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(54) Title: COMPOSITION AND PROCESS FOR TREATMENT OF A FABRIC

(57) Abstract: The present invention relates to a process for treatment of a fabric. It further relates to a composition and a kit for treatment of a fabric. The invention will be described hereinafter with reference to this application. However, it will be appreciated that the invention is not limited to this particular field of use. It is an object of the present invention is to provide a process for treatment of a fabric that improves efficacy of subsequent cleaning. Surprisingly it is found that a mixture of two (or more) complex forming polymers, wherein one of the polymers is shielded from the other(s) by a spacer compound, solves the problem of stability, while providing the desired cleaning benefit.

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COMPOSITION AND PROCESS FOR TREATMENT OF A FABRIC

Technical Field

The present invention relates to a process for treatment of a fabric. It further relates to a composition and a kit for treatment of a fabric. The invention will be described hereinafter with reference to this application. However, it will be appreciated that the invention is not limited to this particular field of use.

Background and Prior Art

Any discussion of the prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of the common general knowledge in the field.

Better cleaning of fabric articles during washing has been the primary focus of laundry detergent research for decades. However, since the present day consumer has ever higher demands for the effectiveness of washing detergents, substantial improvements remain to be desired.

US2006046950A (Penninger and Bastigkeit, 2006) teaches a detergent composition for cleaning textile materials comprising a combination of a soil release-capable alkyl or hydroxyalkyl cellulose derivative and a hygroscopic polymer selected from the class consisting of polypeptides, hydrogels, polyvinyl alcohol, the polyalkylene glycols, the homopolymers of acrylic acid, methacrylic acid, and maleic acid, copolymers of acrylic acid, methacrylic acid, and maleic acid and mixtures of the homo and copolymers. The use of the hygroscopic polymers in combination with the cellulose derivatives is said to result in improved cleaning performance.

EP0256696 (Unilever, 1988) teaches that improvement in soil suspension is achieved by adding mixture of vinyl pyrrolidone polymer and a nonionic cellulose ether to a detergent composition.

GB994353 (Domestos, 1965) teaches that mixtures of certain polymeric materials, when incorporated into unbuilt detergent compositions based on synthetic surface active agents, provide enhanced anti-redeposition as compared to activity of individual polymers alone when added alone to same detergent compositions.

US3771951 (Berni et al, 1973) and GB133803 (Gaf Corp, 1973) teach that detergent composition comprising a water soluble detergent and a mixture of water soluble polyvinyl alcohol and a water soluble poly vinyl pyrollidone exhibits enhanced degree of soil suspension

The above methods are reported to provide improved antiredeposition of soils and better cleaning of fabrics. However, reduction in subsequent post-wash soiling of fabrics is not reported. Further, the cleaning compositions essentially comprise of a surfactant and the pH of wash liquor is alkaline or neutral.

US4007305 (Kakar et al, 1977) addresses the problem of providing satisfactory nondurable finishes to textiles which impart optimum soil release and soil repellent properties. According to D5, the textiles must be treated with an alkaline aqueous medium having pH value of 7.5-11 and containing water soluble hydrophilic soil release polymer having carboxylic acid groups and a dispersed hydrophobic soil repellent fluorochemical.

On the other hand, various industrial treatments for fabric modification are known to render the fabric less prone to soiling. The fabric modification of this type is normally carried out during textile manufacture. The treatments, besides being substrate-specific, are relatively difficult to practice in household.

In view of the shortcomings of the prior art, one of the objects of the present invention is to provide a process for reducing soiling of fabrics that can be easily used in the household.

Another object of the present invention is to provide a process of treatment of a fabric for reducing soiling of fabrics.

Yet another object of the present invention is to provide a process for treatment of a fabric that improves efficacy of subsequent cleaning.

Yet another object of the present invention is to provide a process for reducing soiling of fabrics that allows enhanced deposition of benefit agents, such as perfume and fluorescer.

Yet another object of the present invention is to provide a process for treatment of a fabric which is effective on various types of fabrics such as cotton, polyester and polycotton.

Yet another object of the present invention is to provide a process for treatment of a fabric which is relatively easy to practice in household.

It is yet another object of the present invention to provide such a composition and process for easier cleaning in the form of a single product having good storage stability.

