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(54) **A COMPOSITION AND METHOD FOR TREATING SUBSTRATES**

ZUSAMMENSETZUNG UND VERFAHREN ZUR BEHANDLUNG VON SUBSTRATEN

COMPOSITION ET PROCÉDÉ POUR TRAITER DES SUBSTRATS

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Description**Field of the invention**

- 5 **[0001]** The present invention relates to a composition and a method for treating substrates, such as fabrics; particularly for improved stain removal and better cleaning upon the subsequent wash and also for reduced re-deposition of dirt.

Background of the invention

- 10 **[0002]** Fabric stains run the gamut from food spills to household substances and can be of different types; mainly aqueous, oily, particulate and bleachable. Stains are something that people try to avoid, yet they are unavoidable. Nonetheless, people still prefer to wear clothes with lesser stains or no stains at all. In fact, people prefer to avoid stains not just on clothes but in general in kitchens, bathrooms and also on various household surfaces.

- 15 **[0003]** Consequently, improved stain removal is one of the constant goals of the detergent industry. There is always an interest to improve the detergency effect, especially on fabric stains. Fabric stains such as particulate stains, especially mud or clay containing iron oxides, aqueous/bleachable stains such as tea stains or oily stains such as motor oil stains, grease are difficult to remove during main wash. Even if such stains are removed during the wash process, re-deposition of the removed dirt onto the fabric is hard to avoid.

- 20 **[0004]** JP09/137378A discloses an antibacterial softener composition comprising a cationic bactericide, a salt of an α -olefinsulfonic acid having 20 or more carbon atoms and/or a salt of a dialkylsulfosuccinic acid where the alkyl group has 16 or more carbon atoms, a wax component and optionally a metal chelating agent for better antibacterial property and texture. However, JP09/137378A has not been found to provide improved stain removal or better cleaning upon the subsequent wash and reduced re-deposition of dirt.

- 25 **[0005]** US 2003/0073597 disclose a liquid fabric softener composition comprising anionic and cationic surfactants and optionally amphoteric and/or non-ionic surfactants. But said composition does not provide improved stain removal on the subsequent wash or improved cleaning benefits or reduced re-deposition of dirt.

[0006] EP 0 388 389 A2 relates to detergent compositions containing hydroxamic acid and their derivatives to assist in the removal of stains from fabrics. EP 1 279 724 A1 relates to liquid softener compositions suitable for treatment of clothes and fabrics.

- 30 **[0007]** Laundry compositions have been disclosed in applications WO2010/ 069957, WO2011/ 151170 and WO2011/154225 (all by Unilever). These documents disclose laundry compositions comprising hydroxamate and a surfactant system of anionic and non-ionic surfactants. Similarly, WO2012/062566 (by Unilever) discloses laundry compositions comprising hydroxamate and a surfactant system of two different types of anionic surfactants. However, these documents have not been found to provide improved aqueous/bleachable, oily and particulate stain removal or better cleaning upon the subsequent wash. Also, the need to reduce or even avoid the re-deposition of removed stains onto the fabric is still desired.

- 35 **[0008]** Our co-pending application EP12160157, describes 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; and describing that that improved perfume delivery and stain repellence is obtained in compositions comprising a fatty acid, a water soluble salt of aluminium and a non-ionic polymer having a specific HLB value. However it is a long felt need to reduce or even avoid the re-deposition of removed stains onto the fabric.

[0009] It is therefore an object of the present invention to provide improved aqueous/bleachable, oily or particulate stain removal.

[0010] It is a further object of the present invention to provide improved cleaning upon subsequent wash.

- 45 **[0011]** It is yet another object of the invention to reduce re-deposition of dirt.

[0012] It is still another object of the invention to provide a composition that provides fabric softness.

[0013] It is still another object of the invention to provide a composition that provides improved perfume delivery to the fabric.

- 50 **[0014]** It is still another object of the present invention to provide a stable composition; especially a composition that does not phase separate.

[0015] Surprisingly, it has been found that improved aqueous, oily or particulate stain removal and reduced re-deposition of dirt can be achieved by depositing a surfactant complex of an anionic and a cationic surfactant, a non-ionic polymer and a chelating agent onto the fabric.

- 55 **Summary of the invention**

[0016] Accordingly, in a first aspect, the present invention provides an aqueous composition for treating a substrate, said composition comprising 2-22 % by weight of a surfactant complex, selected from cationic and anionic surfactants,

wherein the cationic to anionic surfactant weight ratio is in the range of 1:1 and 6:1; 0.5- 10% by weight of a non-ionic polymer having a molecular weight of less than 50ku and a HLB value in the range of 12.5 and 18 and; 1-7% by weight of a chelating agent, selected from hydroxamates of the formula R- CO - NH - OM wherein, R is an alkyl, aryl or alkylaryl group having 6-20 carbon atoms; and M is hydrogen or an alkali metal.

[0017] In a second aspect the present invention provides a method for treating a substrate comprising the steps in sequence of preparing a 0.05- 1 % by weight solution of the composition according to claims 1 to 8 in water, rinsing the substrate in the prepared solution, and drying the substrate.

[0018] In a third aspect the present invention provides a method for preparing the composition of the invention comprising the steps in sequence of dispersing the anionic surfactant in a mixture of water and non-ionic polymer, mixing the cationic surfactant into the non-ionic polymer and anionic surfactant mixture, adding the chelating agent to the mixture; and optionally adding a perfume.

[0019] 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.

[0020] For the avoidance of doubt, the improved cleaning upon the subsequent wash benefit is also referred to as next time cleaning benefit.

[0021] 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

[0022] The present invention provides an aqueous composition for treating a substrate, comprising a surfactant complex selected from cationic and anionic surfactants; a non-ionic polymer and; a chelating agent, selected from hydroxamates of the formula R- CO - NH - OM. The balance of the composition is made up to 100% by weight with water.

Surfactant complex

[0023] The surfactant complex of the present invention is a deterative surfactant system comprising surfactants selected from cationic and anionic surfactants. The cationic and anionic surfactants are present in a ratio such that the cationic : anionic surfactant weight ratio is from 1:1 to 6:1, preferably from 2:1 to 6:1.

[0024] Cationic surfactants are included in the composition for rendering softness to the fabric. The cationic surfactant used herein may be a quaternary ammonium salt of the general formula: $R_1R_2R_3R_4N^+X^-$, wherein

N is nitrogen;

R^1 is C_8 - C_{22} alkyl, alkenyl, alkyl/alkenylamidopropyl, alkoxyalkenylethyl, alkyl/alkenyl(poly)alkoxyalkyl, C_1 - C_4 alkyl C_8 - C_{20} alkanoate or alkenoate group, or a C_2 - C_4 alkyl bis [C_8 - C_{20} (alkanoate or alkenoate)] group.

R^2 is C_1 - C_{22} alkyl group, C_2 - C_{22} alkenyl group, C_8 - C_{22} alkyl/alkenylamidopropyl, alkyl/alkenyl(poly)alkoxyalkyl, alkanoylethyl or alkenoylethyl group or a group of the formula $-A-(OA)_n-OH$, C_1 - C_4 alkyl C_8 - C_{20} alkanoate or alkenoate group, or a C_2 - C_4 alkyl bis [C_8 - C_{20} (alkanoate or alkenoate)] group.

