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(54) Title: DETERGENT LIQUID

(57) **Abstract**: A weight efficient, pourable liquid detergent composition comprising: (a) a non-soap surfactant system which comprises at least nonionic or anionic surfactant such that the total content of non-soap surfactant in the composition is at least 30wt%, preferably at least 35wt%; (b) a polymer system which comprises at least one of the following (bi) to (biii), such that the total content of (bi) to (biii) in the composition is in the range of 5 to 35wt%: (bi) one or more particulate soil removal polymer(s) and/or (bii) one or more anti-redeposition polymer(s) and/or (biii) one or more soil release polymer(s); (c) up to 12wt% total added water; (d) from 0.1wt% up to 10wt% total fatty acid/soap; (e) 1 to 15wt% in total of base, optionally providing one or more counterions for any anionic surfactant; (f) less than 40wt%, preferably less than 35wt%, in total of any solvents and hydrotropes, optionally selected from one or more of glycerol, MPG and ethanol; more preferably MPG; and (g) additional ingredients up to 100% optionally including fragrance, enzymes, shading dyes, fluorescer and dye transfer inhibitor. A method of producing the composition comprises the incorporation of no more than 12wt% added water into a composition comprising (a), (b), (d), (e) and (f). A method of laundering fabrics comprises diluting a dose of the detergent composition by a factor >500, especially by a factor of 600-1200, so as to obtain a wash liquor which comprises 3 to 20 g/wash of non-soap surfactant and washing fabric in the wash liquor.



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DETERGENT LIQUID

The present invention relates to improved laundry liquid compositions.

5 TECHNICAL FIELD

The invention concerns concentrated detergent formulations which permit a reduction in dosage volume.

10 BACKGROUND

A trend in detergent formulating is to reduce the amount of surfactant and to replace these petrochemical derived ingredients with highly weight efficient ingredients selected from cleaning and soil release polymers, sequestrants and enzyme cocktails. Typically
15 some surfactant is retained in the composition and the work horse surfactant linear alkyl benzene sulphonate (LAS) is frequently a key part of the surfactant blend. The polymer ethoxylated polyethylene imine may be used as one of the weight efficient ingredients. Suitable compositions are taught, for example, in WO 09/153184. Example formulations are used at a dose of 35ml.

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It would be advantageous to provide more concentrated detergent formulations which would allow for a reduction in the dosage volume. This would result in various advantages such as a reduction in packaging and storage space for the detergents.

25 However there are limits to the extent to which current detergent formulations can be concentrated by simply removing apparently non-functional solvent components. In particular, problems may occur with dispensing and delivery of products of high viscosity. Also, reductions in water or solvent content can lead to dissolution problems during the wash cycle.

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Various concentrated formulations which contain low levels of added water have been described in the literature.

For example, WO00/50549 (Procter & Gamble Company) concerns cleaning compositions
35 containing butoxy capped nonionic surfactants selected to improve dissolution of solid

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products and improve rates of mixing with water, while maintaining good physical attributes and good performance. The examples include an aqueous heavy duty liquid (HDL) laundry detergent composition which comprises a butoxy capped nonionic surfactant with an amide co-surfactant. Adjuvants may be added in the form of particulate material which ranges in size from about 0.1 to about 1500 microns, which are essentially insoluble in liquid phase. Fatty acids, such as C₁₂-C₁₈ monocarboxylic acids are generally not desired in the compositions. Composition pH's are typically in the range of about 7.5 to 11.

Non aqueous liquid heavy duty liquid detergent compositions are provided in the form of a stable suspension as solid, substantially insoluble particulate material (in an amount of 0.2 to 30% by weight) dispersed throughout a structured surfactant-containing liquid phase. Laundry washing methods involve treatment of soiled laundry with from 40g to 300g of product dissolved in a wash solution of volume from 5 to 65 litres.

WO2007/130567(Procter & Gamble Company) is directed to a compact fluid laundry detergent in which the sum of water and non-amino functional solvent ranges from about 5% to about 45% by weight of the composition; a water content of 5 to 25% is proposed together with a fatty acid content of 10% to 25%. An example composition contains 10.5 wt% water in combination with 15.5 wt% fatty acids, 23.5 wt% of alkyl benzene sulfonic acid, 5 wt% of C₁₂₋₁₄ alcohol 7 ethoxylate and 10.5 wt% of C₁₂₋₁₄ alcohol 3 ethoxylate sulphate, sodium salt.

WO2014/160820 (Procter & Gamble Company) concerns cleaning compositions that contain a polyether amine for stain removal at low wash temperatures of 30°C or lower, when 20 to 300g of product is dissolved or dispersed in the wash solution of volume from 5 litre to 65 litre. Example compositions contain an anionic surfactant blend of HFLAS, C₁₄₋₁₅ alkyl ethoxy (2.5) sulphate, C₁₄₋₁₅ alkyl ethoxy (3.0) sulphate and C₂₄₋₉ nonionic surfactant (in a weight ratio of 65 : 35 anionic to nonionic) with 6 wt% coconut fatty acid and about 33 wt% solvent (made up of 1,2-propylene diol, glycerol and 12.4 wt% water). The compositions are used in an amount of 25.36g in water at 60°F (15°C).

WO2014/160821 (Procter & Gamble Company) is directed to cleaning compositions containing a polyether amine, a soil release polymer and a carboxymethylcellulose, intended for cleaning in low wash temperatures of 30°C and below. Example

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compositions contain surfactant systems in which the weight ratio of anionic to nonionic surfactant is at least 2:1. The cleaning compositions are delivered in an amount of from 20g to 300g dispersed in 5 litre to 65 litre of water. Example compositions are included which contain about 30 wt% solvent (made up of water, dipropylene glycol,

- 5 monopropylene glycol and glycerine) in combination with C₁₂₋₁₅ alkylethoxy (1.0) sulphate, C₁₁-C₁₂ alkylbenzene sulfonate and C₁₂₋₁₅ alkyl ethoxylate in which the weight ratio of anionic surfactant to nonionic surfactant is about 9.

