensity grade of the 40 test swatches and the 9 panelists is calculated and recorded.

Post-rub Assessment:

[0082] The test swatches are folded in 2 and opposite ends of the half-folded swatches are stretched with 2 hands. **[0083]** The 2 hands are consequently brought together and with pressure rubbed together up and down 5 times, at a trained and calibrated pressure of 1.2 to 2.4 psi. The rubbed area of the test swatch is consequently sniffed and a remaining malodor intensity grade on a zero (no malodor left) to 100 (strong malodor left) scale is again provided. All 40 test swatches are assessed for post-rub. A break of 2 minutes is provided in-between different test swatch evaluations. The average post-rub malodor intensity grade of the 40 test swatches and the 9 panelists is calculated and recorded.

Analytical Evaluation :

[0084] Analytical evaluation of remaining malodor actives on test swatches after a laundry wash test has been conducted through a headspace measurement above test fabrics. Herefore a Gas Chromatograph 7890B equipped with a Gerstel Multi-Purpose sampler equipped with a solid phase micro-extraction (SPME) probe (Divinylbenzene/Carbox-

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en/Polydimethylsiloxane SPME fiber from Supelco part# 57298-U), DB-FFAP column Agilent part# 122-3232 (30 m, 0.25 mm, 0.25 μ m), a Mass Selective Detector (5977B), and Chemstation quantitation package was used. Test swatches were cut in 2x2.5 inch pieces and placed in a 10 ml headspace crimp vial, and allowed to equilibrate for 12 hours prior to running the analytical measurement. Test results were compared versus malodor standards to quantify amount of remaining malodor. Malodor standards for analysis were prepared by pipetting 1.18 mL of the malodor standard at room temperature into 10 mL deactivated headspace vials and equilibrated in an oven @ 80 C for 90 minutes and allowed to sit overnight before analysis.

Gerstel auto sampler parameters :

[0085]

- SPME: from Incubator
- Incubation Temperature : 80°C
- Incubation Time : 90.00 min SAMPLE PARAMETERS
- Sample Tray Type : VT32-10
- Vial Penetration : 22.00 mm
- Extraction Time : 20.00 min
- Inj. Penetration : 54.00 mm
- Desorption Time : 300 s

GC oven parameter :

[0086]

- Front SS Inlet He
- Mode Split
- Heater On 250 °C
- Pressure On 11.962 psi
- Total Flow On 79.5 mL/min
- Septum Purge Flow On 3 mL/min
- Split Ratio 50 :1
- GC Run Time 22.5 min
- Oven
- (Initial) 40 °C
- Hold Time 0 min
- Heating Program
- Rate 12 °C/min
- Temp 250 °C
- Hold Time 5

MSD parameters :

[0087]

- Run in scan mode with a minimum range of 40 to 350 m/z (range may be greater). A target ion for quantification is determined for each malodor component along with a minimum of 1 qualifier ion, preferably 2. The defined target and qualifier ions for each component must be based on an MSD compound library or standard.
- Calibration curves are generated from the standards in mineral oil for each malodor material. Utilizing the calibration headspace response, the integration of the extracted ion (EIC) for each malodor components in the samples are plotted or recorded.

Test Results :

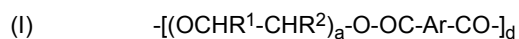
[0088] It is clear from both the sensory panel as from the analytical data tabulated below (the lower the better) that single variable addition of Texcare SRA300 technology on top of unit dose liquid laundry detergent formulation results in a reduction of remaining malodor on fabric.

