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(71) Applicant *(for all designated States except AE, AG, AU, BB, BH, BN, BW, BZ, CA, CY, EG, GB, GD, GH, GM, IE, IL, IN, KE, KN, LC, LK, LS, MT, MW, MY, NA, NG, NZ, OM, PG, QA, RW, SC, SD, SG, SL, SZ, TT, TZ, UG, US, VC, ZA, ZM, ZW)*: **UNILEVER N.V.** [NL/NL]; Weena 455, NL-3013 AL Rotterdam (NL).

(71) Applicant *(for AE, AG, AU, BB, BH, BN, BW, BZ, CA, CY, EG, GB, GD, GH, GM, IE, IL, KE, KN, LC, LK, LS, MT, MW, MY, NA, NG, NZ, OM, PG, QA, RW, SC, SD, SG, SL, SZ, TT, TZ, UG, VC, ZA, ZM, ZW only)*: **UNILEVER PLC** [GB/GB]; Unilever House, 100 Victoria Embankment, London, Greater London EC4Y 0DY (GB).

(71) Applicant *(for IN only)*: **HINDUSTAN UNILEVER LIMITED** [IN/IN]; Unilever House, B.D. Sawant Marg Chakala Andheri (East), Mumbai, Maharashtra 400 099 (IN).

(71) Applicant *(for US only)*: **CONOPCO, INC., D/B/A UNILEVER** [US/US]; 800 Sylvan Avenue, AG West, S. Wing, Englewood Cliffs, New Jersey 07632 (US).

(72) Inventors: **GHOSH, Amit,Kumar**; Hindustan Unilever Ltd, Research Centre, 64 Main Road, Whitefield, Bangalore 560 066 (IN). **PERINCHEERY, Aravindakshan**; Hindustan Unilever Ltd, Research Centre, 64 Main Road, Whitefield, Bangalore 560 066 (IN). **RASTOGI, Abhishek**; Hindustan Unilever Ltd, Research Centre, 64 Main Road, Whitefield, Bangalore 560 066 (IN). **SARKAR, Arpita**; Hindustan Unilever Limited, Research Centre, 64 Main Road, Whitefield, Bangalore 560 066 (IN). **DUTTA, Kingshuk**; Hindustan Unilever Limited, Research Centre, 64 Main Road, Whitefield, Bangalore 560 066 (IN).

(74) Agent: **KAN, Jacob, H.**; Unilever Patent Group, Olivier van Noortlaan 120, NL-3133 AT Vlaardingen (NL).

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(54) Title: A COMPOSITION AND METHOD FOR TREATING SUBSTRATES

(57) Abstract: The present invention relates to a composition and a method for treating substrates, such as fabrics; particularly to make the substrate stain repellent and easier to clean upon the subsequent wash. The invention has been developed primarily for use on fabrics, and will be described hereinafter with reference to these applications. It is an object of the present invention to provide stain repellence to a fabric. It is still another object of the invention to provide a composition that provides improved perfume delivery to the fabric. It has been found that improved perfume delivery is obtained in compositions comprising a fatty acid, a water soluble salt of Aluminium and a non-ionic polymer. Improved stain repellence is obtained when the HLB of the polymer is between 12 and 18.

A COMPOSITION AND METHOD FOR TREATING SUBSTRATES

Field of the invention

The present invention relates to a composition and a method for treating substrates, such as fabrics; particularly to make the substrate stain repellent and easier to clean upon the subsequent wash.

The invention has been developed primarily for use on fabrics, and will be described hereinafter with reference to these applications.

Background of the invention

Fabrics are generally cleaned with detergents. Standard detergent compositions include surfactants and builders. Surfactants clean the fabrics. Some detergent compositions also contain soda ash to enhance the cleaning action. Many detergent compositions also include specialty polymers that help release stains. Such polymers are called soil release polymers (SRP). Some detergent compositions also include additives that reduce re-deposition of dirt which is released in the wash liquor. Such additives are called anti-redeposition agents (ARD).

Fabrics tend to get stained during use. Stains are generally, either oily, or aqueous. Common sources of aqueous stains include tea, coffee, beverages and inks. Common sources of oily stains include pickles, sauces and ketchups, motor oil, and grease. People do prefer to wear clothes with lesser stains. This is particularly applicable to white fabrics, such as white shirts. People also prefer that kitchen, bathroom surfaces and windows surfaces are free of stains.

One of the ways to prevent fabrics and hard surfaces from getting stained is to treat them with compositions that form a film on the surface of the fabric or hard surface. This film prevents, or at least reduces, the adhesion of stains. The film also allows for facile removal of stains during washing, and it may be said to form a sacrificial layer, such as disclosed in our application WO2009/077255.

Another way to provide easier cleaning upon the next wash is to reduce the ability of the fabric to get soiled or stained. Typically salts of metals are generally present in such compositions. Surfaces get stained when stains spreads on it. In such cases, the stain wets the surface. When a stain wets a surface, the contact angle between the stain and the surface is very low, generally less than 10(°). When a surface treatment composition forms a film, the film increases the contact angle. In other words, this film doesn’t allow the stain to wet the surface. Generally, water contact angle in the range of 90(°) to 170(°) is considered to be good for repelling aqueous stains. On the other hand, oil contact angles greater than 60 are considered to be good for repelling oily stains. Such treated surfaces may be termed as super-hydrophobic or super-oleophobic. Compositions to provide such stain repellence to fabrics are disclosed in WO2010/069731.

The contact angle is the angle at which a liquid/vapour (or two immiscible liquids) interface meets a solid surface. The contact angle is specific for any given system and is determined by the interactions across the two interfaces. Most often, the concept is illustrated with a liquid droplet resting on a flat horizontal solid surface. The shape of the droplet is determined by Young-Laplace equation. One of the ways to measure contact angle is to use a contact angle goniometer on a sessile drop of the liquid. This method is used to estimate wetting properties of a localized region on a solid surface. The angle between the baseline of the drop and the tangent at the drop boundary is the contact angle.

Fabric treatment compositions have been disclosed in co-pending unpublished Indian applications WO2011/134755 and WO2011/134756 (both by Unilever). WO2011/134756 discloses stain repellent liquid compositions and a method for their use. The compositions help make substrates, particularly fabrics, repellent to hydrophilic stains. The compositions include 25 to 50 wt% soap, 10 to 30 wt% a complex of zinc and triethanolamine, 30 to 65 wt% trivalent metal ion and/or tetravalent metal ion, and a solvent having a lower alcohol and water in a ratio of 99:1 to 85:15.

Ideally such compositions are dosed in the final rinse of the machine washing cycle, together with or instead of a fabric conditioner.

In US 4,555,349 fabric conditioners comprising metal salt electrolytes and soap have been disclosed, however, they have not been found to provide any stain repellence or improved cleaning benefits on the subsequent wash. Similar compositions are disclosed in US 4,417,995, disclosing fabric softener composition comprising Aluminium Chlorhydrate (a.k.a. Poly Aluminium Chloride) and Pristerene (a tallow fatty acid), but said compositions do not provide improved cleaning on the subsequent wash or improved stain repellence. Furthermore, US 4,555,349 and US 4,417,995 do not provide improved perfume delivery to the fabric.

GB 552447 discloses a permanent coating for water- proofing and rot-proofing materials. Similarly, GB662945 discloses a fabric treatment composition that serves as an ironing aid and imparts to the fabric a permanent, protective, stain- resistant, water-repellent and starchy finish. Moreover, GB662945 discloses polymer concentrations of less than 0.3%. When it comes to fabrics, however, consumers prefer removable coatings than permanent ones. Therefore, it still remains to be desired to have compositions that impart improved stain repellency and next time cleaning benefit through a fabric conditioner.