Surprisingly it is found that a mixture of two (or more) complex forming polymers, wherein one of the polymers is shielded from the other(s) by a spacer compound, solves the problem of stability, while providing the desired cleaning benefit.

By secondary cleaning benefit is meant that a fabric treated with the composition exhibits benefits such as reduction in soiling, ease of subsequent cleaning and/or enhanced deposition of benefit agents.

Summary of the invention

According to a first aspect the present invention provides a fabric treatment composition comprising a complex or mixture of a polymer A selected from the group of homopolymers and copolymers of carboxylic acid and derivatives; a spacer compound; and a polymer B selected from the group of homopolymers and copolymers of alkylene oxides, vinyl pyrrolidone and/or their derivatives; and/or the group of homopolymers and copolymers of vinyl alcohol, saccharides, hydroxyalkyl cellulose and/or their derivates; and wherein the composition is in the form of a uniform dispersion.

According to a second aspect the present invention provides a wash or rinse liquor comprising between 0.02 and 40 g/l of the composition according to any one of claims 1 to 5, having a pH of < 6.

According to a third aspect the present invention provides a process for washing fabric comprising the steps in sequence of: contacting the fabric with a wash or rinse liquor comprising between 0.02 and 40 g/l of the composition according to any one of claims 1 to 5; leaving the fabric to dry; leaving the fabric for soil and/or dirt to deposit onto the fabric; washing the fabric with a conventional washing detergent in a conventional way.

According to a fourth aspect the present invention provides a process for preparing the composition according to the invention comprising the steps of mixing Polymer A with the spacer compound; and mixing the mixture from step a with the Polymer B.

By stability of the formulation, it is meant that the complex formation of the interacting polymers is avoided when it is solid form and give an instant complex when dispersed in water.

By secondary cleaning benefit is meant that a fabric treated with the composition exhibits benefits such as reduction in soiling, ease of subsequent cleaning and/or enhanced deposition of benefit agents.

These and other aspects, features and advantages will become apparent to those of ordinary skill in the art from a reading of the following detailed description and the appended claims. For the avoidance of doubt, any feature of one aspect of the present invention may be utilised in any other aspect of the invention. It is noted that the examples given in the description below are intended to clarify the invention and are not intended to limit the invention to those examples per se. Similarly, all percentages are weight/weight percentages unless otherwise indicated. Numerical ranges expressed in the format "from x to y" are understood to include x and y. When for a specific feature multiple preferred ranges are described in the format "from x to y", it is understood that all ranges combining the different endpoints are also contemplated.

Detailed description of the invention

The present invention thus aims for a composition and process for the application of a sacrificial layer of polymeric material onto a fabric surface, before dirt and/or soil is deposited onto the fabric. Upon the subsequent (conventional) washing of the fabric the dirt and/or soil are removed by dissolution of the sacrificial layer of the polymeric material from the fabric surface. This is also referred to in the art as a secondary cleaning benefit or next-time-cleaning-benefit.

Without wishing to be bound by a theory, it is thought that the polymers in the compositions of the invention form a complex when in contact with water under acid conditions by the formation of hydrogen bonds. The complex disperses into water and does not dissolve, like the individual polymers. The dispersed complex in turn is thought to bind or precipitate onto a fabric surface, thus forming a layer. The complex is thought to disintegrate when in alkaline conditions, such as the conditions in a laundry main wash, thereby removing the layer and soil or stains deposited onto the layer from the fabric.

Fabric

The fabric that can be treated includes synthetic as well as natural textiles. Fabrics may be made of cotton and other cellulosic materials, polycotton, polyester, silk or nylon. It is envisaged that the method of the present invention can be used to treat garments and other clothing and apparel materials that form typical washload in household laundry. The household materials that can be treated according to the process of the present invention include, but are not limited to, bedspreads, blankets, carpets, curtains and upholstery. Although the process of the present invention is described primarily for treatment of a fabric, it is envisaged that the process of the present invention can be advantageously used to treat other materials such as jute, leather, denim and canvass. It is envisaged that the process of the present invention can be used to treat articles such as shoes, rain-wear and jackets.

Polymers

The composition according to the invention comprises a polymer A and a polymer B. Polymers A and B are selected such that they form a complex due to the formation of hydrogen bonds.