R^3 and R^4 are C_1 - C_4 -alkyl or hydroxyalkyl group, C_2 - C_{21} alkenyl group or a group of the formula $-A-(OA)_n-OH$;

A is $-C_2H_4-$ and/or $-C_3H_6-$;

n is a number from 0 to 20;

O is oxygen;

H is hydrogen; and

[0025] X is an anion such as chloride, bromide, iodide, nitrate, sulphate or a methyl or ethyl sulfate.

[0026] The preferred cationic surfactants of the present invention are esterquats in which partially hardened triethanolamine ester quats are most preferred.

[0027] Non-limiting examples of the cationic surfactants that can be used according to the present invention include methyl bis[ethyl (tallowate)]-2-hydroxyethyl ammonium methyl sulphate; methyl bis[ethyl (palmate)]-2-hydroxyethyl ammonium methyl sulphate, ditallow dimethyl ammonium chloride; ditallow dimethyl ammonium methyl sulfate; dihexadecyl dimethyl ammonium chloride; di (hydrogenated tallow alkyl) dimethyl ammonium chloride; dioctadecyl dimethyl ammonium chloride; dieicosyl dimethyl ammonium chloride; didocosyl dimethyl ammonium chloride; di (hydrogenated tallow) dimethyl ammonium methyl sulfate; dihexadecyl diethyl ammonium chloride; di(coconut alkyl) dimethyl ammonium chloride.

[0028] Most preferred examples of the cationic surfactants that can be used according to the present invention include Methyl bis[ethyl (tallowate)]-2-hydroxyethyl ammonium methyl sulphate, Methyl bis[ethyl (palmate)]-2-hydroxyethyl ammonium methyl sulphate.

[0029] Anionic surfactants are included in the composition for primary cleaning action. Any non-soap anionic surfactant known in the art for use in laundry detergents may be used herein.

[0030] Preferred anionic surfactants are water-soluble salts, particularly alkali metal, ammonium and alkylolammonium salts of organic sulphur reaction products having in their molecular structure an alkyl group containing from about 10 to 20 carbon atoms and a sulphonic acid or sulphuric acid ester group.

[0031] Non-limiting examples of the anionic surfactants include any of the common anionic surfactants such as linear or modified, e. g., branched, alkylbenzene sulphonates, alkylpoly(ethoxylates), alkyl sulphates, methyl ester sulphonates, or mixtures thereof.

[0032] In the composition of the present invention, the surfactant complex may be present in a concentration of 2 -22%, preferably not more than 20%, more preferably not more than 15% but preferably not less than 3% by weight of the total composition.

[0033] For the best stability of the compositions, and to obtain compositions that do not phase separate, the concentration of the surfactant complex is preferably between 3- 20 % by weight of the total composition.

[0034] Without wishing to be bound by a theory, it is thought that the coulombic interaction of the positively charged quaternary ammonium ion of the cationic surfactant and the negative charge on the sulfate/sulfonate group of the anionic surfactant leads to formation of a complex adduct.

Non-ionic polymer

[0035] 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.

[0036] The polymer is used to stabilise the composition and aid in the deposition of the composition onto the fabric.

[0037] The composition comprises 0.5 - 10% by weight of the non-ionic polymer, preferably at least 1%, more preferably at least 3% by weight, but typically less than 8% by weight of the composition. For the best stability the concentration is preferably at least 1%. For the best stability and cleaning performance the polymer is preferably present in a concentration of from 1 to 10% by weight, more preferably from 1 to 8% by weight of the composition.

[0038] 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 ($HLB = 7 + \sum(\text{Hydrophilic group numbers}) - \sum(\text{Lipophilic group numbers})$).

[0039] For the purpose of the present invention, compositions providing excellent perfume delivery to and extended perfume release from the fabric are obtained when the HLB value is in the range from 12.5 to 18.

[0040] The best mud cleaning properties are obtained when the HLB value is between 14 and 17, preferably between 15 and 16.

[0041] For the best stability of the compositions, and to obtain compositions that do not phase separate, the HLB is preferably between 14 and 17.

[0042] 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, polypropylene glycols and polyvinyl alcohols, having an HLB value in the range from 12.5 to 18.

[0043] Ethylene oxide/Propylene oxide block co-polymer and polyvinyl alcohols are the most preferred.

[0044] To get the best stability and cleaning of the composition, it is preferred that poly vinyl alcohol polymers (PVA),

when used, is in a concentration of 1-10% by weight of the composition and have a degree of hydrolysis of at least 75(%), preferably at least 80%, or even at least 85%, but preferably less than 95%. A degree of hydrolysis between 85-91%, or even 87-89% is the most preferred. The molecular mass of the PVA is less than 50ku, preferably between 10ku and 50ku, and most preferably in the range of 12ku and 25ku. For the avoidance of doubt, "u" is the SI atomic mass unit, also known as amu, Dalton, D or Da.

[0045] Ethylene oxide/Propylene oxide block co-polymers (commercially available as Pluronic, ex BASF) used in the present invention have a molecular mass of less than 50 ku, preferably between 2.5ku and 25ku, and a PPG block of between 5 and 30%, more preferably 10-25%, or even between 15 and 20% by weight of the polymer.

[0046] To get the best stability and cleaning of the composition, it is preferred that Ethylene oxide/Propylene oxide block co-polymers, when used, is in a concentration of 2-10% by weight of the composition and is a triblock co-polymer.

[0047] It is found that when a non-ionic polymer of more than 50 ku is used, the composition phase separates resulting in inferior cleaning, especially of particulate stains.

Chelating agent

[0048] To further enhance the next time cleaning benefit and reduce the re-deposition of the stains onto the fabric, the composition further comprises a chelating agent,

[0049] The chelating agent of the present invention is selected from hydroxamates of the formula:



where, R is an alkyl, aryl or alkylaryl group having 6-20 carbon atoms; and M is hydrogen or an alkali metal.

[0050] In the above formula, R is preferably hexyl, octyl, decyl, dodecyl, 2-ethylhexyl, oleyl, eicosyl, phenyl, naphthyl or hexylphenyl; and M is lithium, sodium, potassium, rubidium or caesium.

[0051] Without wishing to be bound by theory, it is believed that the hydroxamate deposited onto the fabric acts by binding to the metal ions that are present in the stains thereby preventing the contact of the stains with the fabric and facilitating easy removal and suspension of the metal ions, such as iron ions from the fabric into the wash liquor and thus reducing re-deposition of dirt onto the fabric.

[0052] The composition comprises 1-7% by weight of the chelating agent, preferably at least 2%, more preferably at least 3% by weight, but typically not more than 6%, more preferably not more than 5% by weight of the composition.

[0053] For the best stability of the compositions, and to obtain compositions that do not phase separate, the concentration of the chelating agent is preferably between 1- 6 % by weight of the total composition.

Further optional polymers

[0054] For the best cleaning performance upon the subsequent wash, especially for improved cleaning of soils and stains it is preferred that the composition further comprises a further polymer.