WO01/07551 discloses the use of polyvinyl alcohols (soil release polymers) as detergent additives in main wash detergent compositions. However, the composition disclosed in this document does not provide a next time cleaning benefit through a fabric conditioner.

US 4136038 relates to fabric conditioning compositions comprising a soil release polymer. However, the composition disclosed in this document does not provide a next time cleaning benefit. Therefore, a next time cleaning benefit through a fabric conditioner is still desired.
It is an object of the present invention to provide stain repellence to a fabric.

It is a further object of the present invention to provide improved cleaning upon the subsequent wash.

It is yet another object of the invention to provide a stable composition that does not phase separate.

It is still another object of the invention to provide a composition that provides improved perfume delivery to the fabric.

It is still another object of the invention to provide a composition that provides improved perfume release from the fabric.

It is still another object of the invention to provide a composition that provides fabric softness.

Surprisingly, it has been found that improved perfume delivery is obtained in compositions comprising a fatty acid, a water soluble salt of Aluminium and a non-ionic polymer. Improved stain repellence is obtained when the HLB of the polymer is between 12 and 18.

Summary of the invention

Accordingly the present invention provides a composition for treating a substrate, said composition comprising 2 – 25% by weight of a C8-C24 fatty acid, 2.5-40% by weight of a water soluble salt of Aluminium, 0.01-2.0% by weight of an alkalinity source; 0.3 – 10% by weight of a non-ionic polymer having an HLB value of 12 to 20, perfume and water; and wherein the pH of the composition is between 1 and 6 and wherein 5 to 50% by weight of the total fatty acid is neutralised by the alkalinity source.

In a second aspect the present invention provides a method for treating a substrate comprising the steps of preparing a 0.05 – 1% by weight solution of the composition according to the invention in water, rinsing a fabric article in the solution, and drying the fabric article.

In a third aspect the present invention provides a method for preparing the composition of the invention comprising the steps in sequence of partially neutralising fatty acid with the alkali source at a temperature above the melting point of the fatty acid, mixing the polymer into the partially neutralized fatty acid mixture, adding the aluminium salt to the mixture, homogenize the mixture, and leave the composition to cool down to room temperature; and optionally add a perfume.

In a fourth aspect the present invention provides a bottled rinse conditioner agent comprising the composition according to the invention in a 250 mL to 5 L bottle.

For the avoidance of doubt, the improved cleaning upon the subsequent wash benefit, is also referred to as next time cleaning benefit, while the composition as applied to the fabric is also referred to as sacrificial layer. The benefit of reduced uptake of stains or soil onto or into a fabric is also referred to as stain repellence, regardless of whether it relates to a specific stain or soils in general.

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. The word “comprising” is intended to mean “including” but not necessarily “consisting of” or “composed of.” In other words, the listed steps or options need not be exhaustive. 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. Except in the operating and comparative examples, or where otherwise explicitly indicated, all numbers in this description indicating amounts of material or conditions of reaction, physical properties of materials and/or use are to be understood as modified by the word “about”. 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 provides a composition for treating a substrate, comprising a C_8-C_{24} fatty acid, a water soluble salt of Aluminium, an alkalinity source; a non-ionic polymer. The composition preferably comprises further optional ingredients. The balance of the composition is made up to 100% by weight with water. The pH of the composition is between 1 and 6.

Fatty acid

The composition comprises a fatty acid comprising a carbon chain length of from 8 to 24 carbon atoms, herein after referred to as C_8-C_{24} fatty acid. The composition preferably comprises a fatty acid having a carbon chain length of at least 10 carbon atoms, but preferably not more than 20, more preferably not more than 18, still more preferably not more than 16 carbon atoms or even not more than 14 carbon atoms. Combinations of different fatty acids are preferred from a cost perspective, as the commercially available fatty acids typically comprise of a mixture of different fatty acids with similar chain lengths.

The fatty acid may or may not have one or more carbon-carbon double bonds or triple bonds. The iodine value, which is indicative of degree of unsaturation, is preferably less than 20, more preferably less than 10, and most preferably less than 5. Saturated fatty acid having no carbon-carbon double bond or triple bond is particularly preferred.

The fatty acids are water-insoluble. Non-limiting examples of water-insoluble fatty acids that may be used according to the present invention include lauric acid, caprylic acid, myristic acid, stearic acid, oleic acid, and palmitic acid.

The composition comprises 2 – 25% by weight of the fatty acid, preferably at least 5%, or even at least 10% by weight, but typically less than 22% by weight of the composition.

Alkalinity source

The composition comprises an alkalinity source. The purpose of the alkalinity source is to partially neutralise the fatty acid. Preferably 5-50% by weight of the total fatty acid is neutralised by the alkalinity source, more preferably at least 10%, more preferably at least 12%, or even at least 15% by weight, but typically not more than 40%, more preferably not more than 30% by weight of the total fatty acid is neutralised.

The alkalinity source is preferably a hydroxide salt, more preferably an alkali metal hydroxide, wherein sodium and potassium hydroxides are the most common. Sodium hydroxide is the most preferred alkalinity source.

To neutralise the fatty acid to an extent of 5-50% by weight of the total fatty acid, the composition comprises 0.05-0.5 mol of a hydroxide salt per mol of the fatty acid.

Thus, the composition comprises 0.01-2.0% by weight of an alkalinity source, preferably at least 0.02%, more preferably at least 0.05%, still more preferably at least 0.1% by weight, but typically not more than 1.5%, more preferably not more than 1.2% by weight of the composition.

Aluminium salt

The aluminium salt according is preferably a water soluble salt of aluminium, including aluminium nitrate, aluminium sulphate, and aluminium chloride. For the avoidance of doubt, the aluminium compounds of the invention include poly salts of aluminium, including polyaluminium chloride and polyaluminium sulphate. Polyaluminium chloride is the most preferred.

Poly aluminium chloride (PAC) may be defined as a non-stoichiometric oligomer of aluminium hydroxychloride having general formula $[Al_nCl_{(3n-m)}(OH)_m]$ where the value of m is preferably in the range of 5 to 24 and n preferably in the range of 2 to 12.

Water-insoluble aluminium compounds like clays, alumina and aluminium hydroxide are excluded from the scope of the present invention.

The best results are obtained when a 1% solution of the aluminium salt according to the invention in water of 20°C gives a pH of between 1 and 6, more preferably between 2 and 5.

The composition comprises 2.5-40% by weight of the water soluble salt of aluminium, preferably at least 5%, more preferably at least 10% by weight, but typically not more than 30%, more preferably not more than 25% by weight of the composition.

Without wishing to be bound by a theory, it is thought that the aluminium salt and the fatty acid form an aluminium soap that deposits onto the fabric fibres, thereby providing hydrophobicity.

Further poly-valent metal ion

Further improved results may be obtained when the composition comprises a further poly-valent metal ion. From the perspective of the cost of the composition several poly-valent metal ions are also less costly than Aluminium, and therefore more preferred. The poly-valent metal salt is ideally water soluble.

The metal salts provide further ionic strength to the medium that helps in deposition of the actives on the surface. Therefore polyvalent metals are more preferred than monovalent metal salts. Polyvalent metals are also more hydrolysable than monovalent metal salts and thereby tend to help deposition of the actives further through weak agglomeration and flocculation of actives on the surface.

Preferred polyvalent metal ions are selected from alkaline earth metal ions, titanium and zinc ions. More preferably, the metal salts including calcium, zinc, magnesium, barium, titanium, more preferably is chosen from calcium, zinc, magnesium or iron. These metal salts can be used in combination with PAC in the composition. Chromium is not preferred for household use as it is toxic. Corresponding anions of the metal salts may be chloride, nitrate, sulphate and acetate, or other water-soluble anions. Chloride, nitrate, sulphate and acetate are the most preferred.