The polymers may be homo polymers or co polymers. Wherein by copolymer of monomer X is meant any polymer that contains the monomer X at least one further monomer.

Polymer A

According to the present invention, polymer A is a polymer selected from the group of homopolymers and copolymers of carboxylic acid and derivatives. Polymer A has a plurality of carboxyl groups. The polymer A has a molecular mass preferably from 300 to 10^9 D. The polymer A is selected from the class consisting of homopolymers or copolymers of carboxylic polymers, including natural synthetic and semi-synthetic polymers in this class.

Some non-limiting examples of polymer A according to the present invention include:
(a) Homopolymer of a carboxylic acid, including but not limited to polycarboxylic acid such as polyacrylic acid, polymaleic acid or copolymer of acrylic and maleic acid.
(b) Polysaccharides comprising carboxyl groups. Such poly saccharides may include (but are not limited to) starch, cellulose, sodium alginate, natural gums, and their modified materials such as sodium carboxymethyl cellulose, hydroxyethyl cellulose.

Homopolymer or copolymer of carboxylic acid has a molecular mass of preferably from $2x10^3$ to 10^7 D more preferably from $5x10^4$ to 10^6 D and most preferably from $9x10^4$ to $5x10^5$ D.

The homopolymer or copolymer of saccharide has a molecular mass of preferably from 10^3 to 10^9 D, more preferably from 10^4 to 10^9 D and most preferably from 10^5 to 10^9 D.

The particle size is preferably less than 200µm, more preferably less than 100µm, still more preferably less than 50µm, even more preferably less than 10µm, or even less than 5µm.

Polymer A may be synthetic, semi-synthetic or natural. However, synthetic or semi-synthetic polymers are preferred.

Polymer A is preferably water soluble or water dispersable, most preferably polymer A is water soluble.

It is preferred that the polymer A is selected from a class consisting of homopolymers or copolymers of carboxylic acid.

The homopolymer or copolymer of carboxylic acid is preferably a polyacrylic acid or a copolymer thereof. Examples include SOKALAN® PA (BASF) and CARBOPOL® (Lubrizol).

The concentration of polymer A in a fabric cleaning or fabric rinse composition is preferably between 0.01 and 25% by weight, more preferably at least 0.1%, or even at least 1%, but preferably not more than 20%, more preferably less than 15%.

The amount of polymer A relative to the fabric surface area is preferably from 0.5 to 200 µg/cm^2 of fabric surface area, more preferably from 1 to 100 µg/cm^2, and most preferably from 2 to 50 µg/cm^2 of fabric surface area. The term “fabric surface area” as used herein refers to surface area of one side of the fabric.

Polymer B

According to the present invention, polymer B has a monomeric unit comprising a group that can form hydrogen bonds with the carboxyl groups of polymer A.

Accordingly, polymer B is selected from the group of homopolymers and copolymers of alkylene oxides, vinyl pyrrolidone and/or their derivatives; and/or the group of homopolymers and copolymers of vinyl alcohol, saccharides, hydroxyalkyl cellulose and/or their derivates.

The group of homopolymers and copolymers of vinyl alcohol, saccharides, hydroxyalkyl cellulose and/or their derivates, is generally not water soluble. In order to obtain the benefit of this group of polymers the particle size is set such that the particles are easily dispersible in water or and aqueous solution (i.e. a wash or rinse liquor). The particle size is preferably less than 200µm, preferably less than 100µm, more preferably less than 50µm still more preferably less than 10µm, or even less than 5µm.

Polymers and homopolymers of carboxylic acid and/or sacchharides and/or polyalkylene glycol/ether qualify to be selected both as polymer A or polymer B, as they comprise hydroxyl or carboxyl group and either a carbonyl or an ether group. However, according to an essential aspect, polymer A and polymer B are not of the same class. It is particularly preferred that the polymers A and B are selected from different classes of polymers. Without wishing to be limited by theory, it is believed that the two polymers A and B, when dissolved in water, form a complex with a solubility lower than each of the polymers A and B, which helps in enhanced deposition and other benefits.

Polymer B has a molecular mass preferably from 10^3 to 10^9 D.