- 10 WO2011/032138 (Procter & Gamble Company) concerns compact fluid detergent compositions which comprise a stabilization system against phase splitting which comprises (a) alkanolamine, (b) crystalline structurant and (c) coupling polymer. Example compositions contain 34wt% to 42wt% added water and employ anionic and nonionic surfactants in a ratio of about 72:28 by weight.

- 15 WO2012/104159 (Unilever) proposes alkaline liquid detergent compositions which contain polyester substantive nonionic soil release polymers of the type E-M-L-E in which the end blocks E comprise capped oligomers of polyethylene glycol. Example compositions contain at least 27wt% water (for a 20ml dose) with 27wt% of non-soap surfactants.

- 20 WO2013/092049 (Unilever) relates to isotropic liquid laundry detergent compositions that deliver lower than normal levels of surfactant to the wash. Examples contain 27wt% surfactant and 33wt% water.

- 25 US6376446 B1 (Smadi et al) proposes concentrated liquid detergents which contain alkylamine ethoxylate surfactant in a surfactant pre-mixture which contains at least 20% water. Example detergent formulations contain at least about 40wt% water.

- 30 In addition to the surfactants, polymers and enzymes which perform a cleaning function, laundry detergent compositions contain solvents and other adjuvants in order to provide a stable vehicle for storage and delivery of the functional materials in the wash.

- 35 It would be desirable to provide a detergent composition which exhibits an enhanced combination of properties in terms of increased weight efficiency with good dissolution characteristics. Attempts to reduce the amount of added water and other solvents which

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do not perform a cleaning function often result in compositions which show unsatisfactory dissolution in the wash.

The present invention is directed to a liquid detergent composition in a concentrated form
5 which permits low dosage volumes and which exhibits good dissolution characteristics.

SUMMARY OF THE INVENTION

Accordingly, in a first aspect the present invention provides a pourable liquid detergent
10 composition comprising

(a) at least 30wt%, preferably at least 35wt%, more preferably at least 40wt% in total of a non-soap surfactant system which comprises at least nonionic or anionic surfactant;
15

(b) 5 to 35wt%, preferably up to 30wt%, more preferably up to 25wt%, especially up to 20wt% and most preferably up to 15wt% and/or at least 6wt%, preferably at least 7wt% in total of a polymer system which comprises at least one of the following (bi) to (biii):
20

- (bi) one or more particulate soil removal polymer(s) and/or
- (bii) one or more anti-redeposition polymer(s) and/or
- (biii) one or more soil release polymer(s);

25 (c) up to 12wt% and especially up to 10wt% total added water;

(d) from 0.1wt% up to 10wt%, preferably up to 8wt% in total of fatty acid or fatty acid soap; more preferably from 1wt% and/or up to 5wt% ,especially from 3wt% and/or up to 5wt%;

30 (e) 1 to 15wt%, preferably 1 to 10wt% in total of base, optionally providing one or more counterions for any anionic surfactant;

(f) less than 40wt%, preferably less than 35wt%, more preferably less than 35 30wt% or 25wt% and especially less than 22wt% or less than 20wt% of any solvents and

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hydrotropes, which solvents and hydrotropes are optionally non-amino functional solvents selected from one or more of glycerol, monopropylene glycol (MPG), and ethanol; more preferably MPG; and

- 5 (g) additional ingredients up to 100% optionally including fragrance, enzymes, shading dyes, fluorescer and dye transfer inhibitor.

The present invention provides detergent compositions that are highly weight efficient and, as a result, are suitable for use in low dosage volumes. Compositions in accordance
10 with the invention have been found to exhibit a combination of good physical characteristics, as stable isotropic liquids, together with good dissolution characteristics.

In a second aspect the invention provides a method for the production of a pourable liquid detergent composition of the first aspect, which method comprises the incorporation of no
15 more than 12wt% added water, and preferably no more than 10wt% added water, into a composition comprising (a), (b), (d), (e), (f) and (g).

In a further aspect the invention provides a method of laundering fabric which comprises the steps of (A) providing a liquid detergent composition in accordance with the first
20 aspect of the invention, (B) diluting a dose of the detergent composition in water by a factor of >500, preferably by a factor of 600 – 1200, so as to obtain a wash liquor which comprises 1.3 to 0.2 g/l of non-soap surfactant, and (C) washing fabrics with the wash liquor so formed. In typical use conditions this would involve supplying the composition to a washing machine that may hold up to 15 litres of water for the dilution step.

25 According to the method aspect, a dilution step preferably provides a wash liquor which comprises 3 to 20 g/ wash of non-soap surfactant. A preferred method provides at least 3.5 g/wash especially at least 4g/wash and more preferably at least 5 g/wash. Preferred methods also provide up to 19g/wash, especially up to 18g/wash, preferably using a
30 detergent composition at a dose level of at least 13mL and preferably at least 14mL. Preferably dose volumes are up to 25ml, especially no more than 24.5ml. A dilution step also preferably provides a polymer system in an amount corresponding to 0.6 to 9 g/wash, preferably 0.8 to 4 and more preferably 1 to 3 g/wash.

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The polymer system is also preferably provided in an amount corresponding to 0.04 to 0.60g/L, preferably 0.05 to 0.3g/L, preferably 0.06 to 0.2g/L, calculated on the basis of a washing machine that can accommodate about 15 litres of water for the initial dilution step.

5

Furthermore, the dilution step preferably provides a wash liquor which provides 3.6 to 20 g/ wash in total of functional ingredients comprising non-soap surfactant and polymer system, preferably 4 to 15 g/wash and especially 5 to 12g/wash. Conveniently the dilution step provides 0.2 to 1.4g/l in total of functional ingredients made up of non-soap

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surfactant and polymer system, based on a dilution step with 15 litres of water.

Preferred embodiments of the various aspects of the invention may include combinations of one or more of the following features.

15

A pourable liquid detergent composition wherein the surfactant system (a) comprises nonionic and anionic surfactant in a ratio by weight in the range of 20:80 to 80:20, preferably in the range of 40:60 to 80:20, more preferably in the range of 40:60 to 70:30.