[0055] It is found that the addition of methyl cellulose improves the removal of soils and stains upon the next wash. The most preferred is methyl cellulose having a methoxy substitution of between 27.5-31.5% by weight of the methyl cellulose and preferably has a degree of substitution (D.S., average number of substituent groups attached to the ring hydroxyls) between 1.5 and 1.9. It is preferred that a 2% solution of the methyl cellulose in water has a viscosity of between 2000 and 6000 mPa.s (at 20°C, measured in a Brookfield viscometer). The composition preferably comprises between 0.1 and 2% by weight of the composition of the methyl cellulose.

Water

[0056] The composition of the present invention is an aqueous composition comprising water. The composition is preferably made up to 100 percent by adding water.

Optional ingredients

[0057] 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.

[0058] The composition may further comprise softening agents as commonly used in fabric softening compositions, antimicrobial agents, silicone oils and co-solvents like 2-phenoxyethanol (commercially available as ex Dow Chemicals as Dowanol EP-trademark) to improve stability and dispersibility.

[0059] In addition, the formulation may optionally contain certain non-ionic surfactants. Any type of non-ionic surfactants may be used. In general, the non-ionic surfactants may be chosen from the surfactants described in 'Surface Active

Agents' Vol. 1, by Schwartz & Perry, Interscience 1949, Vol. 2 by Schwartz, Perry & Berch, Interscience 1958, in the current edition of 'McCutcheon's Emulsifiers and Detergents' published by Manufacturing Confectioners Company or in 'Tenside- Taschenbuch', H. Stache, 2nd Edn., Carl Hauser Verlag, 1981.

5 Process for treating a fabric

[0060] 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 the substrate in the prepared solution, and drying the substrate.

10 **[0061]** The solution is preferably 0.1 - 0.5% by weight of the composition in water.

[0062] The solution as dosed to a commercially available front load - horizontal axis - washing machine is typically between 25 and 100 ml of the composition into 12-15 L of rinse water. For top load - vertical axis - washing machines the dosage is typically 50-150 ml to 50-60 L of rinse water.

15 Process for preparing the composition

[0063] In another aspect the invention provides a method for preparing the compositions according to the invention comprising the steps in sequence of dispersing the anionic surfactant in a mixture of water and non-ionic polymer, mixing the cationic surfactant into the non-ionic polymer and anionic surfactant mixture in a mixer at 4000 rpm for 5-10 minutes at 30 °C, adding a chelating agent to the mixture and mixing at 4000 rpm for 5 minutes, and optionally adding a perfume and mixing at 4000 rpm for 2-3 minutes at 30 °C.

[0064] Further ingredients according to the invention may be added subsequently.

25 Product Format

[0065] 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.

30 **[0066]** Also considered in the context of the present invention for the purpose of direct application, such as direct application onto a fabric article or a household surface, 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.

[0067] Larger containers for industrial scale use are also included the scope of this invention.

35 Examples

[0068] The invention will now be illustrated by means of the following non limiting examples.

40 Materials

[0069]

45	Cationic surfactant:	Methyl bis[ethyl (tallowate)]-2-hydroxyethyl ammonium methyl sulphate - Stepanex®VT 90(ex Stepan, CAS No. 157905-74-3)
	Anionic surfactant :	NaLAS: Prepared by neutralizing LAS acid (96%, LABSA RHODACAL SSA/R) with 40% Sodium carbonate (ex Merck, India) solution and the final pH was set to 10. This mixture was used for all the experiments.
50	Non-ionic polymer :	SLES: Sodium Lauryl Ether Sulphate (EO2, EO3) PVA: Polyvinyl alcohol- wt average MW - 13-250ku, 87-89% hydrolyzed (ex Sigma Aldrich)
55		Pluronic F108, F65, P62, P64 (ex BASF) EO5 (ex Galaxy Surfactants Ltd.) PEG: Polyethylene glycol (ex Merck India) PEI: Poly(ethyleneimine) (ex Sigma-Aldrich)
	Anionic Polymers :	PAA: Polyacrylic acid PAA (sodium salt) (ex Sigma Aldrich)

(continued)

- SCMC: Sodium carboxymethyl cellulose (ex Sigma-Aldrich)
 Sodium alginate (ex Sigma-Aldrich)
 5 Methyl cellulose : Methyl cellulose - 4000 cp, 2% H₂O @ 20 °C (ex Sigma-Aldrich)
 Chelating agents: Hydroxamate: C12 hydroxamate (sodium salt) (RK 858, Axis House, Australia)
 10 EDTA: Ethylenediaminetetraacetic acid disodium salt dehydrate (ex Sigma-Aldrich, 99.0-101.0%, CAS-No. 6381-92-6)
 Ethylene glycol tetra acetic acid: Ethylene glycol-bis(β-aminoethyl ether)-N,N,N',N'-tetraacetic acid tetrasodium salt (ex Sigma Aldrich, CAS-No. 13368-13-3)
 Citric acid: Sodium citrate dehydrate (ex Sigma Aldrich, CAS-No. 6132-04-3)
 15 PAA : Poly(acrylic acid) - average Mw ~ 1800 (ex Sigma Aldrich, CAS-No. 9003-01-4)
 Diethylene triamine penta acetic acid: Diethylenetriamine-pentaacetic acid pentasodium salt solution (ex Sigma Aldrich, CAS-No. 140-01-2)
 Nitritotriacetic acid: Nitritotriacetic acid trisodium salt (ex Sigma Aldrich, CAS-No. 5064-31-3)

20 Preparing the compositions

[0070] First, the anionic surfactant was dispersed in a water and non-ionic polymer mixture. To this mixture, cationic surfactant was added and mixed well in a mixer at 4000 rpm for 5-10 minutes at 30°C. Following which, a chelating agent was added to the mixture and mixed at 4000 rpm for 5 minutes, and perfume was added and mixed at 4000 rpm
 25 for 2-3 minutes at 30°C. Further ingredients as used in some of the examples were added subsequently.

Fabric treatment protocol

[0071] All the treatment processes in the examples were carried out in a 5 kg front loader washing machine (IFB, MODEL: SENATOR DX, 5 kg) with 6°fH water. 10 of each cotton, poly-cotton and polyester 10x10 cm² swatches were used for treatment. 3.5 kg of fabrics which comprised of a mix of cotton, poly-cotton 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, 35 mL of the test formulation as described in the examples, was used for
 35 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 step, and 3 rinse steps and centrifuging), the swatches were removed and then dried in a drier and ironed.

Staining Protocol

[0072] Red mud soiling: To 1 L 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.
 [0073] Tea stain soiling: Two tea bags were dipped in 150ml hot milk to make tea. 0.2 ml of this tea was dropped onto
 45 the fabric which was placed at an inclined plane of 45°. The fabrics were allowed to dry over-night.
 [0074] Dirty Motor oil (DMO) stain soiling: 50 ml of motor oil was mixed with 50 ml of engine 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.

50 Washing Protocol

[0075] The soiled 10x10 cm² 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
 55 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.

Evaluation of fabrics

[0076] The extent of stain removal was compared against the control (untreated) fabrics on a one to 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 trained panellists.