Homopolymers or copolymers of vinyl pyrrolidone or vinyl alcohol preferably have a molecular mass of between 10^3 and 10^7 D, more preferably from 10^4 to 10^6 D and most preferably from 30,000 to 500,000 D. Commercially available polyvinyl pyrrolidone can be used, one example of which is LUVISKOL® (BASF).

Homopolymers or copolymers of poly alkylene oxide preferably have a molecular mass greater than $2x10^4$ D. The molecular mass is preferably from $2x10^4$ to 10^6 D, more preferably from $3x10^4$ to $5x10^5$ D and most preferably from $5x10^4$ to $2x10^5$ D.

Homopolymers or copolymers of saccharide preferably have a molecular mass of preferably from 10^3 to 10^9 D, more preferably from 10^4 to 10^9 D and most preferably from 10^5 to 10^9 D. Any commercially available poly alkylene oxide, for example POLYOX® (Dow Chemical Co) can be used according to the present invention.

Polymer B may be synthetic, semi-synthetic or natural. However, synthetic or semi-synthetic polymers are preferred.

According to a preferred aspect, the polymer B is water soluble.

It is particularly preferred that the polymer B is selected from a class consisting of homopolymers or copolymers of vinyl pyrrolidone or alkylene oxide.

The concentration of polymer B in a fabric cleaning or fabric rinse composition is preferably between 0.01 and 20% by weight, more preferably at least 0.1%, or even at least 1%, but preferably not more than 15%, more preferably less than 10%.

The amount of polymer B relative to the fabric surface area is preferably from 0.5 to 200 μg/cm^2 of fabric surface area, more preferably from 1 to 100 μg/cm^2, and most preferably from 2 to 50 µg/cm^2 of fabric surface area. The term “fabric surface area” as used herein refers to surface area of one side of the fabric.

Some examples of combinations of polymer A and polymer B, which are particularly preferred, are given below.

Table 1: Preferred combination of the polymers

Polymer A	**Polymer B**
Polyacrylic acid (PAA)	Poly vinyl pyrrolidone (PVP)
Polyacrylic acid (PAA)	Polyethylene Oxide(PEO)
Polyethylene Glycol (PEG)	Polyacrylic acid (PAA)
Poly vinyl alcohol (PVA)	Polyacrylic acid (PAA)
Poly vinyl alcohol (PVA)	Polyethylene Oxide (PEO)
Sodium carboxymethyl cellulose (SCMC)	Polyethylene Oxide (PEO)
Hydroxyethyl cellulose	Polyacrylic acid(PAA)
Starch-graft-polymethacrylic acid	Polyethylene Oxide
Starch-graft-polymethacrylic acid	Polyvinyl pyrrolidone
Pluronic-g-Polyacrylic acid	Polyethylene Oxide
Pluronic-g-Polyacrylic acid	Polyvinyl pyrrolidone
Sodium carboxymethyl cellulose	Hydroxyethyl cellulose
Sodium carboxymethyl cellulose	Polyvinyl alcohol

The most preferred combinations of the polymers are PAA-PVP, PAA-PEO, PEG-PAA, Starch-graft-polymethacrylic acid-Polyethylene Oxide.

Spacer compound

The composition further comprises a spacer compound. Without wishing to be bound to any particular theory, it is thought that the use of a spacer compound of the invention improves the storage stability of the composition as it reduces complex forming on storage, while at the same time it improves the dispersibility of the composition when brought in contact with water (or an aqueous solution).

The spacer compound of the present invention is preferably selected from the group of hydrophobic acidic organic compounds, the group of hydrophobic oils, the group of inorganic salts and/or the group of clays. The compositions according to the invention comprise at least one spacer compound, but preferably two or more, more preferably even 3 or more. When two or more spacer compounds are present, it is most preferred that they are chosen from different groups.

Hydrophobic acidic organic compounds are preferably selected from phtalic acid, phthalic anhydride, ascorbic acid, glutamic acid, salicylic acid, tartaric acid, pyroglutamic acid, malic acid, maleic acid, malonic acid, succinic acid, glutarric acid, adipic acid, propane 1,2,3 tricarboxylic acid, butane 1,2,3,4 tetra carboxylic acid. The anhydrides of all the abovementioned acids may also be used for this purpose.