20

A pourable liquid detergent composition wherein the surfactant system (a) includes C₁₀-C₁₅ alcohol ethoxylated nonionic surfactant with 2 to 7 EO.

A pourable liquid detergent composition wherein the surfactant system (a) includes less than 20wt % of any alkyl polyethoxylate sulphate anionic surfactant.

25

A pourable liquid detergent composition wherein the surfactant system (a) includes anionic surfactant for which the anion is selected from linear alkyl benzene sulfonate (LAS), primary alkyl sulfate (PAS), alkyl ether sulfate (AES) and mixtures thereof, and is preferably LAS and wherein a counter ion for the anionic surfactant is provided by an inorganic and/or ammoniacal base (e) preferably selected from NaOH, KOH, MEA and

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TEA; more preferably KOH or MEA.

A pourable liquid detergent composition wherein the polymer system (b) comprises particulate soil removal polymer (bi) and/ or antiredeposition polymer (bii), preferably provided in a total amount of between 1 to 18wt% of the composition, more preferably 2 to 15wt%, especially 3 to 10 wt% and most preferably 5 to 10wt%.

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A pourable liquid detergent composition wherein the polymer system (b) comprises a modified polyethyleneimine polymer EPEI as a particulate soil removal polymer (bi) and/or anti-redeposition polymer (bii), especially an ethoxylated polyethyleneimine such as PEI(600) 20 EO.

A pourable liquid detergent composition wherein the polymer system (b) comprises soil release polymer (biii), preferably in an amount of from 1 to 12wt% of the composition, preferably from 2 to 12wt%, especially 2 to 8wt%.

A pourable liquid detergent composition wherein the polymer system (b) comprises polyethylene terephthalate (PET) polyoxyethylene terephthalate (POET) polyester as a soil release polymer (biii) , especially SRN 100 or SRN 170 or SRN 240.

A pourable liquid detergent composition wherein the polymer system (b) comprises at least two polymers selected from (bi), (bii) and (biii) and preferably comprises at least one of (bi) or (bii) with at least one of (biii), and further preferably provided in a total amount of at least 7wt% of the composition.

A pourable liquid detergent composition wherein the weight ratio of polymer system (b) to surfactant system (a) is in the range of from 0.15:1 to 0.4 :1, preferably 0.2:1 to 0.4:1, and more preferably 0.2:1 to 0.3:1.

A pourable liquid detergent composition which has a pH in a range of 5 to 9, preferably 6 to 8, more preferably 6 to 7, and especially 6.2 to 6.8 when measured on dilution of the liquid composition to 1% using demineralised water.

A pourable liquid detergent composition which contains less than 40wt% and preferably less than 35wt% , and more preferably less than 30wt% in total of added water (c) and solvents and hydrotropes (f).

A pourable liquid detergent composition which contains less than 10wt %, preferably less than 8wt% of additional ingredients (g) including fragrance, enzymes, shading dyes, fluorescer and dye transfer inhibitor and optionally is substantially free of bleach and / or sequestrant.

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A pourable liquid detergent composition which contains less than 0.5wt% of any additional inorganic builder materials and / or less than 0.5wt% of any additional organic builder materials.

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DETAILED DESCRIPTION OF THE INVENTION

Preferred embodiments of the present invention may include one or more of the following features.

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The detergent liquids

The compositions for use in the method of the invention comprise deterative surfactant. The non-soap deterative surfactant makes up at least 30 wt% in total of the liquid composition, preferably it makes up from 35 to 60 wt% and especially from 40 to 55 wt%.

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In the method the compositions are used in small doses that require them to be diluted in at least 500 or 600 times their own volume of water to form a main-wash liquor comprising up to 20g non-soap surfactant. Based on an initial dilution of 15L this corresponds to 1.3 g/l non-soap surfactant.

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They may be concentrated compositions designed for front loading automatic washing machines (which typically accommodate about 15L in a wash load and use about 50L of water in a wash cycle), hand washing or top loading automatic washing machines. In hand washing less water may be used and in top loading automatic washing machines a higher amount of water would normally be used than for a front loading automatic machine. The dose of detergent liquid could be adjusted accordingly to give appropriate wash liquor concentrations. Within this context it is preferred that the dose of liquid (especially if it is in unit dose form) is no more than 24.5ml.

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Surfactants

Surfactants assist in removing soil from the textile materials and also assist in maintaining removed soil in solution or suspension in the wash liquor. Anionic, or blends of anionic and nonionic, surfactants are a preferred feature of the present invention. The amount of anionic surfactant is preferably at least 5 wt% of the composition. Preferably, anionic surfactants form at least 20wt% and/ or up to 60wt% of the non-soap surfactant (a).

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Anionic Surfactants

Preferred anionic surfactants have an anion selected from linear alkyl benzene sulfonate (LAS), primary alkyl sulfate (PAS), alkyl ether sulfate (AES) and mixtures thereof.

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Preferred alkyl sulphonates are alkylbenzene sulphonates, particularly linear alkylbenzene sulphonates (LAS) having an alkyl chain length of C₈-C₁₅. The counter ion for anionic surfactants is generally an alkali metal (such sodium) or an ammoniacal counterion (such as MEA, TEA). Suitable anionic surfactant materials are available in the marketplace as the 'Genapol'™ range from Clariant. Preferred linear alkyl benzene sulphonate surfactants are Detal LAS with an alkyl chain length of from 8 to 15, more preferably 12 to 14. LAS is normally formulated into compositions in acid, i.e., HLAS form and then at least partially neutralized in-situ. Other common anionic surfactants are generally provided in pre-neutralised form.

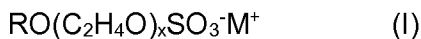
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The present compositions also contain base (e) which may provide a counterion for any anionic surfactant, together with performing pH adjustment. Typically a base provides a counterion selected from Na⁺, K⁺ and ammoniacal ions. Suitable bases include potassium hydroxide, sodium hydroxide, monoethanolamine, diethanolamine and triethanolamine. Most preferred bases include potassium hydroxide and monoethanolamine. Mixtures of bases may be employed.