Reflectance measurement:

[0077] The reflectance of the fabric was measured at ΔR_{460} (values at 460 nanometer, UV excluded) using a Macbeth 7000 color eye reflectometer. A SAV aperture and SAV lens were used for the measurement. Reflectance measured of the fabrics (control and experimental) were recorded each time before and after washing. The extent of stain removal for any given set was evaluated from the difference in their reflectance values before and after washing, as shown below:

$$\Delta R(\text{Control}) = R_{\text{final}}(\text{Control}) - R_{\text{initial}}(\text{Control});$$

where, Control refers to untreated fabrics

$$\Delta R(\text{Experimental}) = R_{\text{final}}(\text{experimental}) - R_{\text{initial}}(\text{experimental})$$

where, Experimental refers to fabrics treated with the said formulations.

[0078] Extent of stain removal (W.r.t untreated) $\Delta(\Delta R) = \Delta R(\text{Experimental}) - \Delta R(\text{Control})$. For each set of experiments, three replicates of each fabric type were used. The average $\Delta(\Delta R)$ values were calculated and compared. The higher the average $\Delta(\Delta R)$ values, the better is the cleaning efficacy.

Evaluation of Perfume Performance

[0079] 50X50 cm² 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. 35 mL of test formulation was used for treatment. As a control, 40g Comfort® (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.

Evaluation of Softness Benefits

[0080] 100X100 cm² terry-towel swatches were used for the softness evaluation study. 5 such swatches were treated with each of the test formulation, as described in the examples, in a manner already described. 35ml of test formulation was used for treatment. After 2 hours of treatment and drying, the softness impact of the treated swatches was compared against the control (in this case Comfort®) on a one to one basis for each set. A score "+" was given in cases where the softness impact on the treated fabrics appeared greater than that on the control fabrics. Similarly, a score "-" was given in cases where the softness impact on the treated fabrics appeared lesser than that on the control fabrics. In all the cases, the evaluation was done by trained persons.

Example 1: Effect of cationic to anionic surfactant ratio

[0081] In this example, different ratios of cationic to anionic surfactant are compared. Ex1 to Ex4 are example compositions according to the present invention which are compared to Comp A and B (Comparative examples) having a cationic to anionic surfactant ratio outside the scope of the present invention.

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Set	Cationic surfactant wt%	Anionic surfactant wt%	Cationic to Anionic ratio	Non-ionic polymer (PVA) wt%	Hydroxamate wt%
Comp A	8.8	1.3	7	3	1
Ex 1	8.6	1.4	6	3	1
Ex 2	8.0	2.0	4	3	1
Ex 3	6.7	3.3	2	3	1
Ex 4	5.0	5.0	1	3	1
Comp B	3.3	6.7	0.5	3	1

The balance is water.

[0082] The results for stability, softness, perfume delivery and DMO and mud cleaning are tabulated below.

Set	Stability	Softness	Perfume	Cleaning_D MO	Cleaning_M ud
Comp A	No	+	+	-	=
Ex 1	Yes	+	+	+	+
Ex 2	Yes	+	+	+	+
Ex 3	Yes	+	+	+	+
Ex 4	Yes	=	+	=	+
Comp B	Yes	-	+	=	+

[0083] The table above indicates that the results obtained for a cationic to anionic ratio of 1:1 to 6:1 are good. The best results on stability, softness, perfume delivery, DMO and mud cleaning are obtained with a cationic to anionic ratio of 2:1 to 6:1.

Example 2: Effect of concentration of the surfactant complex

[0084] In this example, different concentrations of the surfactant complex in accordance with the invention (Ex 5 to Ex 8) are compared with a comparative composition (Comp C) having the surfactant complex in a concentration beyond the claimed range.

Set	Cationic surfactant wt%	Anionic surfactant wt%	Cationic to Anionic ratio	Surfactant complex wt%	Non-ionic polymer (PVA) wt%	Hydroxamate wt%
Ex 5	16.5	5.5	3	22	3	1
Ex 6	15	5	3	20	3	1
Ex 7	6	2	3	8	3	1
Ex 8	2.25	0.75	3	3	3	1
Comp C	0.6	0.2	3	0.8	3	1

The balance is water.

[0085] The results for stability, softness, perfume delivery and DMO and mud cleaning are given in the table below.

Set	Stability	Perfume	Softness	Cleaning_ DMO	Cleaning_ Mud
Ex 5	No	+	+	+	+
Ex 6	Yes	+	+	+	+
Ex 7	Yes	+	+	+	+
Ex 8	Yes	+	+	+	+
Comp C	Yes	-	-	-	-

[0086] The above table shows that good results are obtained for Ex5 to Ex8 having a surfactant complex concentration within the scope of the present invention when compared to Comp C having the surfactant complex in a concentration of less than 2%. Best results on stability are obtained with a surfactant concentration of between 3 and 20% by weight.

Example 3: Effect of concentration of the non-ionic polymer

[0087] In this example, different concentrations of non-ionic polymer in accordance with the invention are compared with comparative compositions having non-ionic polymer in a concentration outside the claimed range. Experiments were conducted with two non-ionic polymers.

1. The effect of different concentrations of polyvinyl alcohol (PVA).

Table 1

Set	Cationic surfactant wt%	Anionic surfactant wt%	Cationic to Anionic ratio	Surfactant complex wt%	Non-ionic polymer (PVA)wt%	Hydroxamate wt%
Ex 9	6	1.2	5	7.2	0.8	1
Ex 10	6	1.2	5	7.2	1	1
Ex 11	6	1.2	5	7.2	5	1
Ex 12	6	1.2	5	7.2	8	1
Comp D	6	1.2	5	7.2	12	1

The balance is water.

The results for stability, softness, perfume delivery and DMO and mud cleaning are tabulated below.

Set	Stability	Perfume	Softness	Cleaning_ DMO	Cleaning_ Mud
Ex 9	No	+	+	+	+
Ex 10	Yes	+	+	+	+
Ex 11	Yes	+	+	+	+
Ex 12	Yes	+	+	+	+
Comp D	Yes	+	-	+	-

It is inferred from the above table that the results obtained for Ex9 to Ex12 having PVA concentration within the scope of the present invention are superior when compared to Comp D having PVA in a concentration of more than 10% by weight. Best results for both stability and cleaning are obtained when the polymer is present in a concentration of between 1 and 10% by weight.

2. The effect of different concentrations of pluronic (PL).

Table 2

Set	Cationic surfactant wt%	Anionic surfactant wt%	Cationic to Anionic ratio	Surfactant complex wt%	Non-ionic polymer (PL)wt%	Hydroxamate wt%
Ex 13	6	1.2	5	7.2	1	1
Ex 14	6	1.2	5	7.2	3	1
Ex 15	6	1.2	5	7.2	5	1
Ex 16	6	1.2	5	7.2	8	1
Comp E	6	1.2	5	7.2	12	1

The balance is water.

[0088] The results for stability, softness, perfume delivery and DMO and mud cleaning are given in the table below.