The poly-valent metal salt is preferably present in the composition in a concentration of between 5 and 30% by weight, more preferably 5- 25% by weight, still more preferably 5-20% by weight, or even 5-15% by weight of the composition.

When a poly-valent metal salt is present, the combined amount of the water soluble aluminium salt and the polyvalent metal salt together is 7.5-40% by weight, preferably at least 10% by weight, but typically not more than 30%, more preferably not more than 25% by weight of the composition.

When both Aluminium (Al) and the further polyvalent metal (M) are present in the composition, the best results are obtained when the molar ratio of Al to M is between 0.2 to 2.5 for good perfume delivery. The best hydrophobicity and stability results are obtained between 0.5 and 2.5. The best cleaning results are obtained at a molar ratio between 0.2 and 1, preferably between 0.5 and 1.

Fatty acid to Metal Ion ratio

The fatty acid to metal in ratio determines the deposition of perfume, fabric hydrophobicity and cleaning efficacy.

Fatty acid to aluminium alone

The fatty acid to aluminium salt ratio (on weight basis) is preferably between 0.2 and 5 for good perfume deposition and delivery, preferably between 0.4 and 2 or even between 0.6 and 1.5 for improved hydrophobicity and stain repellence.

The compositions typically phase separate at fatty acid to aluminium salt ratios above 1.5 (on weight basis). However, 2-phase systems that need to be shaken before use are also acceptable to the consumer.

For the best stain repellence properties, the fatty acid to aluminium salt ratio is preferably between 0.6 and 1.5, or even more preferably between 0.8 and 1.2 on weight basis.

Fatty acid to total metal ion ratio (aluminium + further polyvalent metal)

The fatty acid to metal ion ratio (molar basis) is preferably between 0.2 and 2 for good perfume deposition and delivery, preferably between 0.5 and 1.2 for improved hydrophobicity and stain repellence.

The compositions typically phase separate or solidify at fatty acid to metal ion ratios (on molar basis) above 1.2.

For the best stain repellence properties, the fatty acid to metal ion ratio is preferably between 0.6 and 1.5, or even more preferably between 0.8 and 1.2 on molar basis.

Polymer

The composition according to the invention comprises a non-ionic polymer. Non-ionic polymers typically comprise of hydrophilic and lipophilic parts. To define the hydrophilic to lipophilic balance, the HLB value of a polymer is widely used in the art.

The polymer is used to stabilise the composition and aid in the deposition of the composition onto the fabric.

HLB values may be calculated, e.g. by Griffin's method (Griffin WC: "Calculation of HLB Values of Non-Ionic Surfactants," Journal of the Society of Cosmetic Chemists 5 (1954): 259), or Davies' group contribution method (Davies JT: "A quantitative kinetic theory of emulsion type, I. Physical chemistry of the emulsifying agent," Gas/Liquid and Liquid/Liquid Interface. Proceedings of the International Congress of Surface Activity (1957): 426-438); or the group calculation method (HLB= 7+∑(Hydrophilic group numbers)-∑(Lipophilic group numbers)).

For the purpose of the present invention, compositions providing excellent perfume delivery to and extended perfume release from a fabric is obtained when the HLB value is in the range from 10 to 20.

The best stain repellence properties are obtained when the HLB value is between 10 and 18, preferably between 12 and 18, or even between 15 and 17.

For the best stability of the compositions, and to obtain compositions that do not phase separate, the HLB is preferably between 12 and 18.

The non-ionic polymer of the invention is preferably selected from homopolymers and copolymers of alkylene oxides, including ethylene oxide and propylene oxide and co-polymers thereof and polyvinyl alcohols, having an HLB value in the range from 12 to 20.

Ethylene oxide/Propylene oxide block co-polymer and polyvinyl alcohols are the most preferred.

To get the best stability of the composition, it is preferred that poly vinyl alcohol polymers (PVA), when used have a degree of hydrolysiation of at least 75(%), preferably at least 80%, or even at least 85%, but preferably less than 95%. A degree of hydrolysation between 85-91%, or even 87-89% is the most preferred. The molecular mass of the PVA is preferably between 10,000 u and 200,000 u.

Ethylene oxide/Propylene oxide block co-polymers (commercially available as Pluronic, ex BASF) are especially preferred, and preferably have a molecular mass of between 2500 and 25000 u (wherein u is the SI atomic mass unit), and a PPG block of between 5 and 30%, more preferably 10-25%, or even between 15 and 20% by weight of the polymer.

The composition comprises 0.3 – 10% by weight of the non-ionic polymer, preferably at least 0.5%, more preferably at least 1% or even at least 2% by weight, but typically less than 8% by weight of the composition.

pH of the composition

The best results upon use of the composition in the rinse water of a machine wash cycle is acidic. At alkaline pH the composition does not or only partially deposit onto the fabric.

Therefore it is preferred that the pH of the composition is between 1 and 6. The best results are obtained when the pH of the composition is less than 5.

Perfume

The composition according to the invention comprises 0.1-10% by weight of a perfume, preferably at least 0.2%, more preferably at least 0.5%, but typically not more than 5% by weight of the composition.

Further optional ingredients for oily soil removal

For the best cleaning performance upon the subsequent wash, especially for improved cleaning of oily soils and stains it is preferred that the composition further comprises a further polymer or non-ionic surfactant.

Cellulose polymers

It is found that the addition of a lower alkyl cellulose, preferably methyl cellulose improves the removal of fatty soils upon the next wash. It is preferred that a 2% solution of the alkyl cellulose in water has a viscosity of between 2000 and 6000 mPa.s (at 20°, measured in a Brookfield viscometer) The composition preferably comprises between 0.1 and 2.5% by weight of the composition of the alkyl cellulose.

Similar results are found with soil release polymers, such as the Repel-O-Tex range of Rhodia (trade mark) i.e. SF2, PF94, Crystal, notably Repel-O-Tex SF2. The composition preferably comprises between 0.1 and 2.5% by weight of the soil release polymer.

Similar results may be obtained with sodium carboxymethylcellulose having a molecular mass of 40-200ku, Polyacrylic acid having a molecular mass of 2k-100ku, and Polythylene oxide having a molecular mass of 10k-100ku.

The best results are obtained when both the repel-o-tex polymer and the alkyl cellulose are included in the composition.

Fatty acid alkyl esters

Fatty acid esters may be produced by an alkali-catalyzed reaction between fats or fatty acids and methanol/ethanol. Preferred examples include methyl laurate, ethyl octanoate, ethyl laurate, ethyl octanoate, methyl hexanoate, methyl myristate, methyl stearate.

Non-ionic Surfactants

Non-ionic surfactants are well-known in the art. They normally consist of a water-solubilising polyalkoxylene (preferably from 3 to10 ethoxy and/or propoxy groups) or a mono- or di-alkanolamide group in chemical combination with an organic hydrophobic group derived from, for example, fatty alcohols with from 9 to 15 carbon atoms (optionally branched, e.g. methyl branched), alkylphenols (preferably from 12 to 20 carbon atoms) in which the alkyl group contains from about 6 to about 12 carbon atoms, dialkylphenols in which each alkyl group contains from 6 to 12 carbon atoms, primary, secondary or tertiary aliphatic alcohols (or alkyl-capped derivatives thereof) monocarboxylic acids having from 10 to about 24 carbon atoms in the alkyl group and polyoxypropylenes.

Fatty acid mono- and dialkanolamides in which the alkyl group of the fatty acid radical contains from 10 to about 20 carbon atoms and the alkyloyl group having from 1 to 3 carbon atoms are also common. In any of the mono- and dialkanolamide derivatives, optionally, there may be a polyoxyalkylene moiety joining the latter groups and the hydrophobic part of the molecule.