Hydrophobic oils are preferably selected from perfume ingredients, e.g. perfume oils and limonene. Other suitable hydrophobic materials include fatty acids, such as stearic acid; and talc.

Even better dispersions may be obtained when the spacer compounds include both a organic carboxylic acids such as citric acid and also a compound selected from hydrophobic oils or perfumes, due to increased hydrophobicity.

Inorganic salts are preferably selected from sodium chloride, sodium sulphate, potassium chloride, potassium sulphate, etc

The invention may further comprise natural or synthetic clays, preferably kaolin (kaolinite), bentonite or attapulgate.

pH adjustment agent

The polymers of the invention are best applied to the fabric at acidic pH and removed at alkaline pH. A normal washing process is done at alkaline pH, generally pH between 8 and 11. When an article is washed under such conditions there will be carry over of some of the high pH (alkaline) washing liquor from the main wash to the rinse step. This carry over is typically in the order of 1:10 and cause the rinse liquor to be alkaline.

The polymers may be chosen in such a way that when the polymers are added to the aqueous medium, pH of the aqueous medium is less than 6. Preferably, an acidic ingredient is added to aqueous medium to ensure that the pH of the aqueous medium is less than 6. Acidic ingredients that reduce pH of resulting aqueous medium to less than 6 are well known to a person skilled in the art and any suitable acidic ingredient may be chosen.

However, the composition of the invention may further comprise a pH adjustment agent or a buffer.

Suitable pH adjustment agents are, organic and inorganic acids. Such acids are preferably in solid form and have a high water solubility, most preferably they are fully soluble in water.

Suitable inorganic acids are boric acid, sodium dihydrogen phosphate, aluminium chloride, aluminium sulphate, cupric sulphate etc.

Suitable organic acids are citric acid, formic acid, oxalic acid, phtalic acid ascorbic acid, glutamic acid, salicylic acid, tartaric acid, pyroglutamic acid, malic acid, maleic acid, malonic acid, succinic acid, glutaric acid, adipic acid, propane 1,2,3 tricarboxylic acid, butane 1,2,3,4 tetra carboxylic acid. The anhydrides of all the abovementioned acids may also be used for this purpose.

The wash liquor or rinse liquor wherein the composition of the invention is dissolved, preferably has a pH of less than 6, preferably less than 5 and more preferably less than 4. Aqueous medium has pH preferably greater than 2 and more preferably greater than 3.

Optional ingredients

The aqueous medium may comprise an electrolyte. The electrolyte is preferably present in a concentration from 0.001 to 5%, more preferably from 0.01 to 1%, and most preferably from 0.04 to 0.2% by weight of the aqueous medium.

Without wishing to be limited by theory, it is believed that the addition of electrolyte allows the process of the invention to be carried out with relatively low amounts of polymers A and B.

Electrolytes that can be used according to the present invention include water soluble ionic salts. The cation of the salt includes an alkali metal, alkaline earth metal or trivalent metal cation. The anion of the salt includes chloride, sulphate, nitrate and phosphate. Some examples of electrolytes include chlorides, sulphates or nitrates of sodium, potassium, magnesium or calcium. Calcium salts are particularly preferred.

According to a preferred aspect, the aqueous medium comprises no more than 200 ppm anionic surfactant. The aqueous medium comprises no more than 100 ppm, more preferably less than 50 ppm anionic surfactant. It is particularly preferred that the aqueous medium is substantially free of anionic surfactant.

The aqueous medium may further comprise at least one benefit agent. The benefit agent that can be included in the aqueous medium includes, but not limited to ingredients such as perfume, fluorescer, deodorant, antibacterial agent, shading dye and bluing agent. One of the advantages of the present invention is that the deposition of benefit agent is enhanced.

Process

The composition according to the invention may be applied to a fabric in different ways.

One way of applying the composition is by adding the composition to the rinse water of a manual or automatic washing process. The fabric may be added to the rinse water either before or after addition of the composition.

Alternatively, the composition may be applied by use of a trigger spray dispenser.

In another aspect the invention provides a process for washing fabric comprising the steps in sequence of: contacting the fabric with a wash or rinse liquor comprising between 0.02 and 40 g/l of the composition according to the invention; leaving the fabric to dry; leaving the fabric for soil and/or dirt to deposit onto the fabric; washing the fabric with a conventional washing detergent in a conventional way.