Set	Stability	Perfume	Softness	Cleaning_DMO	Cleaning_Mud
Ex 13	No	+	+	+	+
Ex 14	Yes	+	+	+	+
Ex 15	Yes	+	+	+	+
Ex 16	Yes	+	+	+	+
Comp E	Yes	+	-	+	-

[0089] It is inferred from the above table that the results obtained for Ex13 to Ex16 having a PL concentration within the scope of the present invention are superior when compared to Comp E having PL in a concentration outside the claimed range. Best results for both stability and cleaning are obtained with a polymer concentration of 2-10% by weight.

Example 4: Effect of concentration of hydroxamate

[0090] This example demonstrates the effect of different concentrations of hydroxamate in the compositions according to the present invention (Ex17 to Ex20) against a comparative composition (Comp F) having hydroxamate in a concentration outside the claimed range.

Set	Cationic surfactant wt%	Anionic surfactant wt%	Cationic to Anionic ratio	Surfactant complex wt%	Non-ionic polymer (PVA) wt%	Hydroxamate wt%
Comp F	6	1.2	5	7.2	3	0.6
Ex 17	6	1.2	5	7.2	3	1
Ex 18	6	1.2	5	7.2	3	3
Ex 19	6	1.2	5	7.2	3	5
Ex 20	6	1.2	5	7.2	3	7

The balance is water.

[0091] The results for stability, softness, perfume delivery and DMO and mud cleaning are tabulated below.

Set	Stability	Perfume	Softness	Cleaning_DMO	Cleaning_Mud
Comp F	Yes	+	+	+	-

(continued)

Set	Stability	Perfume	Softness	Cleaning_DMO	Cleaning_Mud
Ex 17	Yes	+	+	+	+
Ex 18	Yes	+	+	+	+
Ex 19	Yes	+	+	+	+
Ex 20	No	+	+	+	+

[0092] It is inferred from the above table that the results obtained for Ex17 to Ex20 having an hydroxamate concentration within the scope of the present invention are good when compared to Comp F having hydroxamate in a concentration outside the claimed range. Best results for both stability and cleaning are obtained with 1-6% of hydroxamate.

Example 5: Effect of the HLB value of the polymer

[0093] In this example, polymers of the invention having an HLB value within the scope of the present invention (Ex21 and Ex22) are compared to polymers having an HLB value outside the scope of the present invention (Comp G to Comp N).

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Set	Cationic surfactant wt%	Anionic surfactant wt%	Cationic to Anionic ratio	Hydroxamat wt%	Polymer type	Polymer (HLB)	Polymer wt%	Stability
Ex 21	6	1.2	5	1	PVA	15.5-16.2*	3-5	Yes
Ex 22	6	1.2	5	1	Pluronic	16.5*	3-5	Yes
Comp G	6	1.2	5	1	EO5	10.5*	3-5	No
Comp H	6	1.2	5	1	Methyl cellulose	10-12#	3-5	No
Comp I	6	1.2	5	1	PEG	>20#	3-5	No
Comp J	6	1.2	5	1	PAA		3-5	No
Comp K	6	1.2	5	1	NaLAS		3-5	No
Comp L	6	1.2	5	1	SCMC		3-5	No
Comp M	6	1.2	5	1	PEI		3-5	No
Comp N	6	1.2	5	1	Alginat e		3-5	No

* HLB was calculated by Griffin's method.

HLB was calculated by Group Calculation method.

[0094] The table above shows that stability is obtained only with compositions comprising non-ionic polymers having an HLB value within the scope of the invention (Ex21 and Ex22).

Example 6: Effect of molecular weight of the polymer

[0095] Example 17 was repeated with polyvinyl alcohol (PVA) polymer having different molecular weights.

[0096] The compositions below contained 1.2% anionic surfactant, 6% cationic surfactant, and 1% hydroxamate. The concentration, molecular weight, HLB and degree of hydrolysis of the polyvinyl alcohol (PVA) polymers are given below. The balance is water.

Set	Mol. wt. (Mw)	Degree of Hydrolysis (%)	PVA (HLB)	Non-ionic polymer (PVA) wt%	Stability	Mud cleaning
Comp O	89ku-98ku	99	19.61	3	No	Not measured
Comp P	146ku-186ku	99	19.61	3	No	Not measured
Comp Q	85ku-124ku	99	19.61	3	No	Not measured
Comp R	31ku-50ku	98-99	19.23	3	No	Not measured
Comp S	85ku-124ku	96	18.49	3	No	Not measured
Comp T	85ku-124ku	87-89	16.11	3	Yes	Inferior
Ex 23	13ku-23ku	87-89	15.48	3	Yes	Superior

[0097] It is inferred from the above table that superior mud cleaning is obtained only when the compositions comprise a non-ionic polymer having a molecular weight within the scope of the invention (Ex23).

Example 7: Effect of each component of the composition on various attributes of the composition

[0098] In this example, the compositions according to the invention (Ex24 and Ex25) are compared to comparative example compositions (Comp U, V, W and X), where the comparative example compositions are devoid of at least one component of the composition.

[0099] The compositions in the following table were compared with each other to demonstrate the results on cleaning properties on various stains, stability and perfume delivery. The compositions were prepared by the method as described above.

Ingredients (wt %)	Base Formulation (BF)	BF + Hydroxamate	BF + PVA	BF + PVA + Hydroxamate	BF + PL	BF + PL + Hydroxamate
	Comp U	Comp V	Comp W	Ex 24	Comp X	Ex 25
Anionic surfactant	1.2	1.2	1.2	1.2	1.2	1.2
Cationic surfactant	6	6	6	6	6	6
Non-ionic polymer (PVA)	0	0	3	3	0	0
Non-ionic polymer (PL)	0	0	0	0	3	3

(continued)

Ingredients (wt %)	Base Formulation (BF)	BF + Hydroxamate	BF + PVA	BF + PVA + Hydroxamate	BF + PL	BF + PL + Hydroxamate
	Comp U	Comp V	Comp W	Ex 24	Comp X	Ex 25
Hydroxamate	0	1	0	1	0	1
Water	92.8	91.8	89.8	88.8	89.8	88.8
Total	100	100	100	100	100	100

[0100] The results for stability and perfume delivery are tabulated below.

Set	Stability	Perfume delivery
Comp U	No	+
Comp V	No	+
Comp W	Yes	+
Ex 24	Yes	+
Comp X	Yes	+
Ex 25	Yes	+

[0101] The table above indicates that stability and perfume delivery is good for Comp W and Comp X (compositions without hydroxamate) as well, apart from the example compositions of the present invention (EX 24 and Ex 25). However, it may be noted from the below tables that the comparative compositions without hydroxamate (Comp W and Comp X) are inferior in DMO, tea stain and mud stain cleaning when compared to the example compositions of the present invention (EX 24 and Ex 25).

[0102] The result for Dirty motor oil (DMO) cleaning is given in the table below.

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Comp U	0.2	4.7	5.1
Comp V	0.8	5.0	5.5
Comp W	2.1	10.2	8.7
Ex 24	2.3	11.2	9.1
Comp X	1.5	8.3	6.5
Ex 25	1.8	9.1	6.8

[0103] It is deduced from the above table that example compositions of the present invention are superior in DMO cleaning when compared to comparative compositions having base formulation comprising anionic and cationic surfactants alone (Comp U), comparative compositions having base formulation and hydroxamate (Comp V) and comparative compositions having base formulation and PVA or PL (Comp W and Comp X).