15

The composition may optionally comprise an alkyl polyethoxylate sulphate anionic surfactant of the formula (I):

20



where R is an alkyl chain having from 10 to 22 carbon atoms, especially 12 to 16 carbon atoms and is saturated or unsaturated, M is a cation which makes the compound water-soluble, especially an alkali metal, ammonium or substituted ammonium cation, and x averages from 1 to 15, especially 1 to 3. An example is the anionic surfactant sodium lauryl ether sulphate (SLES) which is the sodium salt of lauryl ether sulphonic acid in which the predominantly C₁₂ lauryl alkyl group has been ethoxylated with an average of 3 moles of ethylene oxide per mole.

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Typically the non-soap surfactant system (a) will contain less than 20wt% of any alkyl polyethoxylate sulfate anionic surfactants.

Some alkyl sulphate surfactant (PAS) may be used, especially the non-ethoxylated C₁₂₋₁₅ primary and secondary alkyl sulphates. An example material, commercially available from Cognis, is Sulphopon 1214G.

Nonionic Surfactants

Nonionic surfactants include primary and secondary alcohol ethoxylates, especially C₈-C₂₀ aliphatic alcohol ethoxylated with an average of from 1 to 20 moles of ethylene oxide per mole of alcohol, and more especially the C₁₀-C₁₅ primary and secondary aliphatic alcohols ethoxylated with an average of from 1 to 10 moles of ethylene oxide per mole of alcohol. Non-ethoxylated nonionic surfactants include alkyl polyglycosides, glycerol monoethers and polyhydroxy amides (glucamide). Mixtures of nonionic surfactant may be used.

When included therein the composition may contain from 0.2 wt% to 40 wt%, preferably 1 wt% to 35 wt%, more preferably 5 to 30 wt% of a nonionic surfactant, such as alcohol ethoxylate, nonylphenol ethoxylate, alkylpolyglycoside, alkyldimethylamineoxide, ethoxylated fatty acid monoethanolamide, fatty acid monoethanolamide, polyhydroxy alkyl fatty acid amide, or N-acyl N-alkyl derivatives of glucosamine ("glucamides").

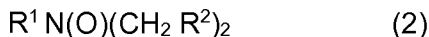
Nonionic surfactants that may preferably be used include the primary and secondary alcohol ethoxylates, especially the C₈-C₂₀ aliphatic alcohols ethoxylated with an average of from 1 to 35 moles of ethylene oxide per mole of alcohol, and more especially the C₁₀-C₁₅ primary and secondary aliphatic alcohols ethoxylated with an average of from 1 to 10 moles of ethylene oxide per mole of alcohol.

Preferred surfactant systems (a) comprise nonionic and anionic surfactant in a weight ratio in the range of 40:60 to 80:20 and more preferably in a range of 40:60 to 70:30. Such combinations of nonionic and anionic surfactant in particular have been found to be associated with good physical characteristics.

Amine Oxide Surfactants

The surfactant system of the composition may contain an amine oxide of the formula (2):

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In which R^1 is a long chain moiety and each $CH_2 R^2$ is a short chain moiety. R^2 is

5 preferably selected from hydrogen, methyl and $-CH_2OH$. In general R^1 is a primary or branched hydrocarbyl moiety which can be saturated or unsaturated, preferably, R^1 is a primary alkyl moiety having chain length of from about 8 to about 18 and R^2 is H. These amine oxides are illustrated by C_{12-14} alkyldimethyl amine oxide, hexadecyl dimethylamine oxide, octadecylamine oxide.

10

Example amine oxide materials are Lauryl dimethylamine oxide, also known as dodecyldimethylamine oxide or DDAO, commercially available from Hunstman under the trade name Empigen® OB.

15 Amine oxides suitable for use herein are also available from Akzo Chemie and Ethyl Corp. See McCutcheon's compilation and Kirk-Othmer review article for alternate amine oxide manufacturers.

20 Preferably the compositions contain less than 10wt%, more preferably less than 5wt% amine oxide surfactant.

Zwitterionic Surfactants

Some zwitterionic surfactant, such as sulphobetaine, may be present. A preferred zwitterionic material is a betaine available from Huntsman under the name Empigen® BB.

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Preferably the compositions contain less than 10wt%, more preferably less than 5wt% zwitterionic surfactant.

Cationic Surfactants

30 Cationic surfactants are preferably substantially absent.

A particularly preferred surfactant system is provided by linear alkyl benzene sulfonate (LAS) and C_{10} - C_{15} alcohol ethoxylated nonionic surfactant with 2 to 7 EO.

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The polymer system

The compositions contain (b) 5 to 35wt% in total of a polymer system which comprises at least one of the following (bi) to (biii):

- 5 (bi) one or more particulate soil removal polymer(s) and/or
 (bii) one or more anti-redeposition polymer(s) and/or
 (biii) one or more soil release polymer(s).

- 10 The inclusion of such a polymer system results in enhanced weight efficiency for the compositions. In particular it has been found that such a polymer system contributes to the good dissolution characteristics of the compositions and allows for a reduction in the amount of other non-functional components and solvents required in order to achieve acceptable dissolution.
- 15 Example compositions may preferably contain up to 25wt%, more preferably up to 20wt% and especially up to 15wt% of the polymer system. Preferably the compositions contain at least 5wt%, preferably at least 6wt% and more preferably at least 7wt% of the polymer system.
- 20 Preferred embodiments employ an ethoxylated polyethylene imine polymer (EPEI) which may assist with particulate soil removal and/or perform an anti-redeposition function. Preferably the EPEI is nonionic. That means it does not have any quaternary nitrogens, or nitrogen oxides or any ionic species other than possible pH affected protonation of nitrogens.
- 25 Polyethylene imines (PEIs, especially modified PEIs) are materials composed of ethylene imine units -CH₂CH₂NH- and, where branched, the hydrogen on the nitrogen is replaced by another chain of ethylene imine units. These polyethyleneimines can be prepared, for example, by polymerizing ethyleneimine in the presence of a catalyst such as carbon
- 30 dioxide, sodium bisulphite, sulphuric acid, hydrogen peroxide, hydrochloric acid, acetic acid, and the like. Specific methods for preparing these polyamine backbones are disclosed in U.S. Pat. No. 2,182,306, Ulrich et al., issued Dec. 5, 1939; U.S. Pat. No. 3,033,746, Mayle et al., issued May 8, 1962; U.S. Pat. No. 2,208,095, Esselmann et al., issued Jul. 16, 1940; U.S. Pat. No. 2,806,839, Crowther, issued Sep. 17, 1957; U.S. Pat.
- 35 No. 2,553,696, Wilson, issued May 21, 1951 and WO2006/086492 (BASF).