In all polyalkoxylene containing surfactants, the polyalkoxylene moiety usually consists of an average of from 2 to 20 groups of ethylene oxide, propylene oxide groups or mixtures thereof. The latter class includes those described in European Patent Specification EP-A-0,225,654, especially for use as all or part of the liquid phase, incorporated herein by reference.

Especially preferred are those ethoxylated non-ionics which are condensation products of fatty alcohols with from 9 to 15 carbon atoms condensed with 3 to 12 moles of ethylene oxide (generally understood to be an average value). Examples of those are the condensation products of C9 to C15 alcohols with 3 or 7 moles of ethylene oxide, or mixtures thereof. These may be used as the sole non-ionic surfactant or in combination with those described in EP-A-0,225,654.

Fabric Softening Cationic Co-surfactant

The fabric softening cationic co-surfactant is a quaternary ammonium salt surfactant, characterised in that the ammonium salt has the general formula: R1R2R3R4N+ X-, wherein R1 to R4 are alkyl or aryl groups, and X- is an inorganic anion. Preferably partially hardened triethanolmaine ester quaternary surfactants are used.Specifically preferred quaternary ammonium cationic cosurfactants are Methyl bis[ethyl (tallowate)]-2-hydroxyethyl ammonium methyl sulphate, Methyl bis[ethyl (palmate)]-2-hydroxyethyl ammonium methyl sulphate, etc.

Anionic Surfactants

The anionic surfactant is selected from linear alkylbenzenesulfonates, branched alkylbenzenesulfonates, alkylpoly(ethoxylates), alkyl sulfates, methyl ester sulfonates, and mixtures thereof. Examples of anionic surfactants useful herein include any of the common anionic surfactants such as linear or modified, e. g. alkylbenzenesulfonate surfactants, alkylpoly(ethoxylate) surfactants, alkyl sulfates, methyl ester sulfonates, or mixtures thereof.

Ideally, when both an cationic surfactant and an anionic surfactant are present the ratio of Cationic to Anionic is between 5:1 and 1:1, preferably between 3:1 and 1:1.

Further optional ingredients

The composition typically comprises a perfume, typically between 0.1 and 10% of the total composition, preferably between 0.1 and 5%, or even between 0.3 and 3% of the composition.

The composition may further comprise softening agents as commonly used in fabric softening compositions.

Process for treating a fabric

In another aspect the invention provides a method for treating a substrate comprising the steps of preparing a 0.05 – 1% by weight solution of the composition of the invention in water, rinsing a fabric article in the solution, and drying the fabric article.

The solution is preferably 0.1 – 0.5% by weight of the composition in water.

The solution as dosed to a commercially available front load washing machine is tically between 25 and 100 ml of the composition into 12-15 L of rinse water. For top load washing machines the dosage is typically 50-150 ml to 50-60 L of rinse water.

Process for preparing the composition

In another aspect the invention provides a method for preparing the compositions according to the invention comprising the steps in sequence of partially neutralising fatty acid with the alkali source at a temperature above the melting point of the fatty acid, mixing the polymer into the partially neutralized fatty acid mixture, adding the aluminium salt to the mixture, homogenize the mixture, leave the composition to cool down to room temperature; and optionally add a perfume.

By room temperature is meant a temperature between 20 and 25°C.

The fatty acid is preferably partially neutralized with alkali solution at a temperature of less than 100°C, more preferably at a temperature of less than 90°C, still more preferably at a temperature of less than 80°C, or even less than 75°C, while the temperature is typically above the melting point of the fatty acid, typically at least 45°C, more preferably at least 50°C, still more preferably at least 55°C, or even at least 60°C.

Further ingredients according to the invention may be added subsequently.

Product Format

The product is typically packed in a bottle, preferably a plastic bottle at volumes of between 250 ml and 5 L, more preferably between 250 ml and 1.5 L. Common supermarket size bottles are 250 ml, 500 ml, 750ml, 1 L and 1.5 L. The bottles may optionally have a measuring cup attached, or a measuring scale indicator in the cap, to enable the consumer to dose the right amount into the rinse conditioner compartment of the washing machine.

Also considered in the context of the present invention is a product format in the form of a bottle with a trigger spray dispenser comprising the composition according to the invention. Trigger spray dispenser bottles typically have a volume of between 250 ml and 1.5 L. Common volumes include 400 ml, 500 ml, 750 ml, and 1 L.

Larger containers for industrial scale use are also included the scope of this invention.

Examples

The invention is now illustrated by means of the following non-limiting examples.

Preparing the compositions

First, fatty acid was partially neutralized with alkali solution at 70 °C temperature. Then, polyvinyl alcohol was mixed into the partially neutralized fatty acid. After that, PAC was added to the above mixture. After the complete addition of PAC, the mixture was homogenized for 5 min and was allowed to cool down at room temperature (25 °C) and perfume was added to the cooled mixture and was mixed well. Further ingredients as used in some of the examples were added subsequently.

Fabric treatment protocol

All the treatment processes in the examples were carried out in a 5 kg front loader washing machine (IFB make, 5 kg) with 6°fH water. 10 of each cotton, poly-cotton and polyester 10x10 cm swatches were used for treatment. 3.5 kg of fabrics which comprised of a mix of cotton, poly-cotton (60:40) and polyester shirts were used as ballast material. The fabric swatches were stapled into one of the ballast shirts. 30 grams of Surf Excel Matic - Front Load (ex Hindustan Unilever Ltd, India) was used for the main-wash and it was dispensed through the detergent compartment of the machine. In a typical process, 40g of the test formulation as described in the examples, was used for fabric surface treatment and was dispensed through the fabric conditioner compartment of the machine during the third (=final) rinse. After the completion of the full cycle (comprising of wash and 3 rinses with spin), the swatches were removed and then dried in a drier and ironed.

Evaluation of fabric hydrophobicity

A droplet of water is dropped on a fabric kept horizontally from a height of ~2cm and the behaviour of the droplet is studies and ratings are given as tabulated below:

Hydrophobicity Ratings

Time taken by droplet to wick in fabric	**Hydrophobicity Rating**
Fabric not wetted till 10s after contacting	Superhydrophobic (SH)
Fabric not wetted till 5s after contacting or Fabric is wetted between 5-10s after contacting	Hydrophobic (H)
Fabric wetted in less than 5s after contacting	Wicking (w)

Staining Protocol

Carbon soot soiling: To 1L of de-ionized water 150mg of carbon soot (Cabot India) was added and sonicated in a sonication bath for 2 hrs. 0.2 ml of this carbon soot slurry was dropped onto the fabric which was placed at an inclined plane of 45°. The fabrics were allowed to dry over-night.

Red mud soiling: To 1lt de-ionized water 5 g of red mud (sieved, < 150 microns) was added and sonicated in a sonication bath for 2 hrs. 0.2 ml of this slurry was dropped onto the fabric which was placed at an inclined plane of 45°. The fabrics were allowed to dry over- night.

Tea stain soiling: Two tea bags were dipped in 150ml hot milk to make tea. 0.2 ml of this tea was dropped onto the fabric which was placed at an inclined plane of 45°. The fabrics were allowed to dry over-night.

Dirty motor oil (DMO) soiling: 50 ml of dirty motor oil was mixed with 50 ml of fresh motor oil to obtain the stain. 0.2 ml of the stain was dropped onto the fabric which was placed at an inclined plane of 45°. The fabrics were allowed to dry over-night.

Cooking oil soiling: 0.2 g of Macrolex (trademark) violet dye was added to 100 ml of sunflower oil and was mixed well. 0.2 ml of the stain was dropped onto the fabric which was placed at an inclined plane of 45°. The fabrics were allowed to dry over-night.