[0104] The result for tea stain cleaning is given in the table below.

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Comp U	0.5	3.6	2.2

(continued)

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Comp V	1.0	4.2	2.6
Comp W	1.4	9.5	6.1
Ex 24	4.2	9.7	7
CompX	1.2	6.7	1.6
Ex 25	2	6.8	2

[0105] The table above shows that the compositions according to the invention perform better on cotton, polycotton and polyester than any of the combinations with one of the components missing.

[0106] The result for mud stain cleaning is given in the table below.

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Comp U	0.1	0.5	0.3
Comp V	2.4	3.1	3.8
Comp W	0.1	0.3	-0.8
Ex 24	4.5	5.5	4.8
Comp X	2.1	3.4	3.7
Ex 25	5.9	6.3	7.3

[0107] The table shows that the compositions according to the invention perform better on cotton, polycotton and polyester than any of the combinations with one of the components missing.

Example 8: Effect of hydroxamate on the cleaning performance of the composition

[0108] This example demonstrates the cleaning performance of the composition comprising hydroxamate as the chelating agent in comparison to compositions comprising other chelating agents. Experiments were carried out separately with compositions having PVA as the non-ionic polymer and compositions having PL as the non-ionic polymer.

1. PVA based compositions

[0109] The compositions in the following table were compared with each other to demonstrate the performance of the composition on mud stain cleaning. The compositions were prepared by the method as described above.

[0110] 0.051 moles of each of the chelating agents were used below.

Ingredients (wt %)	Chelating agents						
	Hydroxamate	EDTA	Citric Acid	Low MW PAA (1.8K)	Ethylene glycol tetraacetic acid	Diethylenetriamine pentaacetic acid	Nitriolotriacetic acid
	Ex 26	Comp Y1	Comp Y2	Comp Y3	Comp Y4	Comp Y5	Comp Y6
Anionic surfactant	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Cationic surfactant	6	6	6	6	6	6	6
Non-ionic polymer (PVA)	3	3	3	3	3	3	3
Chelating agent	1	1.91	1.51	2	2.4	2.58	1.32
Water	88.8	87.89	88.29	87.8	87.4	87.22	88.48

Result for mud cleaning is tabulated below.

[0111]

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Ex 26	4.5	5.5	4.8
Comp Y1	-2	-2.5	-3.2
Comp Y2	1.5	1.9	1.2
Comp Y3	1.1	0.8	0.2
Comp Y4	1.6	2.1	1.5
Comp Y5	1.7	2.3	1.5
Comp Y6	1	1.1	0.5

[0112] The table above shows that the composition according to the invention (Ex 26) performs better on cotton, polycotton and polyester than any of the comparative compositions with a different chelating agent.

2. PL based compositions

[0113] The compositions in the following table were compared with each other to demonstrate the performance of the composition on mud stain cleaning. The compositions were prepared by the method as described above.

[0114] 0.051 moles of each of the chelating agents were used below.

Ingredients (wt %)	Chelating agents						
	C-12 Hydroxamate (Na-salt)	EDTA (Na salt)	Citric Acid (Na salt)	Low MW PAA (1.8K)	Ethylene glycol tetraacetic acid (Na salt)	Diethyleneetriamine pentaacetic acid (Na salt)	Nitrilotriacetic acid (Na salt)
	Ex 27	Comp Y7	Comp Y8	Comp Y9	Comp Y10	Comp Y11	Comp Y12
Anionic surfactant	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Cationic surfactant	6	6	6	6	6	6	6
Non-ionic polymer (PL)	3	3	3	3	3	3	3
Chelating agent	1	1.91	1.51	2	2.4	2.58	1.32
Water	88.8	87.89	88.29	87.8	87.4	87.22	88.48

Result for mud cleaning is tabulated below.

[0115]

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Ex 27	5.9	6.3	7.3
Comp Y7	1	1.5	2.1
Comp Y8	3.1	3.7	4.3
Comp Y9	3.1	4.3	4.5
Comp Y10	3.3	4.1	4.5
Comp Y11	3.7	4.3	4.5
Comp Y12	3.0	3.9	4.1

[0116] The table above shows that the composition according to the invention (Ex 27) performs better on cotton, polycotton and polyester than any of the comparative compositions with a different chelating agent.

Example 9: Effect of the addition of additional polymers on various attributes of the composition

[0117] In this example is illustrated the additional effect of methyl cellulose in the composition of the present invention.

[0118] The compositions in the following table were compared with each other to demonstrate the results on cleaning properties on various stains, stability and perfume delivery. The compositions were prepared by the method as described above.

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Ingredients (wt %)	Base Formulation(B F) + PVA	BF + PVA + Hydroxamate	BF+ PVA + MC	BF+ PVA + MC +Hydroxamate	BF + PL	BF + PL + Hydroxamate	BF + PL + MC	BF + PL + MC +Hydroxamate
	Comp W	Ex 24	Comp W1	Ex 24A	Comp X	Ex 25	Comp X1	Ex 25A
Anionic surfact ant	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Cationi c surfact ant	6	6	6	6	6	6	6	6
PVA	3	3	2	2	0	0	0	0
MC	0	0	1	1	0	0	1	1
PL	0	0	0	0	3	3	2	2
Hydrox amate	0	1	0	1	0	1	0	1
Water	89.8	88.8	89.8	88.8	89.8	88.8	89.8	88.8
Total	100	100	100	100	100	100	100	100

[0119] The results for stability and perfume delivery are tabulated below.

Set	Stability	Perfume delivery
Comp W	Yes	+
Ex 24	Yes	+
Comp W1	Yes	+
Ex 24A	Yes	+
Comp X	Yes	+
Ex 25	Yes	+
Comp X1	Yes	+
Ex 25A	Yes	+

[0120] The table above indicates that stability and perfume delivery is good for the comparative examples as well, apart from the example compositions of the present invention. However, it may be noted from the below tables that the comparative compositions are inferior in DMO, tea stain and mud stain cleaning when compared to the example compositions of the present invention.

[0121] The result for DMO cleaning is given in the table below.

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Comp W	2.1	10.2	8.7
Ex 24	2.3	11.2	9.1
Comp W1	5.5	14.2	12.3
Ex 24A	6.1	14.3	12.5
Comp X	1.5	8.3	6.5
Ex 25	1.8	9.1	6.8
Comp X1	2.9	10.8	9.1
Ex 25A	3.2	11.5	9.5

[0122] The table above shows that better results for DMO cleaning on cotton, polycotton and polyester are obtained when methyl cellulose is added to the composition of the present invention (Ex 24A and Ex 25A) when compared to the composition without methyl cellulose (Ex 24 and Ex 25).

[0123] The result for tea stain cleaning is given in the table below.