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Preferably, the EPEI comprises a polyethyleneimine backbone wherein the modification of the polyethyleneimine backbone is intended to leave the polymer without quaternisation. Such nonionic EPEI may be represented as PEI(X)YEO where X represents the molecular weight of the unmodified PEI and Y represents the average moles of ethoxylation per nitrogen atom in the polyethyleneimine backbone. The ethoxylation number Y may range from 9 to 40 ethoxy moieties per modification, preferably it is in the range of 16 to 26, most preferably 18 to 22. X is selected to be from about 300 to about 10000 weight average molecular weight and is preferably about 600.

A preferred example EPEI is PEI (600) 20EO.

If present, the polymer (bi) and / or (bii), such as ethoxylated polyethyleneimine polymer (EPEI), may typically be included in the composition at a level of between 0.01 and 20 wt%, and preferably at a level of at least 1wt% and/or less than 18 wt%, more preferably at a level of from 2wt% and/or up to 15wt%. Particularly preferred compositions contain 3wt% to 10wt% and especially 5 to 10 wt% or 4 to 10wt% EPEI. A ratio of non-soap surfactant to EPEI may preferably be from 2:1 to 7:1, preferably from 3:1 to 6:1, or even to 3:1 to 5:1.

Soil Release Polymer

The polymer system of the composition preferably comprises at least some soil release polymer for oily soil removal, especially from polyester.

Soil release polymers improve the main wash performance of the compositions when used in the low in wash surfactant process of the present invention.

One preferred class of polymer is the fabric-substantive polymers comprising at least one of (i) saccharide or (ii) dicarboxylic acid and polyol monomer units. Typically these have soil release properties and while they can have a primary detergency effect they generally assist in subsequent cleaning. Preferably these should be present at a level of at least 2% wt preferably at least 3 wt% of the composition.

If present, the soil release polymer(s) (biii) will generally comprise up to 12.0 wt%, of the detergent composition, preferably up to 9 or 10 wt%. Preferably they are used in an

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amount of at least 1 or perhaps 2 wt%. Most preferably they are used in an amount of 1 to 9wt%, more preferably 2wt% to 9wt%, especially 2wt% to 8 wt%.

5 Generally the soil release polymers for polyester will comprise polymers of aromatic dicarboxylic acids and alkylene glycols (including polymers containing polyalkylene glycols).

The polymeric soil release agents useful herein especially include those soil release agents having:

- 10 (a) one or more nonionic hydrophilic components consisting essentially of:
- (i) polyoxyethylene segments with a degree of polymerization of at least 2, or
 - (ii) oxypropylene or polyoxypropylene segments with a degree of polymerization of from 2 to 10, wherein said hydrophilic segment does not encompass any oxypropylene unit unless it is bonded to adjacent moieties at each end by ether linkages, or
 - 15 (iii) a mixture of oxyalkylene units comprising oxyethylene and from 1 to about 30 oxypropylene units wherein said mixture contains a sufficient amount of oxyethylene units such that the hydrophilic component has hydrophilicity great enough to increase the hydrophilicity of conventional polyester synthetic fibre surfaces upon deposit of the soil
 - 20 release agent on such surface, said hydrophilic segments preferably comprising at least about 25% oxyethylene units and more preferably, especially for such components having about 20 to 30 oxypropylene units, at least about 50% oxyethylene units; or
- (b) one or more hydrophobic components comprising:
- 25 (i) C₃ oxyalkylene terephthalate segments, wherein, if said hydrophobic components also comprise oxyethylene terephthalate, the ratio of oxyethylene terephthalate: C₃ oxyalkylene terephthalate units is about 2:1 or lower,
 - 30 (ii) C₄ -C₆ alkylene or oxy C₄ -C₆ alkylene segments, or mixtures therein,
 - (iii) poly (vinyl ester) segments, preferably polyvinyl acetate), having a degree of polymerization of at least 2, or (iv) C₁ -C₄ alkyl ether or C₄ hydroxyalkyl ether substituents, or mixtures therein, wherein said substituents are present in the form of C₁ -C₄ alkyl ether
 - 35 or C₄ hydroxyalkyl ether cellulose derivatives, or mixtures therein, and such cellulose

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derivatives are amphiphilic, whereby they have a sufficient level of C₁-C₄ alkyl ether and/or C₄ hydroxyalkyl ether units to deposit upon conventional polyester synthetic fibre surfaces and retain a sufficient level of hydroxyls, once adhered to such conventional synthetic fibre surface, to increase fibre surface hydrophilicity, or a combination of (a) and (b).

Typically, the polyoxyethylene segments of (a)(i) will have a degree of polymerization of from about 200, although higher levels can be used, preferably from 3 to about 150, more preferably from 6 to about 100. Suitable oxy C₄-C₆ alkylene hydrophobic segments include, but are not limited to, end-caps of polymeric soil release agents such as MO₃S(CH₂)_nOCH₂CH₂O--, where M is sodium and n is an integer from 4-6, as disclosed in U.S. Pat. No. 4,721,580, issued Jan. 26, 1988 to Gosselink.