Washing Protocol

The soiled 10x10 cm swatches were stapled onto one of the ballast shirts (as described in the fabric treatment protocol). Total wash load was 3.5kg comprising of the soiled swatches and the ballast shirts. Washing was done with 30 grams Surf Excel Matic Front Load (ex Hindustan Unilever Ltd, India) at 6°fH. Cotton, poly-cotton and polyester swatches, both treated and untreated, were used for each study. A typical wash cycle comprised of wash and two rinses along with spin. After washing was completed, the swatches were removed and then dried in the drier.

The extent of stain removal was compared against the control (untreated) fabrics on a one to a one basis for each stain type. A score “+” was given in cases where the stains on the treated fabrics appeared lighter than that on the untreated fabrics. Similarly, a score “-” was given in cases where the stains on the treated fabrics appeared darker than that on the untreated fabrics. In all the cases, the evaluation was done by a trained person.

Evaluation of Perfume Performance

50x50 cm polyester swatches were used for the perfume evaluation study. 5 swatches were treated with each of the test formulation, as described in the examples, in a manner already described. 40g of test formulation was used for treatment. As a control, 40g Comfort® (Market sample-Batch no. B.876, Blue variant, India) was used. After 2 hours of treatment and drying, the perfume impact of the treated swatches was compared against the control (in this case Comfort treated) on a one to one basis for each set. A score “+” was given in cases where the perfume impact on the treated fabrics appeared greater than that on the control fabrics. Similarly, a score “-” was given in cases where the perfume impact on the treated fabrics appeared lesser than that on the control fabrics. In all the cases, the evaluation was done by trained persons.

Materials

Prifac 5908, (ex Croda Chemicals - 55% Lauric, 22% Myristic, 22% Palmitic,1% oleic)
Commercially available Lauric acid
Poly aluminium chloride: Grade _ AC/100S (ex Grasim, India).
Polyvinyl alcohol (ex Sigma Aldrich, wt average MW – 13-250K, 87-89% hydrolyzed).
Methyl cellulose (ex Sigma-Aldrich, 4000 cp, 2% H2O @ 20 °C))
PPG/PEG co-polymer: Pluronic F108 and F65 (ex BASF)
Soil release polymer: REPEL-O-TEX SF2 (ex Rhodia)

Example 1: effect of fatty acid to poly aluminium chloride ratio

The composition was prepared as indicated above. Lauric acid was neutralised to ca 15%. The polymer used was Poly vinyl alcohol (PVA) having a Mw of 85-124k u. Sodium hydroxide (NaOH) was used to neutralise the fatty acid.

The following compositions were used (see table below). 1% of perfume was used in the compositions below.

Example	Fatty Acid (%w)	PAC (%w)	PVA (%w)	NaOH (%w)	FA:PAC ratio
Ex1	8	18	1.5	0.2	0.44
Ex2	10	12	1.5	0.2	0.83
Ex3	20	20	1.5	0.6	1.0
Ex4	20	12	1.5	0.4	1.67

The balance is water.

The results for stability, hydrophobicity and perfume delivery are given in the table below

Example	Stability	Perfume delivery score	Hydrophobicity		
			Cotton	Poly/cotton	Polyester
Ex1	Phase separated	+	W	W	W
Ex2	Yes	+	SH	SH	SH
Ex3	Yes	+	SH	SH	SH
Ex4	Phase separated	+	W	W	W

The table above shows that the perfume delivery throughout Example compositions Ex1-Ex4 is good. The best stability and hydrophobicity results are obtained with example Ex2 and 3.

Example 2: effect of fatty acid to poly aluminium chloride ratio

Example 1-4 were repeated with a commercially available mixture of fatty acids comprising 55% Lauric, 22% Myristic, 22% Palmitic and 1% oleic acid (Prifac 5908, ex Croda), The polymer used was Poly vinyl alcohol (PVA) having a Mw of 13-23k u. Sodium hydroxide (NaOH) was used to neutralise the fatty acid.

The following compositions were used (see table below). 1% of perfume was used in the compositions below.

Example	**Fatty Acid (%w)**	**PAC (%w)**	**PVA (%w)**	**NaOH (%w)**	**FA:PAC ratio**
Ex5	8	18	3	0.2	0.44
Ex6	20	25	3	0.4	0.80
Ex7	18	18	3	0.6	1.0
Ex8	20	12	3	0.4	1.67

The balance is water.

The results for stability, hydrophobicity and perfume delivery are given in the table below

Example	**Stability**	**Perfume delivery score**	**Hydrophobicity**		
			Cotton	**Poly/cotton**	**Polyester**
Ex5	Phase separated	+	W	W	W
Ex6	Yes	+	SH	SH	SH
Ex7	Yes	+	SH	SH	SH
Ex8	Phase separated	+	W	W	W

The table above shows that the perfume delivery throughout Example compositions Ex5-Ex8 is good. The best stability and hydrophobicity results are obtained with example Ex6 and Ex7.

<u>Example 3: Effect of the degree of neutralisation of the fatty acid</u>

In this example the effect of the degree of neutralization is demonstrated. The experiments were carried out as in Example 1. The polymer used was Poly vinyl ohol (PVA) having a Mw of 85-124k u. Sodium hydroxide (NaOH) was used to neutralise the fatty acid.

The following compositions were used (see table below). 1% of perfume was used in the compositions below.

Example	**Lauric Acid (%w)**	**PAC (%w)**	**PVA (%w)**	**NaOH (%w)**	**FA degree of neutralisation (%)**
Ex9	20	20	1.5	0	0
Ex10	20	20	1.5	0.16	4
Ex11	20	20	1.5	0.48	12
Ex12	20	20	1.5	1.0	25
Ex13	20	20	1.5	2.4	60
Ex14	20	20	1.5	4.0	100

The balance is water.

The results for stability, hydrophobicity and perfume delivery are given in the table below

Example	**Stability**	**Perfume delivery score**	**Hydrophobicity**		
			Cotton	**Poly/cotton**	**Polyester**
Ex9	Phase separated	+	W	W	W
Ex10	Phase separated	+	W	W	W
Ex11	Yes	+	SH	SH	SH
Ex12	Yes	+	SH	SH	SH
Ex13	Phase separated	+	W	W	W
Ex14	Phase separated	+	W	W	W

The table above shows that perfume delivery throughout the Ex9-Ex14 is good. The best stability and hydrophobicity results are obtained with example compositions Ex11 and Ex12.

Example 4: Effect of the HLB value of the polymer

In this example the effect of the HLB value of the polymer is demonstrated. The experiments we carried out as in Example 1.

All compositions in this example contained 20% Lauric acid and 20% PAC; other ingredients are listed below. The balance is water.

The following compositions were used (see table below). 1% of perfume was used in the compositions below.

Example	Polymer (type)	Polymer (Mnf)	Polymer (Mw)	Polymer (HLB)	Polymer (%w)	NaOH (%w)
Ex15	PVA	Sigma	10-200k	15.5-16.2 (1)	3	0.6
Ex16	Pluronic	BASF	2.5-25k	16-17 (1)	3	0.6
Ex17	Methyl Cellulose	Sigma		10-12 (1)	3	0.6
CompA	Polyethylene glycol	Sigma	20-100k	86 (2)	5	0.6
CompB	Polyacrylic acid	Sigma	20-100k		5	0.6
CompC	Sodium carboxymethyl cellulose	Sigma	40-150k		5	0.6
CompD	Polyethyleneimine	Sigma	20-100k		5	0.6

1) HLB was calculated by Griffin's method.
2) HLB was calculated by Group Calculation method.