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Comp W	1.4	9.5	6.1
Ex 24	4.2	9.7	7
Comp W1	2.4	10.4	6.8
Ex 24A	4.8	11.2	7.1
Comp X	1.2	6.7	1.6
Ex 25	2	6.8	2
Comp X1	2	7.1	2.1
Ex 25A	3.1	7.8	2.5

[0124] The table above shows that better results for tea stain cleaning on cotton, polycotton and polyester are obtained when methyl cellulose is added to the composition of the present invention (Ex 24A and Ex 25A) when compared to the composition without methyl cellulose (Ex 24 and Ex 25).

[0125] The result for mud stain cleaning is given in the table below.

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Comp W	0.1	0.3	-0.8
Ex 24	4.5	5.5	4.8
Comp W1	-0.4	-1	-3.8
Ex 24A	4.1	4.8	2.9
Comp X	2.1	3.4	3.7
Ex 25	5.9	6.8	7.3
Comp X1	0.6	0.2	-1.2
Ex 25A	6.4	6.1	4.8

[0126] The table above shows that better results for mud stain cleaning on cotton, polycotton and polyester are obtained when the optional methyl cellulose is added to the composition of the present invention (Ex 24A and Ex 25A) when compared to the composition without methyl cellulose (Ex 24 and Ex 25).

Example 10: Effect of the combination of surfactants in the surfactant complex

[0127] In this example, the surfactant complex of the present invention comprising cationic and anionic surfactants (Ex 24) is compared to surfactant complexes with anionic and non-ionic surfactants (Comp Z2) and surfactant complexes with two anionic surfactants (Comp Z1).

[0128] The compositions in the following table were compared with each other to demonstrate the results on cleaning properties on various stains, stability and perfume delivery. The compositions were prepared by the method as described above.

Ingredients (wt %)	Surfactant complex		
	Anionic+ Cationic	Anionic+ Anionic	Anionic + Non-ionic
	Ex 24	Comp Z1	Comp Z2
Anionic surfactant (NaLAS)	1.2	1.2	1.2
Cationic surfactant (Stepantex®)	6	0	0
Anionic surfactant (SLES)	0	6	0
Non-ionic polymer (EO5)	0	0	6
Non-ionic polymer (PVA)	3	3	3
Water	88.8	88.8	88.8
Total	100	100	100

[0129] The results for stability and perfume delivery are tabulated below.

Set	Stability	Perfume delivery
Ex 24	Yes	+
Comp Z1	No	-
Comp Z2	No	-

[0130] The above table indicates that comparative compositions having surfactant complexes outside the scope of the present invention do not have stability and perfume delivery.

[0131] The result for DMO cleaning is given in the table below.

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Ex 24	2.3	11.2	9.1
Comp Z1	0.5	1.7	2.2
Comp Z2	1	2.1	2.5

[0132] The table above shows that the composition according to the invention (Ex 24) has a predominantly better DMO cleaning property on cotton, polycotton and polyester than the comparative compositions having surfactant complexes outside the scope of the present invention.

[0133] The result for tea stain cleaning is given in the table below.

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Ex 24	4.2	9.7	7
Comp Z1	1.1	4.3	2.3
Comp Z2	0.9	4.5	3.0

[0134] The table above shows that the composition according to the invention (Ex 24) has a significantly superior tea stain cleaning property on cotton, polycotton and polyester than the comparative compositions having surfactant complexes outside the scope of the present invention.

[0135] The result for mud stain cleaning is given in the table below.

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Ex 24	4.5	5.5	4.8
Comp Z1	1.1	2.1	1.4
Comp Z2	1.2	2.1	1.8

[0136] The table above shows that the composition according to the invention (Ex 24) has a superior mud stain cleaning on cotton, polycotton and polyester than the comparative compositions having surfactant complexes outside the scope of the present invention.

Example 11: Comparison of the composition of the present invention with commercially available fabric conditioner

[0137] In this example, the example composition of the present invention (Ex 24) is compared with the commercially available fabric conditioner Comfort[®] (Comp Z3) and Comfort[®] + hydroxamate (Comp Z4) (compositions given in the below table) to demonstrate the results on cleaning properties on various stains, stability and perfume delivery.

Ingredients (wt %)	Comp Z3	Comp Z4
Comfort [®]	100	99
Hydroxamate	0	1
Total	100	100

[0138] The results for stability and perfume delivery are tabulated below.

Set	Stability	Perfume delivery
Ex 24	Yes	+
Comp Z3	Yes	+
Comp Z4	No	+

[0139] It is inferred from the above table that comparative composition comprising Comfort® mixed with hydroxamate (Comp Z4) is not a stable composition.

[0140] The result for DMO cleaning is given in the table below.

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Ex 24	2.3	11.2	9.1
Comp Z3	-1.8	-1.5	-2.3
Comp Z4	-1.1	-1.5	-2.5

[0141] The above table shows that the composition according to the present invention (Ex 24) performs best for DMO cleaning on cotton, polycotton and polyester.

[0142] The result for tea stain cleaning is given in the table below.

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Ex 24	4.2	9.7	7
Comp Z3	-0.5	0.4	0.3
Comp Z4	0.1	1.8	1.4

[0143] The above table shows that the composition according to the present invention (Ex 24) performs best for tea stain cleaning on cotton, polycotton as well as polyester.

[0144] The result for mud stain cleaning is given in the table below.

Set	Average $\Delta(\Delta R)$ (error= ± 0.5)		
	Cotton	Polycotton	Polyester
Ex 24	4.5	5.5	4.8
Comp Z3	-1.1	-0.5	-1.3
Comp Z4	0.3	0.4	0.6

[0145] The above table shows that the composition according to the present invention (Ex 24) performs best for mud stain cleaning on cotton, polycotton as well as polyester.

Claims

1. An aqueous composition for treating a substrate, said composition comprising:

- a 2-22 % by weight of a surfactant complex, selected from cationic and anionic surfactants, wherein the cationic to anionic surfactant weight ratio is in the range of 1:1 and 6:1,
- b 0.5- 10% by weight of a non-ionic polymer having a molecular weight of less than 50ku and a HLB value in the range of 12.5 and 18,

c 1-7% by weight of a chelating agent, selected from hydroxamates of the formula R-CO-NH-OM wherein, R is an alkyl, aryl or alkylaryl group having 6-20 carbon atoms; and M is hydrogen or an alkali metal.

2. A composition according to claim 1, wherein the composition further comprises 0.1 to 2% by weight of methyl cellulose.
3. A composition according to any one of claims 1 or 2, wherein the non-ionic polymer is present in a concentration of 1- 8% by weight of the total composition.
4. A composition according to any one of the preceding claims, wherein the non-ionic polymer is selected from homopolymers or copolymers of alkylene oxides, polypropylene glycols or polyvinyl alcohols.
5. A composition according to any one of the preceding claims, wherein the non-ionic polymer is polyvinyl alcohol (PVA) or a polypropylene glycol block co-polymer.
6. A composition according to any one of the preceding claims, wherein the cationic to anionic surfactant ratio is in the range of 2:1 and 6:1.
7. A composition according to any one of the preceding claims, wherein the surfactant complex is present in a concentration of 3- 20% by weight of the total composition.
8. A composition according to any one of the preceding claims, wherein R is hexyl, octyl, decyl, dodecyl, 2-ethylhexyl, oleyl, eicosyl, phenyl, naphthyl or hexylphenyl; and M is hydrogen, lithium, sodium, potassium, rubidium or caesium.
9. A method for treating a substrate comprising the steps in sequence of
 - a Preparing a 0.05- 1 % by weight solution of the composition according to claims 1 to 8 in water,
 - b Rinsing the substrate in the prepared solution and,
 - c Drying the substrate.
10. A method for preparing the composition according to anyone of claims 1-8, comprising the steps in sequence of:
 - a Dispersing the anionic surfactant in a mixture of water and non-ionic polymer,
 - b Mixing the cationic surfactant into the non-ionic polymer and anionic surfactant mixture,
 - c Adding the chelating agent to the mixture; and
 - d Optionally adding a 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.