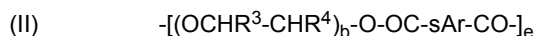
	Sensory Panel		Analytical data			
	Pre-Rub	Post-Rub	Total Markers	Squalene	Water Soluble Acids	Gen V Markers
<i>Comparative Example 1</i>	27.0	18.1	206.4	173.8	17.8	32.6
Example 1A	28.5	17.4	173.6	138.1	23.7	35.5
Example 1B	22.8	12.5	69.7	49.8	5.6	19.9
Example 1C	20.4	9.8	39.3	22.4	1.3	17.0

	Sensory Panel		Analytical data			
	Pre-Rub	Post-Rub	Total Markers	Squalene	Water Soluble Acids	Gen V Markers
<i>Comparative Example 2</i>	33.3	23.4	94.0	56.6	22.3	37.4
Example 2A	27.0	17.4	60.5	33.2	15.8	27.4
Example 2B	24.3	15.0	49.8	26.7	10.5	23.2
Example 2C	24.3	16.1	39.6	20.3	7.2	19.4

Claims

- Use of a polyester terephthalate polymer to reduce malodour on a fabric, wherein the polyester terephthalate comprises a polyester terephthalate backbone and the polyester terephthalate backbone is grafted with one or more anionic groups.
- The use according to claim 1 wherein the polyester terephthalate is used to;
 - reduce malodour on fabrics during a laundry wash operation, wherein the polyester terephthalate polymer is comprised within a wash liquor and the wash liquor is in contact with the fabric;
 - reduce malodour on fabrics during use of said fabrics following a wash operation, wherein in the wash operation the polyester terephthalate polymer is comprised within a wash liquor and the wash liquor is in contact with the fabric and following contact the polyester terephthalate polymer is deposited onto the fabrics;
 - reduce malodour on fabrics during a laundry wash operation, wherein the polyester terephthalate polymer is comprised on the fabric prior to the fabric being contacted with a wash liquor;
 - or a mixture thereof.
- The use according to claim 2 wherein the polyester terephthalate is present in the wash liquor, preferably at a concentration between 1ppm and 200ppm, preferably between 5ppm and 150ppm, more preferably between 10ppm and 100ppm.
- The use according to claim 3, wherein the wash liquor is prepared by diluting a laundry detergent composition in water, diluting a fabric softening composition in water, or a mixture thereof, and wherein the laundry detergent composition, the fabric softening composition, or a mixture thereof, comprises the polyester terephthalate polymer.
- The use according to claim 4, wherein the polyester terephthalate polymer is comprised in a laundry detergent composition, and the laundry detergent composition is comprised within a water-soluble unit dose article wherein the water-soluble unit dose article comprises a water-soluble film.
- The use according to any preceding claims wherein the polyester terephthalate polymer comprises a combination of the structural units (I) to (III):





wherein:

a, b and c are from 1 to 200;

d, e and f are from 1 to 50;

Ar is a 1,4-substituted phenylene;

sAr is 1,3-substituted phenylene substituted in position 5 with SO₃Me;

Me is Li, K, Mg/2, Ca/2, Al/3, ammonium, mono-, di-, tri-, or

tetraalkylammonium wherein the alkyl groups are (C₁-C₂₂) alkyl or (C₂-C₁₀) hydroxyalkyl, or mixtures thereof;

R¹, R², R³, R⁴, R⁵ and R⁶ are independently selected from H or (C₁-C₁₈)n- or iso-alkyl preferably methyl; and

R⁷ is a linear or branched (C₁-C₁₈) alkyl, or a linear or branched (C₂-C₃₀) alkenyl, or a cycloalkyl group with 5 to 9 carbon atoms, a (C₆-C₃₀) aryl group or a (C₆-C₅₀) arylalkyl group preferably phenyl or benzyl.

7. The use according to claim 6, wherein:

R¹ to R⁶ independently are H or methyl,

R⁷ is methyl,

a, b and c are a number from 1 to 20, preferably a and b are 1 and c is a number from 2 to 10,

d is a number between 1 and 25, preferably between 1 and 10, more preferably between 1 and 5,

e is a number between 1 and 30, preferably between 2 and 15, more preferably between 3

and 10, and

f is a number between 0.05 and 15, preferably between 0.1 and 10, more preferably between 0.25 and 3.

8. The use according to any preceding claims, wherein the malodour comprises body soils, cooking oils and chemical degradation products thereof, non-food oils and chemical degradation products thereof, or mixtures thereof, preferably hydrolysable fatty acid esters and chemical degradation products thereof, hydrolysable triglyceride esters and chemical degradation products thereof or a mixture thereof.