The results for stability, and hydrophobicity are given in the table below

Example	Stability	Hydrophobicity		
		Cotton	Poly/cotton	Polyester
Ex15	Yes	SH	SH	SH
Ex16	Yes	SH	SH	SH
Ex17	Phase separated	SH	SH	SH
CompA	Phase separated	W	W	W
CompB	Phase separated	W	W	W
CompC	Phase separated	W	W	W
CompD	Phase separated	W	W	W

The table above shows that the best hydrophobicity results are obtained with Ex15, Ex16 and Ex17. Ex 17 showed some phase separation, but is considered to be quite suitable for shake-before-use compositions.

Example 5: effect of degree polymer hydrolysis

Example 1 was repeated with different degrees of hydrolysis of the poly vinyl alcohol (PVA) polymer. The balance is water.

All composition below contained 20% Lauric acid, 20% PAC, 0.6% NaOH. The concentration, type, HLB and degree of hydrolysis are given below.

The following compositions were used (see table below). 1% of perfume was used in the compositions below.

Example	Mol. wt. (Mw)	Degree of Hydrolysis (%)	HLB (1)	PVA (%)	Stability
Ex18	89k-98k	99	19.61	5	No
Ex19	146k-186k	99	19.61	5	No
Ex20	85k-124k	99	19.61	5	No

Ex21	31k-50k	98-99	19.23	5	No
Ex22	85k-124k	96	18.49	5	No
Ex23	85k-124k	87-89	16.11	3	Yes
Ex24	13k-23k	87-89	15.48	3	Yes

The table above shows that compositions having an HLB below 18 give the best stability (i.e. no phase separation) of the composition.

Example 6: Effect of the addition of additional polymers

Example 1 was repeated and the cleaning efficacy on the subsequent wash was demonstrated and compared with a control without treatment.

Additionally some examples with optional further polymers were carried out and the effect of oily soil cleaning was demonstrated

The following compositions were used (see table below). 1% of perfume was used in the compositions below.

Example	**Ex 25 (%)**	**Ex26 (%)**	**Ex27 (%)**	**Ex28 (%)**
Prifac 5908	20	16	16	16
Polyaluminiumchloride	25	20	20	20
Sodium hydroxide	0.4	0.5	0.5	0.5
PVA (13-23k)	3	3	3	3
Methyl cellulose			0.5	0.5
Repel-O-Tex SF2		0.5		0.125
Perfume	1	1	1	1
Water	50.6	59	59	58.875
Total	100	100	100	100

The results for cleaning upon the subsequent wash are given in the table below

Formulation	Stain Type	Cotton	Polycotton	Polyester
Ex25	Carbon soot	+	+	+
	Tea stain	+	+	+
	Red mud	+	+	+
	Dirty motor oil	-	-	=
	Cooking oil	-	-	-
EX26	Carbon soot	+	+	+
	Tea stain	+	+	+
	Red mud	+	+	+
	Dirty motor oil	-	-	=
	Cooking oil	-	-	=
Ex27	Carbon soot	+	+	+
	Tea stain	+	+	+
	Red mud	+	+	+
	Dirty motor oil	=	+	+
	Cooking oil	=	=	=
Ex28	Carbon soot	+	+	+
	Tea stain	+	+	+
	Red mud	+	+	+
	Dirty motor oil	+	+	+
	Cooking oil	=	+	+

The table above shows that the fabrics that are treated with compositions according to the invention all perform better than untreated upon the subsequent wash for carbon soot, tea and mud stains, while the compositions with the optional polymers, also perform better on the removal of oily soils (dirty motor oil and cooking oil).

<u>Example 7: Effect of further metal ion.</u>

The following materials were used in the examples below:

Prifac 5908, (ex Croda Chemicals - 55% Lauric, 22% Myristic, 22% Palmitic,1% oleic)

Commercially available Lauric acid

Poly aluminium chloride: Grade _ AC/100S (ex Grasim, India).

$CaCl2.2H2O$- CAS: 10035-04-8	Merck India
$MgCl2.6H2O$- CAS: 7791-18-6	Merck India
ZnCl2- CAS: 7646-85-7	Merck India
NaOH- CAS: 1310-73-2	Merck India

Polyvinyl alcohol Sigma Aldrich, wt average Mw of 85-124k u, 87-89% hydrolyzed)

First, fatty acid was partially neutralized with alkali solution at 70 °C temperature. Then, polyvinyl alcohol was mixed into the partially neutralized fatty acid. After that, an aqueous solution comprising of a mixture of PAC (poly aluminium chloride) and CaCl2.2H2O was added to the above mixture. After the complete addition of the solution containing Al and Ca, the mixture was homogenized for 5 min and was allowed to cool down at room temperature (25 °C) and perfume was added to the cooled mixture and was mixed well. Further ingredients as used in some of the examples were added subsequently.

Lauric acid was neutralised to 20%. The polymer used was Poly vinyl alcohol (PVA) having a Mw of 85-124k u. Sodium hydroxide (NaOH) was used to neutralise the fatty acid. PAC was used as a source of Aluminium. PAC contains 15% Al (mole calculation were done on this basis)

The following compositions were used (see table below). 1% of perfume was used in the compositions below.

Example	**Lauric Acid**		**PAC**		**$CaCl_2$.2H2O**		**Al to Ca mole ratio**	**PVA (85-124K) (%w)**	**NaOH (%w)**
	(% w)	(moles)	(%w)	(moles of Al)	(%w)	(moles of Ca)			
Ex 29	20	0.1	15	0.083	5	0.034	2.4	1.5	0.8
Ex 30	20	0.1	14	0.078	6	0.041	1.9	1.5	0.8
Ex 31	20	0.1	12	0.067	8	0.054	1.2	1.5	0.8
Ex 32	20	0.1	9	0.05	11	0.075	0.67	1.5	0.8
Ex 33	20	0.1	6	0.033	14	0.095	0.35	1.5	0.8

The results for stability, hydrophobicity and perfume delivery are given in the table below:

Ex	**Stability**	**Perfume delivery score**	**Hydrophobicity**			**DMO cleaning**		
			Cotton	**Poly-cotton**	**Poly-ester**	**Cotton**	**Poly-cotton**	**Poly-ester**
Ex 29	Yes	+	SH	SH	SH	-	-	-
Ex 30	Yes	+	SH	SH	SH	=	-	=
Ex 31	Yes	+	SH	SH	SH	+	=	+
Ex 32	Yes	+	SH	SH	SH	+	+	+
Ex 33	Solidified	+	W	W	W	+	+	+

The results show that perfume delivery is good for al formulations. The results further show that a Al to Ca mole ratio greater than 2.3 leads to stable formulations but inferior oily (DMO) soil cleaning, a Al to Ca mole ratio between 0.5 to 2.3 leads to stable formulations with better oily (DMO) soil cleaning, and a Al to Ca mole ratio less than 0.5 leads to unstable formulations but better oily (DMO) soil cleaning.

Formulations are immediately stable, solidify upon keeping for overnight. Treatment was done immediately.

Example 8: Effect of Fatty acid to Total metal (Al + Ca) mole ratio:

The composition was prepared as indicated above. Lauric acid was neutralised to 20%. The polymer used was Poly vinyl alcohol (PVA) having a Mw of 85-124k u. Sodium hydroxide (NaOH) was used to neutralise the fatty acid. PAC was used as a source of Al. PAC contains 15% Al (mole calculation were done on this basis)

The following compositions were used (see table below). 1% of perfume was used in the compositions below.