Patentansprüche

1. Wässrige Zusammensetzung zur Behandlung eines Substrats, wobei die Zusammensetzung umfasst:
 - a 2-22 Gewichts-% eines Tensidkomplexes, ausgewählt unter kationischen und anionischen Tensiden, wobei das Gewichtsverhältnis des kationischen zu dem anionischen Tensid in dem Bereich von 1:1 und 6:1 liegt,
 - b 0,5-10 Gewichts-% eines nichtionischen Polymers mit einem Molekulargewicht von weniger als 50 ku und einem HLB-Wert in dem Bereich von 12,5 und 18,
 - c 1-7 Gewichts-% eines Chelatbildners, ausgewählt unter Hydroxamaten der Formel R-CO-NH-OM, worin R eine Alkyl-, Aryl- oder Alkylaryl-Gruppe mit 6-20 Kohlenstoffatomen ist und M Wasserstoff oder ein Alkalimetall ist.
2. Zusammensetzung nach Anspruch 1, wobei die Zusammensetzung des Weiteren 0,1 bis 2 Gewichts-% Methylcellulose umfasst.
3. Zusammensetzung nach irgendeinem der Ansprüche 1 oder 2, wobei das nichtionische Polymer in einer Konzentration von 1-8 Gewichts-% der Gesamtzusammensetzung vorliegt.

4. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei das nichtionische Polymer unter Homopolymeren oder Copolymeren von Alkylenoxiden, Polypropylenglycolen oder Polyvinylalkoholen ausgewählt ist.
5. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei das nichtionische Polymer Polyvinylalkohol (PVA) oder ein Polypropylenglycol-Blockcopolymer ist.
6. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei das Verhältnis des kationischen zum anionischen Tensid in dem Bereich von 2:1 und 6:1 liegt.
7. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei der Tensidkomplex in einer Konzentration von 3-20 Gewichts-% der Gesamtzusammensetzung vorliegt.
8. Zusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei R Hexyl, Octyl, Decyl, Dodecyl, 2-Ethylhexyl, Oleyl, Eicosyl, Phenyl, Naphthyl oder Hexylphenyl ist und M Wasserstoff, Lithium, Natrium, Kalium, Rubidium oder Cäsium ist.
9. Verfahren zur Behandlung eines Substrats, umfassend die Schritte in der Folge von
 - a Herstellen einer 0,05-1 gewichts-%-igen Lösung der Zusammensetzung nach den Ansprüchen 1 bis 8 in Wasser,
 - b Spülen des Substrats in der hergestellten Lösung und
 - c Trocknen des Substrats.
10. Verfahren zur Herstellung der Zusammensetzung nach irgendeinem der Ansprüche 1-8, umfassend die Schritte in der Folge von
 - a Dispergieren des anionischen Tensids in einer Mischung von Wasser und nichtionischem Polymer,
 - b Einmischen des kationischen Tensids in die Mischung von nichtionischem Polymer und anionischem Tensid,
 - c Zugeben des Chelatbildners zu der Mischung und
 - d optionales Zugeben eines Parfüms.
11. Flaschenabgefülltes Spülkonditioniermittel, umfassend die Zusammensetzung nach irgendeinem der Ansprüche 1 bis 8 in einer Flasche von 250 ml bis 5 l.

Revendications

1. Composition aqueuse destinée au traitement d'un substrat, ladite composition comprenant :
 - a de 2 à 22 % en poids d'un complexe de tensioactifs, choisis parmi les tensioactifs cationiques et anioniques, le rapport pondéral des tensioactifs cationiques à anioniques étant dans la plage de 1:1 à 6:1,
 - b de 0,5 à 10 % en poids d'un polymère non ionique ayant un poids moléculaire inférieur à 50 ku et un rapport hydro-lipophile dans la plage de 12,5 à 18,
 - c de 1 à 7 % en poids d'un agent chélatant, choisi parmi les hydroxamates répondant à la formule R-CO-NH-OM formule dans laquelle R représente un groupe alkyle, aryle ou alkylaryle comportant de 6 à 20 atomes de carbone ; et M représente un atome d'hydrogène ou un métal alcalin.
2. Composition selon la revendication 1, laquelle composition comprend en outre de 0,1 à 2 % en poids de méthylcellulose.
3. Composition selon l'une quelconque des revendications 1 ou 2, dans laquelle le polymère non ionique est présent en une concentration de 1 à 8 % en poids de la composition totale.
4. Composition selon l'une quelconque des revendications précédentes, dans laquelle le polymère non ionique est choisi parmi les homopolymères ou les copolymères d'oxydes d'alkylène, de polypropylène glycols ou d'alcools polyvinyliques.
5. Composition selon l'une quelconque des revendications précédentes, dans laquelle le polymère non ionique est

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l'alcool polyvinylique (PVA) ou un copolymère séquencé de polypropylène glycol.

- 5 6. Composition selon l'une quelconque des revendications précédentes, dans laquelle le rapport des tensioactifs cationiques à anioniques se situe dans la plage de 2/1 à 6/1.

7. Composition selon l'une quelconque des revendications précédentes, dans laquelle le complexe de tensioactifs est présent en une concentration de 3 à 20 % en poids de la composition totale.

- 10 8. Composition selon l'une quelconque des revendications précédentes, dans laquelle R est un groupe hexyle, octyle, décyle, dodécyle, 2-éthylhexyle, oléyle, éicosyle, phényle, naphthyle ou hexylphényle ; et M est un atome d'hydrogène, de lithium, de sodium, de potassium, de rubidium ou de césium.

9. Procédé destiné au traitement d'un substrat comprenant les étapes successives suivantes

15 a Préparation d'une solution à 0,05 à 1 % en poids de la composition selon les revendications 1 à 8 dans l'eau,
b Rinçage du substrat dans la solution préparée et,
c Séchage du substrat.

- 20 10. Procédé destiné à la préparation de la composition selon l'une quelconque des revendications 1 à 8, comprenant les étapes successives suivantes :

a Dispersion du tensioactif anionique dans un mélange d'eau et de polymère non ionique,
b Mélange du cationique tensioactif dans le mélange de polymère non ionique et de tensioactif anionique,
25 c Ajout de l'agent chélatant au mélange ; et
d Ajout facultatif d'un parfum.

- 30 11. Agent de conditionneur de rinçage en bouteille comprenant la composition selon l'une quelconque des revendications 1 à 8 dans une bouteille de 250 ml à 5 l.

REFERENCES CITED IN THE DESCRIPTION

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