9. The use according to any of claims 2-8, wherein the wash liquor comprises a non-soap surfactant, preferably wherein the non-soap surfactant is present at a concentration of between 10ppm and 2000ppm, preferably between 50ppm and 1500ppm, most preferably between 100ppm and 1000ppm.

10. The use according to claim 9, wherein the non-soap surfactant comprises a non-soap anionic surfactant, a non-ionic surfactant or a mixture thereof, preferably wherein the weight ratio of non-soap anionic surfactant to non-ionic surfactant is from 1:2 to 20:1, preferably from 1:1 to 15:1, more preferably from 1.5:1 to 15:1, most preferably from 3:1 to 15:1.

11. The use according to claims 9 or 10, wherein the non-soap anionic surfactant comprises linear alkylbenzene sulphonate, alkyl sulphate, alkoxylated alkyl sulphate or a mixture thereof, preferably wherein the weight ratio of linear alkylbenzene sulphonate to alkoxylated alkyl sulphate is between 15:1 and 1:15, preferably 10:1 and 1:10, more preferably 5:1 and 1:5, even more preferably 4:1 and 1:4.

12. The use according to any of claims 2-11, wherein the wash liquor comprises an adjunct ingredient selected from hueing dyes, polymers, builders, dye transfer inhibiting agents, dispersants, enzyme stabilizers, catalytic materials, bleach, bleach activators, polymeric dispersing agents, anti-redeposition agents, suds suppressors, aesthetic dyes, opacifiers, perfumes, perfume delivery systems, structurants, hydrotropes, processing aids, pigments, amphoteric surfactants, cyclic diamines, zwitterionic polyamines, anti-oxidants, preservatives and mixtures thereof, preferably selected from fatty acid, neutralised fatty acid salt, carboxymethylcellulose, amphiphilic graft co-polymer, hydroxyethyl cellulose, modified hydroxyethylcellulose, an enzyme, sulphite, or a mixture thereof.

13. The use according to claim 12, wherein the enzyme is selected from protease, amylase, lipase, cellulase, mannanase, pectate lyase, xyloglucanase, keratinase or a mixture thereof.

14. The use according to any preceding claims wherein the fabric is selected from cotton, polycotton, polyester, or

mixtures thereof, preferably wherein the fabric comprises polyester.

- 15.** The use according to claims 2-14 wherein the wash liquor comprises a chelant, an anti-oxidant or a mixture thereof.

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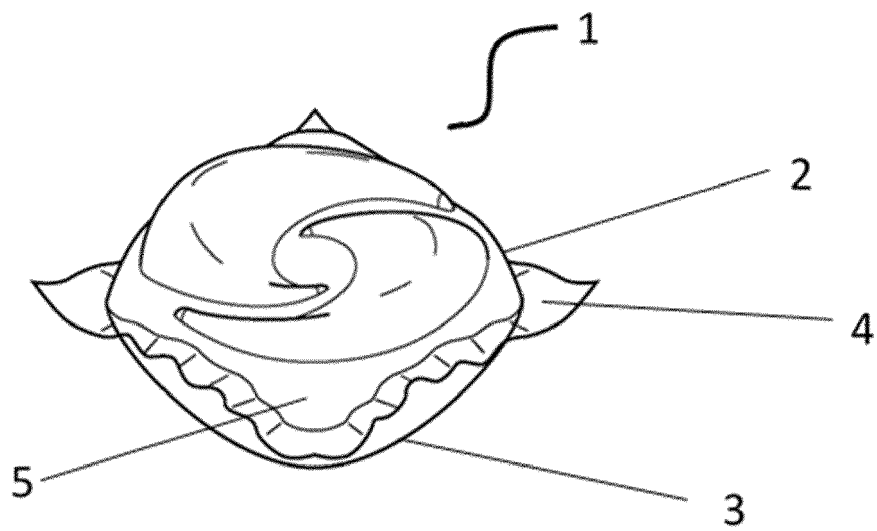
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FIG. 1





EUROPEAN SEARCH REPORT

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 December 2018	Examiner Grittern, Albert
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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