Example	**Lauric Acid**		**PAC**		**$CaCl_2$.2H2O**	
	(%w)	(moles)	(%w)	(moles of Al)	(%w)	(moles of Ca)
Ex 34	20	0.1	7.2	0.04	4.8	0.033
Ex 35	20	0.1	8.4	0.047	5.6	0.038
Ex 36	20	0.1	12	0.067	8	0.054

Ex 37	20	0.1	15	0.083	10	0.068
Ex 38	20	0.1	24	0.133	16	0.109

continued

Example	**Al to Ca mole ratio**	**Total Metal**	**Fatty acid to Total metal mole ratio**	**PVA (85-124K)**	**NaOH**
		(moles)		**(%w)**	**(%w)**
Ex 34	1.225	0.073	1.376	1.5	0.8
Ex 35	1.225	0.085	1.180	1.5	0.8
Ex 36	1.225	0.121	0.826	1.5	0.8
Ex 37	1.225	0.151	0.661	1.5	0.8
Ex 38	1.225	0.242	0.413	1.5	0.8

The results for stability, hydrophobicity and perfume delivery are given in the table below:

Ex	**Stability**	**Perfume delivery score**	**Hydrophobicity**			**DMO cleaning**		
			Cotton	**Poly-cotton**	**Poly-ester**	**Cotton**	**Poly-cotton**	**Poly-ester**
Ex 34	Solidi-fied	+	W	W	W	=	=	+
Ex 35	Yes	+	W	SH	SH	+	=	+
Ex 36	Yes	+	SH	SH	SH	+	=	+
Ex 37	Yes	+	SH	SH	SH	=	=	+
Ex 38	Yes	+	W	W	W	-	-	-

The results show that the perfume delivery is good for all examples. The results further show that a fatty acid to (Al + Ca) mole ratio greater than 1.2 leads to unstable formulations, parity/better DMO cleaning, a fatty acid to (Al + Ca) mole ratio between 0.5-1.2 to leads to stable formulations with better oily (DMO) soil cleaning, and a fatty acid to (Al + Ca) mole ratio lesser than 0.5 leads to stable formulations, wetting in all cases and inferior oily (DMO) soil cleaning.

Example 9: Effect of the degree of neutralisation of the fatty acid

The composition was prepared as indicated above. The polymer used was Poly vinyl alcohol (PVA) having a Mw of 85-124k u. Sodium hydroxide (NaOH) was used to neutralise the fatty acid. PAC was used as a source of Al. PAC contains 15% Al (mole calculation were done on this basis). 1% of perfume was used in the compositions below.

Ex	**Lauric Acid (%w)**	**PAC (%w)**	**CaCl2 (%w)**	**Al to Ca mole ratio**	**PVA (85-124K) (%w)**	**NaOH (%w)**	**FA degree of neutr. (%)**
Ex 39	20	12	8	1.225	1.5	0.4	10
Ex 40	20	12	8	1.225	1.5	0.6	15
Ex 41	20	12	8	1.225	1.5	1.6	40
Ex 42	20	12	8	1.225	1.5	1.8	45

The results for stability, hydrophobicity and perfume delivery are given in the table below:

Ex	**Stability**	**Perfume delivery score**	**Hydrophobicity**			**DMO cleaning**		
			Cotton	**Poly-cotton**	**Poly-ester**	**Cotton**	**Poly-cotton**	**Poly-ester**
Ex 39	Solidified	+	W	W	W	=	=	+
Ex 40	Yes	+	SH	SH	SH	+	=	+
Ex 41	Yes	+	SH	SH	SH	+	+	+
Ex 42	Phase separated	+	W	W	W	+	+	+

The results show that the perfume delivery is good for all examples. The results further show that for Fatty acid neutralization below 10% and above 40% the formulation is unstable, while the formulation is stable between 15-40%.

Example 10: With PAC and other metal ions

CaCl2. 2H2O (MW 147); MgCl2 .6H2O (MW 203) and Anhydrous ZnCl2 (MW 136) were used. PAC was used as a source of Al. PAC contains 15% Al (mole calculation were done on this basis)

The following compositions were used (see table below). 1% of perfume was used in the compositions below.

Example	**Type of M^{2+}**	**Lauric Acid**		**PAC**		**M^{2+} salt**	
		(%w)	(moles)	(%w)	(moles of Al)	(%w)	(moles of M^{2+})
Ex 43	$CaCl_2$. 2H2O	20	0.1	15	0.083	8	0.054
Ex 44	MgCl2. 6H2O	20	0.1	15	0.083	11	0.054
Ex 45	ZnCl2	20	0.1	15	0.083	7.5	0.054

continued

Example	**Type of M^{2+}**	**Al to Ca mole ratio**	**Fatty acid to Total metal mole ratio)**	**PVA (85-124K) (%w)**	**NaOH (%w)**
Ex 43	$CaCl_2$. 2H2O	2.4	0.73	1.5	0.8
Ex 44	MgCl2. 6H2O	1.9	0.73	1.5	0.8
Ex 45	ZnCl2	1.2	0.73	1.5	0.8

The results for stability, hydrophobicity and perfume delivery are given in the table below:

Ex	**Stability**	**Perfume delivery score**	**Hydrophobicity**			**DMO cleaning**		
			Cotton	**Poly-cotton**	**Poly-ester**	**Cotton**	**Poly-cotton**	**Poly-ester**
Ex 43	Yes	+	SH	SH	SH	+	=	+
Ex 44	Yes	+	SH	SH	SH	+	=	+
Ex 45	Yes	+	SH	SH	SH	+	+	+

The results show that different metal salts provide the same effect.

Example 11: Optional oil removal ingredients

The following further ingredients were use in the same experimental setup as above.

Product Name	**Specification**	**Manufacturer**
Methyl laurate	CAS Number: 111-82-0	Sigma- Aldrich
Nonionic surfactant	C_{12} Ethoxylated alcohol non-ionic (EO3, EO7 and EO3:EO7 = 1:1, EO5)	Galaxy Surfactants Ltd., India
RHODACAL SSA/R	96% LABSA. Dodecylbenzene Sulfonic Acid (Linear)	Rhodia
Methyl bis[ethyl (palmate)]-2-hydroxyethyl ammonium methyl sulphate	Quat (CAS: 91995-81-2)	Zenith Hygiene Systems
CaCl2.2H2O	CAS: 10035-04-8	Merck India
MgCl2.6H2O	CAS: 7791-18-6	Merck India
ZnCl2	CAS: 7646-85-7	Merck India
NaOH	CAS: 1310-73-2	Merck India

First, fatty acid was partially neutralized with alkali solution at 70 °C temperature. Then, polyvinyl alcohol was mixed into the partially neutralized fatty acid. After that, PAC was added to the above mixture. After the complete addition of PAC, the mixture was homogenized for 5 min and was allowed to cool down at room temperature (25 °C) and perfume was added to the cooled mixture and was mixed well. Further ingredients as used in some of the examples were added subsequently. The formulation containing a combination of anionic and cationic surfactant for enhanced oily soil removal was prepared as follows: Partially neutralising fatty acid with the alkali source at a temperature above the melting point of the fatty acid, mixing the polymer into the partially neutralized fatty acid mixture, adding a solution of aluminium salt to the mixture, homogenize the mixture, followed by addition of the cationic surfactant and then the anionic surfactant, the composition was then let to cool down to room temperature; and optionally perfume was added. By room temperature is meant a temperature between 20 and 25°C. Where used, LAS acid (RHODACAL SSA/R) was neutralized with 40% NaOH solution and the final pH of the mixture was set to 10. This mixture was used in all the experiments.

The table below shows the compositions as used. 1% of perfume was used in the compositions below.