Soil release agents characterized by poly(vinyl ester) hydrophobic segments include graft copolymers of poly(vinyl ester), e.g., C₁-C₆ vinyl esters, preferably poly(vinyl acetate) grafted onto polyalkylene oxide backbones, such as polyethylene oxide backbones. See European Patent Application 0 219 048, published Apr. 22, 1987 by Kud, et al. Commercially available soil release agents of this kind include the SOKALAN type of material, e.g., SOKALAN HP-22, available from BASF (West Germany).

One type of preferred soil release agent is a copolymer having random blocks of ethylene terephthalate and polyethylene oxide (PEO) terephthalate. The molecular weight of this polymeric soil release agent is in the range of from about 25,000 to about 55,000. See U.S. Pat. No. 3,959,230 to Hays, issued May 25, 1976 and U.S. Pat. No. 3,893,929 to Basadur issued Jul. 8, 1975.

Another preferred polymeric soil release agent is a polyester with repeat units of ethylene terephthalate units contains 10 to 15 wt% of ethylene terephthalate units together with 90 to 80 wt% weight of polyoxyethylene terephthalate units, derived from a polyoxyethylene glycol of average molecular weight 300-5,000. Examples of this polymer include the commercially available material ZELCON 5126 (from DuPont) and MILEASE T (from ICI). See also U.S. Pat. No. 4,702,857, issued Oct. 27, 1987 to Gosselink.

Another preferred polymeric soil release agent is a sulphonated product of a substantially linear ester oligomer comprised of an oligomeric ester backbone of terephthaloyl and

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oxyalkyleneoxy repeat units and terminal moieties covalently attached to the backbone. These soil release agents are described fully in U.S. Pat. No. 4,968,451, issued Nov. 6, 1990 to J.J. Scheibel and E. P. Gosselink. Other suitable polymeric soil release agents include the terephthalate polyesters of U.S. Pat. No. 4,711,730, issued Dec. 8, 1987 to
5 Gosselink et al, the anionic end-capped oligomeric esters of U.S. Pat. No. 4,721,580, issued Jan. 26, 1988 to Gosselink, and the block polyester oligomeric compounds of U.S. Pat. No. 4,702,857, issued Oct. 27, 1987 to Gosselink.

Preferred polymeric soil release agents also include the soil release agents of U.S. Pat.
10 No. 4,877,896, issued Oct. 31, 1989 to Maldonado et al, which discloses anionic, especially sulfoaroyl, end-capped terephthalate esters.

Still another preferred soil release agent is an oligomer with repeat units of terephthaloyl units, sulfoisoterephthaloyl units, oxyethyleneoxy and oxy-1,2-propylene units. The
15 repeat units form the backbone of the oligomer and are preferably terminated with modified isethionate end-caps. A particularly preferred soil release agent of this type comprises about one sulfoisophthaloyl unit, 5 terephthaloyl units, oxyethyleneoxy and oxy-1,2-propyleneoxy units in a ratio of from about 1.7 to about 1.8, and two end-cap units of sodium 2-(2-hydroxyethoxy)-ethanesulphonate. Said soil release agent also
20 comprises from about 0.5% to about 20%, by weight of the oligomer, of a crystalline-reducing stabilizer, preferably selected from the group consisting of xylene sulfonate, cumene sulfonate, toluene sulfonate, and mixtures thereof.

Suitable soil release polymers are described in WO 2008095626 (Clariant); WO
25 2006133867 (Clariant); WO 2006133868 (Clariant); WO 2005097959 (Clariant); WO 9858044 (Clariant); WO 2000004120 (Rhodia Chimie); US 6242404 (Rhodia Inc); WO 2001023515 (Rhodia Inc); WO 9941346 (Rhodia Chim); WO 9815346 (Rhodia Inc); WO 9741197 (BASF); EP 728795 (BASF); US 5008032 (BASF); WO 2002077063 (BASF); EP 483606 (BASF); EP 442101 (BASF); WO 9820092 (Proctor & Gamble); EP 201124
30 (Proctor & Gamble); EP 199403 (Proctor & Gamble); DE 2527793 (Proctor & Gamble); WO 9919429 (Proctor & Gamble); WO 9859030 (Proctor & Gamble); US 5834412 (Proctor & Gamble); WO 9742285 (Proctor & Gamble); WO 9703162 (Proctor & Gamble); WO 9502030 (Proctor & Gamble); WO 9502028 (Proctor & Gamble); EP 357280 (Proctor & Gamble); US 4116885 (Proctor & Gamble); WO 9532232 (Henkel); WO 9532232
35 (Henkel); WO 9616150 (Henkel); WO 9518207 (Henkel); EP 1099748 (Henkel); FR

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2619393 (Colgate Palmolive); DE 3411941 (Colgate Palmolive); DE 3410810 (Colgate Palmolive); WO 2002018474 (RWE-DEA MINERALOEL & CHEM AG; SASOL GERMANY GMBH); EP 743358 (Textil Color AG); PL 148326 (Instytut Ciekkiej Syntezy Organicznej "Blachownia", Pol.); JP 2001181692 (Lion Corp); JP 11193397 A (Lion Corp); RO 114357 (S.C. "Prod Cresus" S.A., Bacau, Rom.); and US 7119056 (Sasol).

The most preferred soil release polymers are the water soluble/miscible or dispersible polyesters such as: linear polyesters sold under the Repel-O-Tex brand by Rhodia (Gerol), or the Texcare brand by Clariant, especially Texcare SRN100 and SRN170, and heavily branched polyesters such as those available from Sasol and described in US 7119056. The polyesters are preferably nonionic and comprise a mid block of spaced apart terephthalate repeat units and at least one end block based on polyethylene glycol with a lower alkyl or hydrogen termination.

Example soil release polymers may also be of the type E-M-L-E, where the ester midblock M is connected to generally hydrophilic end blocks E, each comprising capped oligomers of polyethylene glycol, the linking moiety L is of the form B-Ar-B, where B is a urethane, amide or ester moiety. Such soil release polymers are described in WO2012/104159.