The wash liquor preferably comprises at least 0.1g/l of the total composition, more preferably at least 0.25g/l, still more preferably more than 1g/l, but typically less than 20g/l, more preferably less than 10 g/l, and even less than 5g/l.

The conventional washing process may be any washing process, such as machine wash in an automatic or semi-automatic vertical axis or horizontal axis washing machine or a hand wash process.

The detergent may be any conventional washing detergent composition, typically comprising surfactant and builder and optionally perfume, optical brighteners, building aids, etc.

Composition

The composition comprises preferably 5-95%, more preferably 10-90% and most preferably 20-80% by weight polymer A. The composition comprises preferably 5-95%, more preferably 10-90% and most preferably 20-80% by weight polymer B.

The polymers may be chosen in such a way that pH of 1% aqueous solution of the composition is less than 6. Preferably, an acidic ingredient is present in the composition at 0.1-10% by weight of the composition to ensure that the pH of 1%

aqueous solution of the composition is less than 6. Acidic ingredients that reduce pH of resulting aqueous medium to less than 6 are well known to a person skilled in the art and any suitable acidic ingredient may be chosen.

Examples

The invention will now be illustrated by means of the following, non-limiting examples.

Example 1: Dispersibility of the formulations; Dispersion of polymers by in-situ Gas generation

In this example the compositions according to the invention (1 - 3) are compared with comparative compositions outside the scope of the invention, with respect to the required dissolution or dispersion time and the uniformity of the solution or dispersion.

For each of the compositions (1-3 and A-D) 100 ml deionized water was taken in a 250 ml glass beaker and stirred over a magnetic stirrer at controlled speed. The formulation was added to water with continuous stirring and the required time to form a dissolution/dispersion was noted as well as the nature of the dispersion (especially uniformity and/or for lumps remaining).

Table 2: dissolution results

Comp		**Amount**	**Time**	**Remarks**
		(mg / 100ml dispersion)	**(for full dissolution/ dispersion)**	
A	PAA	180	> 40 min	Lumps remaining
B	PAA Perfume	180 30	> 40 min	Few lumps remaining
C	PAA Phthalic anhydride	180 70	> 20 min	Lumps remaining
D	PAA Phthalic anhydride Perfume	180 70 30	> 10 min	Good solution
1	PAA Phthalic	180 70	8 min	Good Dispersion

	anhydride Perfume PEO	 30 113		
2	PAA Phthalic anhydride Perfume PEO NaCl	180 70 30 113 500	7 min	Uniform dispersion
3	PAA Phthalic anhydride Perfume PEO Kaolin	180 70 30 113 500	7 min	Uniform dispersion

NB PAA is polyacrylic acid (Mw = 450000 D; ex Sigma-Aldrich)

Soda is Na_2CO_3

PEO is poly ethylene oxide (Mw = 100000 D; ex Sigma-Aldrich).

The table above shows that the compositions according to the invention show fast dissolution and a uniform dispersion of the polymer complex, whilst the comparative compositions A-D show either long dissolution times, or do not show a uniform dispersion.

Example 2: Best mode formulations

Table 3: best mode formulations

Composition 4	**(g/l)**	**%**
PAA	0.15	9
PEO	0.10	6
Phtahlic anhydride	0.40	24
Perfume	0.044	3
NaCl	0.75	44
Kaolin	0.25	15
Total	1.69	100

This formulation (example composition 4) gives good dispersion and turbidity in 30 seconds.

For polymer coating treatment the cotton, poly cotton and polyester fabric swatches (commercially available from WFK, Germany) were soaked in this dispersion for 30 minutes, and dried in air overnight. The swatches were 10x10 cm.

A composite soil was prepared by sonicating a mixture containing 100 ml triolein, 4 mg carbon soot and 4 mg iron oxide for 1 hour. A homogeneous soil dispersion was obtained.

The fabric swatches were soiled with composite soil and aged for a day at room temperature (ca 24°C). The swatches were then washed in surf XL (ex Unilever) by hand wash procedure.

The swatches treated with the composition of Table 2 were completely cleaned by this procedure.