Example	**Ex 46 (w%)**	**Ex47 (w%)**	**Ex48 (w%)**	**Ex49 (w%)**	**Ex50 (w%)**	**Ex51 (w%)**	**Ex52 (w%)**
Lauric acid							
Prifac 5908	20	20	20	20	20	20	20
Polyaluminiumchloride	25	25	25	25	25	25	25
Sodium hydroxide	0.6	0.6	0.6	0.6	0.6	0.6	0.6
PVA (13-23k)	3	3	3	3	3	3	3
Methyl cellulose							
Methyl Laurate		2					
NI (C12) – EO3			1				
NI (C12) – EO3				1			
NaLAS					0.5		0.5
Softquat						1	1
Repel-O-Tex SF2							
Perfume	1	1	1	1	1	1	1
Water	50.4	48.4	49.4	49.4	47.9	48.4	46.9
Total	100	100	100	100	100	100	100

The results are given below

Ex	**Stability**	**Perfume delivery score**	**Hydrophobicity**		
			Cotton	**Poly/cotton**	**Polyester**
Ex 46	Yes	+	SH	SH	SH
Ex 47	Yes	+	SH	SH	SH
Ex 48	Yes	+	SH	SH	SH
Ex 49	Yes	+	SH	SH	SH
Ex 50	Phase separated	+	W	W	W
Ex 51	Yes	+	W	SH	SH
Ex 52	Yes	+	SH	SH	SH

The table below shows that the fabrics that are treated with compositions according to the invention all perform better than untreated upon the subsequent was for carbon soot, tea and mud stains, while the compositions with the optional polymers, also perform better on the removal of oily soils.

Formulation	Stain Type	Cotton	Polycotton	Polyester
EX46	Carbon soot	+	+	+
	Tea stain	+	+	+
	Red mud	+	+	+
	Dirty motor oil	-	-	=
	Cooking oil	-	-	-
Ex47	Carbon soot	+	+	+
	Tea stain	+	+	+
	Red mud	+	+	+
	Dirty motor oil	+	=	+
	Cooking oil	=	=	+
Ex48	Carbon soot	+	+	+
	Tea stain	+	+	+
	Red mud	+	+	+
	Dirty motor oil	=	=	=
	Cooking oil	=	=	+
EX49	Carbon soot	+	+	+
	Tea stain	+	+	+
	Red mud	+	+	+
	Dirty motor oil	+	=	=
	Cooking oil	+	+	+
Ex50	Carbon soot	=	-	=
	Tea stain	-	-	=
	Red mud	=	=	+
	Dirty motor oil	=	=	+
	Cooking oil	=	=	=
Ex51	Carbon soot	=	=	=
	Tea stain	+	=	=
	Red mud	=	-	=
	Dirty motor oil	=	-	-
	Cooking oil	-	-	-
Ex52	Carbon soot	+	+	+
	Tea stain	+	+	+
	Red mud	+	+	+
	Dirty motor oil	=	=	+
	Cooking oil	=	=	+

Example 12: Effect of concentration of PVA

The composition was prepared as indicated above. Lauric acid was partially neutralised to 15%. The polymer used was Poly vinyl alcohol (PVA) having a Mw of 85-124k u. Sodium hydroxide (NaOH) was used to neutralise the fatty acid. Fatty acid to PAC ratio is fixed at 0.83.

The table below shows the compositions as used. 1% of perfume was used in the compositions below.

Example	**Fatty Acid (%w)**	**PAC (%w)**	**NaOH (%w)**	**FA:PAC ratio**	**PVA (%w)**
Ex 53	10	12	0.2	0.83	0.1
Ex 54	10	12	0.2	0.83	0.2
Ex 55	10	12	0.2	0.83	0.5
Ex 56	10	12	0.2	0.83	3
Ex 57	10	12	0.2	0.83	12

The results for stability, hydrophobicity and perfume delivery are given in the table below:

Example	**Stability**	**Perfume delivery score**	**Hydrophobicity**		
			Cotton	**Poly/cotton**	**Polyester**
Ex 53	Phase separated	+	SH	SH	SH
Ex 54	Phase separated	+	SH	SH	SH
Ex 55	Yes	+	SH	SH	SH
Ex 56	Yes	+	SH	SH	SH
Ex 57	Yes	=	W	W	W

The results show that perfume delivery is good for all examples. The results further show that a PVA concentration of less than .3 % leads to unstable, phase separated compositions. Compositions according to the invention (Ex55 and Ex 56) show the best results for stability, hydrophobicity and perfume delivery.

Claims

1 A composition for treating a substrate, said composition comprising:

a 2 – 25% by weight of a C8-C24 fatty acid,

b 2.5-40% by weight of a water soluble salt of Aluminium,

c 0.01-2.0% by weight of an alkalinity source;

d 0.3 – 10% by weight of a non-ionic polymer having an HLB value of 10 to 20,

e Water, and

f Perfume; and

wherein the pH of the composition is between 1 and 6 and wherein 5 to 50% by weight of the total fatty acid is neutralised by the alkalinity source.

2 A composition according to claim 1 further comprising 5-30% of a salt of a further poly-valent metal ion, wherein the total amount of aluminium salt and polyvalent metal salt is between 7.5 and 40% by weight.

3 A composition according to claim 2, where in the ratio of Aluminium ion to poly-valent metal ion is in the range of 2.5:1 and 1:2.

4 A composition according to any one of claims 2 or 3, wherein the poly-valent metal ion is select from calcium, zinc, magnesium, barium and titanium

5 A composition according to any one of the preceding claims, further comprising 0.1 – 10% by weight of a perfume.

6 A composition according to any one of the preceding claims, further comprising 0.1 – 2.5% by weight of methyl cellulose.

7 A composition according to any one of the preceding claims, further comprising 0.1 – 2.5% by weight of a soil release polymer.

8 A composition according to any one of the preceding claims, wherein the non-ionic polymer has an HLB value of 12 to 18.

9 A method for treating a substrate comprising the steps of:
  - a Preparing a 0.05 – 1% by weight solution of the composition according to anyone of claims 1 to 8 in water,
  - b Rinsing a fabric article in the solution, and
  - c drying the fabric article.

10 A method for preparing the composition according to anyone of claims 1 to 8, comprising the steps in sequence of:
  - a Partially neutralising fatty acid with the alkali source at a temperature above the melting point of the fatty acid,
  - b Mixing the polymer into the partially neutralized fatty acid mixture,
  - c Adding the aluminium salt to the mixture,
  - d Homogenize the mixture,
  - e Leave the composition to cool down to room temperature; and
  - f Add the perfume.

11 A bottled rinse conditioner agent comprising the composition according to anyone of claims 1 to 8 in a 250 ml to 5 L bottle.

12 A trigger spray bottled rinse conditioner agent comprising the composition according to anyone of claims 1 to 8 in a 250 ml to 1.5 L bottle.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2013/050546

A. CLASSIFICATION OF SUBJECT MATTER

INV.	C11D1/00	C11D1/722	C11D3/00	C11D3/04	C11D3/20
	C11D3/22	C11D3/37	C11D3/50	C11D9/10	C11D9/22
	C11D9/26	C11D11/00	D06M11/17	D06M11/57	D06M13/188

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 D06M

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)

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.
A	GB 552 447 A (GEIGY COLOUR COMPANY LTD; HERBERT TAYLOR FERGUSSON) 8 April 1943 (1943-04-08) claims; examples -----	1
A	WO 2010/069731 A1 (UNILEVER NV [NL]; UNILEVER PLC [GB]; UNILEVER HINDUSTAN [IN]) 24 June 2010 (2010-06-24) cited in the application claims; table 4 -----	1-12
A	WO 01/07551 A1 (HENKEL KGAA [DE]) 1 February 2001 (2001-02-01) page 3; claims -----	1-12
A	US 4 136 038 A (PRACHT HANS J ET AL) 23 January 1979 (1979-01-23) claims ----- -/--	1-12

☒ 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 application or patent but published on or after the international filing date

"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)

"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 10 April 2013	Date of mailing of the international search report 18/04/2013
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Pfannenstein, Heide

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 662 945 A (JOHNSON & SON INC S C) 12 December 1951 (1951-12-12) claims; examples -----	1-12
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Information on patent family members

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