Particularly preferred polymer systems (bi), (bii) and (biii) are combinations of relatively high levels of EPEI, particularly greater than 2.5 wt% based on the composition, with soil release polymers, and preferably wherein the soil release polymer (biii) comprises a polyethylene terephthalate (PET) polyoxyethylene terephthalate (POET) polyester.

The polymer system (b) may typically be present in an amount such that the ratio of polymer system (b) to surfactant system (a) is in a range of 0.15:1 to 0.4:1, preferably 0.2:1 to 0.4:1 and more preferably 0.2:1 to 0.3:1.

30 Water

The present compositions are intended to be highly weight efficient and as such contain relatively low levels of water, namely up to (no more than) 12wt% added water which is listed as component (c). Preferred embodiments contain up to 10wt% added water. The amount of water will vary in dependence upon the dose volume required. The present

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invention permits the use of very low dose volumes such as 25ml or lower, including 15 to 20ml. Dose volumes of 20ml and below preferably contain less than 10wt% added water.

The compositions may also contain water provided as a component of a raw material.

- 5 Preferably the total water content of the composition (as provided by the raw materials and as added water) is less than 20wt%, preferably less than 15wt% and more preferably less than 12wt%.

Fatty acid/Soap

- 10 The compositions comprise (d) up to 10wt% total fatty acid and/or soap, preferably up to 8wt% and most preferably up to 5 or 6wt% fatty acid. Typically a composition may contain at least 0.1wt% fatty acid and preferably at least 1wt%.

- 15 Preferred example fatty acids contain 8 to 24 carbon atoms, preferably in a straight chain configuration, saturated or unsaturated. Particularly preferred fatty acids include those where the weighted average number of carbons in the alkyl/alkenyl chains is from 8 to 24, more preferably 10 to 22, most preferably from 12 to 18. Suitably fatty acids include linear and branched stearic, oleic, lauric, linoleic and tallow acids and mixtures thereof.

- 20 Particularly preferred blends of fatty acids that are commercially available include: hydrogenated topped palm kernel fatty acid, and coconut fatty acid saturated fatty acids are preferred. The fatty acid can act as a buffer in addition to preforming a builder and/or as an antifoam. Preferred fatty acids form part of a buffer system that provides buffering in a pH range of 5 to 9, preferably 6 to 8, more preferably 6 to 7 and especially 6.2 to 6.8.

- 25 Preferably the present detergent compositions have a pH in those ranges when measured on dilution of the liquid composition to 1% using demineralised water. The most preferred pH range will vary in dependence upon the polymer system; soil release polymers in particular can have reduced stability under certain conditions of pH.

- 30 Base

As described above in relation to the anionic surfactant, the compositions contain from 1 to 15wt%, preferably from 1 to 10wt% in total of base which may provide a counterion for any anionic surfactant and perform a pH adjustment function. Suitable bases include potassium hydroxide, sodium hydroxide, monoethanolamine, diethanolamine and

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triethanolamine. Most preferred bases include potassium hydroxide and monoethanolamine. Mixtures of bases may be employed.

Solvent and hydrotropes

5 As the present detergent compositions are intended to be highly weight efficient it is proposed that they contain less than 40wt%, preferably less than 35wt%, more preferably less than 30wt% and especially less than 20wt% of any solvents and hydrotropes. Solvents and hydrotropes may be substantially absent or, if present they may be included in an amount of at least 0.5wt%, optionally at least 1wt% and conveniently at least 5 wt%.

10 Generally the solvents are "non-amino functional".

In this context, "non-amino functional solvent" refers to any solvent that does not contain amino functional groups. It includes non-surfactant solvents such as C₁-C₅ alcohols (such as ethanol), C₂-C₆ diols (such as monopropylene glycol and dipropylene glycol) and C₃-C₉ triols (such as glycerol). In preferred embodiments the solvents are optionally selected from one or more of glycerol, monopropylene glycol (MPG) and ethanol.

The level of such solvents including non-amino functional solvents will vary in dependence upon the dose volumes required. The present invention permits dose volumes of 20ml and lower. A dose volume of 20ml (or lower) will preferably contain less than 35wt% and more preferably less than 30wt% of solvents and hydrotropes. Amino-functional materials are not included in the category of solvents as they would be classified by the skilled reader as a base for component (e).

25 In the present compositions the combined total amount of added water and solvents is preferably less than 60wt%, preferably less than 55wt%, more preferably less than 50wt% and especially less than 45wt%. For example a dose volume of 20ml (or lower) may preferably contain less than 45wt% added water and solvents

30 Additional ingredients up to 100%

The compositions may contain additional ingredients such as a fragrance, enzymes, shading dyes, fluorescer, colorants, pearlisers and/or opacifiers, and dye transfer inhibitors.

Typically such additional ingredients will be present in a total amount of less than 10wt%, more preferably less than 9wt% and especially less than 8wt%.

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Example additional ingredients may be as follows.

Enzymes

The detergent composition may comprise an effective amount of at least one enzyme
5 selected from the group comprising, pectate lyase, protease, amylase, cellulase, lipase, mannanase. Advantageously it comprises at least 2 of this group of enzymes, more advantageously at least 3 and most advantageously at least 4 of the enzymes from this group.

10 Protease

Suitable proteases include those of animal, vegetable or microbial origin. Microbial origin is preferred. Chemically modified or protein engineered mutants are included. The protease may be a serine protease or a metallo protease, preferably an alkaline microbial protease or a trypsin-like protease. Preferred commercially available protease enzymes
15 include Alcalase™, Savinase™, Primase™, Duralase™, Dyrzym™, Esperase™, Everlase™, Polarzyme™, and Kannase™, (Novozymes A/S), Maxatase™, Maxacal™, Maxapem™, Properase™, Purafect™, Purafect OXP™, FN2™, and FN3™ (Genencor International Inc.).

Amylase

20 Suitable amylases (alpha and/or beta) include those of bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Amylases include, for example, alpha-amylases obtained from *Bacillus*, e.g. a special strain of *B. licheniformis*, described in more detail in GB 1,296,839, or the *Bacillus* sp. strains disclosed in WO 95/026397 or WO 00/060060. Commercially available amylases are Duramyl™,
25 Termamyl™, Termamyl Ultra™, Natalase™, Stainzyme™, Fungamyl™ and BAN™ (Novozymes A/S), Rapidase™ and Purastar™ (from Genencor International Inc.).