Example 3: Effect of each of the ingredients on cleaning performance

In this example a number of compositions according to the invention are compared to comparative compositions.

Polymer formulations (as specified in the table below) were prepared according to the method of example 1. The dispersion was checked for lump formation and uniformity.

Desized cotton, polycotton and polyester fabric swatches of 10 x 10 cm (cotton, poly-cotton and polyester, ex WFK, Germany) were pretreated by soaking into the polymer composition (dispersion) at a liquid to cloth ratio of 5:1 and soaked for 20 minutes. The fabrics used, had a mass of 1.5 g each (i.e. for 100 cm^2), resulting in a total of 18.75 μg of total polymer per cm^2 of fabric (one side), in the examples where polymer was present.

Fabrics were taken out, squeezed out the excess liquor and dried in air.

Fabrics were soiled with 0.3 ml of composite soil dispersion (see example 2) applied to about 20 cm^2 area and kept for ageing for 16 hours.

The fabric swatches were than washed by hand wash, in 1.5 g/l Surf XL wash liquor, at a wash liquor to cloth ratio of 5:1. The fabric swatches were soaked in the liquor for 30 minutes. The soaked fabrics were washed by a handwash protocol by brushing 5 times on both side of the fabrics. After brushing the fabrics were rinsed three times with clean water and dried in air. The reflectance of the soil region was measured before and after washing using a reflectometer; the cleaning performance is indicated as the difference ("Delta R") between the reflectance at 460 nm before and after washing, as is a commonly known procedure in the art.

Control (compositions E and F)

Two control examples were included wherein untreated fabric was soiled and washed with

Composition E:	3 g/l Surf XL (ex Unilever); and
Composition F:	1.5 g/l Surf XL (ex Unilever).

3 g/l detergent product is representative for normal hand wash and horizontal axis machine wash. 1.5 g/l is included because the fabrics that are pre-treated with the compositions of the invention are washed with only half of the standard main wash dosage.

Comparative compositions (compositions G - O)

In comparative examples G-O one or more of the features of the inventions are omitted.

Example compositions (5 – 17)

Examples 5-17 show compositions according to the invention.

Unless otherwise indicated the concentrations in which the ingredients were used were:

PAA (poly acrylic acid; Mw 450,000 D, ex Sigma-Aldrich): 0.15 g/l, PEO (poly ethylene oxide; Mw 100,000 D, ex Sigma-Aldrich): 0.10 g/l, NaCl: 0.75 g/l, Perfume: 0.045, Kaolin: 0.25 g/l, Citric acid: 0.2 g/l, Adipic acid: 0.4 g/l, Phthalic anhydride: 0.4 g/l, Soda 0.15 g/l in the pre-treating wash liquor.

Table 4: Comparative test results

	Rinse Formulation	Remarks	Cotton Delta R	Poly-cotton Delta R	Poly-ester Delta R
E	Control 3 g/l		14	6	4
F	Control 1.5 g/l		13	5	3
G	PAA 0.25 g/l	Lumps Non uniform dispersion No turbidity	14	7	6
H	PEO 0.25 g/l	Lumps Non uniform dispersion No turbidity	15	4	5
I	PAA+PEO 0.25 g/l	Lumps Non uniform dispersion Slight turbidity	16	5	6
J	PAA+PEO+NaCl	Lumps remaining Non uniform dispersion Low turbidity	18	6	8
K	PAA+PEO+Citric acid	Lumps remaining Non uniform dispersion No turbidity	15	5	6
L	PAA+PEO+Citric acid/NaCl	Lumps remaining Non uniform dispersion	18	5	7
M	PAA+Phthalic anhydride	Lumps remaining Slight Turbidity	14	7	5
N	PEO+Phthalic anhydride	Lumps remaining Slight Turbidity	15	5	4
O	PEO+Phthalic anhydride+NaCl	Lumps remaining Slight Turbidity	15	6	5
5	PAA+PEO+Citric Acid+Perfume	No lumps Uniform dispersion Good turbidity	18	10	9
6	PAA+PEO+ Citric Acid+NaCl+	Uniform dispersion Good turbidity	19	15	16

	Perfume				
7	PAA+PEO+ Citric acid+NaCl+ Kaolin+Perfume	Uniform dispersion Good turbidity	19	10	6
8	PAA+PEO+ Phthalic anhydride	Few very small lumps Turbidity develops slowly	16	18	16
9	PAA+PEO+ Phthalic anhydride+ NaCl	Few very small lumps Turbidity develops slowly	17	19	17
10	PAA+PEO+ Phthalic anhydride+ Kaolin	Few very small lumps Turbidity develops slowly	17	18	16
11	PAA+PEO+ Phthalic anhydride+ NaCl+Kaolin	Uniform dispersion Good turbidity	18	18	16
12	PAA+PEO+ Phthalic anhydride+ Perfume	Few very small lumps Good turbidity	17	19.5	21
13	PAA+PEO+ Phthalic anhydride+ Perfume+NaCl	No lumps Uniform dispersion Good turbidity	17	19	18
14	PAA+PEO+ Phthalic anhydride+ Perfume+Kaolin	Uniform dispersion Good turbidity	18	20	19
15	PAA+PEO+ Phthalic anhydride+ Perfume+NaCl+ Kaolin	Uniform dispersion Good turbidity	19	21	20
16	PAA+PEO+ Adipic acid+ Perfume+NaCl	Uniform dispersion Good turbidity	19	16	18
17	PAA+PEO+ Adipic acid+ Perfume+NaCl+ Kaolin	Uniform dispersion Good turbidity	19	21	20

NB PAA is polyacrylic acid; Soda is Na_2CO_3; PEO is poly ethylene oxide; NaCl is sodium chloride

The results in the table above shows that the compositions according to the invention provide substantially better cleaning than the comparative example compositions.

CLAIMS

1. A fabric treatment composition comprising
    a. a complex or mixture of
        i. a polymer A selected from the group of homopolymers and copolymers of carboxylic acid and derivatives;
        ii. a spacer compound selected from the group of hydrophobic acidic organic compounds, the group of hydrophobic oils, the group of inorganic salts and/or the group of clays; and
    b. a polymer B selected from
        i. the group of homopolymers and copolymers of alkylene oxides having a molecular mass greater than $2x10^4$ D, vinyl pyrrolidone and/or their derivatives; and/or
        ii. the group of homopolymers and copolymers of vinyl alcohol, saccharides, hydroxyalkyl cellulose and/or their derivates; and

    wherein the composition is in the form of a uniform dispersion.

2. A composition according to claim 1, wherein Polymer A is present in a concentration of between 0.01 and 25% by weight on the total composition.

3. A composition according to any one of claims 1 or 2, wherein Polymer B is present in a concentration of between 0.01 and 20% by weight on the total composition.

4. A composition according to any one of the preceding claims, comprising two or more spacer compounds.

5. A wash or rinse liquor comprising between 0.02 and 40 g/l of the composition according to any one of claims 1 to 4, having a pH of < 6.

6. A process for washing fabric comprising the steps in sequence of:

   a. Contacting the fabric with a wash or rinse liquor comprising between 0.02 and 40 g/l of the composition according to any one of claims 1 to 4;
   b. Leaving the fabric to dry;
   c. Leaving the fabric for soil and/or dirt to deposit onto the fabric;
   d. Washing the fabric with a conventional washing detergent in a conventional way.

7. A process for preparing the composition according to the invention comprising the steps of:
   a. mixing Polymer A with the spacer compound; and
   b. mixing the mixture from step a with the Polymer B.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/061745

A. CLASSIFICATION OF SUBJECT MATTER

INV. C11D3/00 C11D3/02 C11D3/12 C11D3/20 C11D3/22 C11D3/37 C11D3/50 C11D17/00

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C11D

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 practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/186832 A1 (PADRON TAMARA ET AL) 2 October 2003 (2003-10-02) examples	1-4
X	DE 103 31 053 A1 (BASF AG) 27 January 2005 (2005-01-27) examples	1-4
X	GB 2 398 571 A (RECKITT BENCKISER INC) 25 August 2004 (2004-08-25) claim 1; table 1	1-5
X	WO 03/099981 A1 (PROCTER & GAMBLE) 4 December 2003 (2003-12-04) example 23	1-4

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search 15 October 2010	Date of mailing of the international search report 27/10/2010
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2010/061745

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