Pectate Lyase

Pectate lyases (also called polygalacturonate lyases): Examples of pectate lyases include pectate lyases that have been cloned from different bacterial genera for example
30 *Erwinia*, *Pseudomonas*, *Klebsiella* and *Xanthomonas*, as well as from *Bacillus subtilis* (Nasser et al. (1993) FEBS Letts. 335:319-326) and *Bacillus* sp. YA-14 (Kim et al. (1994) Biosci. Biotech. Biochem. 58:947-949). Purification of pectate lyases with maximum activity in the pH range of 8-10 produced by *Bacillus pumilus* (Dave and Vaughn (1971) J.

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Bacteriol. 108:166-174), *B. polymyxa* (Nagel and Vaughn (1961) Arch. Biochem. Biophys. 93:344-352), *B. stearothermophilus* (Karbassi and Vaughn (1980) Can. J. Microbiol. 26:377-384), *Bacillus* sp. (Hasegawa and Nagel (1966) J. Food Sci. 31:838-845) and *Bacillus* sp. RK9 (Kelly and Fogarty (1978) Can. J. Microbiol. 24:1164-1172) have also
5 been described. Any of the above, as well as divalent cation-independent and/or thermostable pectate lyases, may be used in practicing the invention. In preferred embodiments, the pectate lyase comprises the pectate lyase disclosed in Heffron et al., (1995) Mol. Plant-Microbe Interact. 8: 331-334 and Henrissat et al., (1995) Plant Physiol. 107: 963-976. Specifically contemplated pectate lyases are disclosed in WO 99/27083
10 and WO 99/27084. Other specifically contemplated pectate lyases (derived from *Bacillus licheniformis*) are disclosed in US patent no. 6,284,524. Specifically contemplated pectate lyase variants are disclosed in WO 02/006442, especially the variants disclosed in the Examples in WO 02/006442.

Examples of commercially available alkaline pectate lyases include BIOPREP™ and
15 SCOURZYME™ L from Novozymes A/S, Denmark.

Mannanase

Suitable examples of mannanases (EC 3.2.1.78) include mannanases of bacterial and fungal origin. In a specific embodiment the mannanase is derived from a strain of the filamentous fungus genus *Aspergillus*, preferably *Aspergillus niger* or *Aspergillus*
20 *aculeatus* (WO 94/25576). WO 93/24622 discloses a mannanase isolated from *Trichoderma reesei*. Mannanases have also been isolated from several bacteria, including *Bacillus* organisms. For example, Talbot et al., Appl. Environ. Microbiol., Vol.56, No. 11, pp. 3505-3510 (1990) describes a beta-mannanase derived from *Bacillus stearothermophilus*. Mendoza et al., World J. Microbiol. Biotech., Vol. 10, No. 5, pp. 551-
25 555 (1994) describes a beta-mannanase derived from *Bacillus subtilis*. JP-A-03047076 discloses a beta-mannanase derived from *Bacillus* sp. JP-A-63056289 describes the production of an alkaline, thermostable beta-mannanase. JP-A-63036775 relates to the *Bacillus* microorganism FERM P-8856 which produces beta-mannanase and beta-mannosidase. JP-A-08051975 discloses alkaline beta-mannanases from alkalophilic
30 *Bacillus* sp. AM-001. A purified mannanase from *Bacillus amyloliquefaciens* is disclosed in WO 97/11164. WO 91/18974 describes a hemicellulase for example a glucanase, xylanase or mannanase active. Contemplated are the alkaline family 5 and 26 mannanases derived from *Bacillus agaradhaerens*, *Bacillus licheniformis*, *Bacillus*

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halodurans, *Bacillus clausii*, *Bacillus sp.*, and *Humicola insolens* disclosed in WO 99/64619. Especially contemplated are the *Bacillus sp.* mannanases concerned in the Examples in WO 99/64619.

5 Examples of commercially available mannanases include Mannaway™ available from Novozymes A/S Denmark.

Cellulase

Suitable cellulases include those of bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Suitable cellulases include cellulases from the genera *Bacillus*, *Pseudomonas*, *Humicola*, *Fusarium*, *Thielavia*, *Acremonium*, e.g. the
10 fungal cellulases produced from *Humicola insolens*, *Thielavia terrestris*, *Myceliophthora thermophila*, and *Fusarium oxysporum* disclosed in US 4,435,307, US 5,648,263, US 5,691,178, US 5,776,757, WO 89/09259, WO 96/029397, and WO 98/012307.

Commercially available cellulases include Celluzyme™, Carezyme™, Endolase™, Renozyme™ (Novozymes A/S), Clazinase™ and Puradax HA™ (Genencor International
15 Inc.), and KAC-500(B)™ (Kao Corporation).

Peroxidase/oxidase

Suitable peroxidases/oxidases include those of plant, bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Examples of useful peroxidases include peroxidases from *Coprinus*, e.g. from *C. cinereus*, and variants
20 thereof as those described in WO 93/24618, WO 95/10602, and WO 98/15257. Commercially available peroxidases include Guardzyme™ and Novozym™ 51004 (Novozymes A/S).

Lipase

Preferred lipase enzymes include those of bacterial or fungal origin. Chemically modified
25 or protein engineered mutants are included. Examples of useful lipases include lipases from *Humicola*, more preferably ones which comprise a polypeptide having an amino acid sequence which has at least 90% sequence identity with the wild-type lipase derived from *Humicola lanuginosa*, most preferably strain DSM 4109. The amount in the composition is higher than typically found in liquid detergents. This can be seen by the ratio of non-
30 soap surfactant to lipase enzyme, in particular. A particularly preferred lipase enzyme is available under the trademark Lipoclean™ from Novozymes.

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Suitable lipases include those of bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Examples of useful lipases include lipases from *Humicola* (synonym *Thermomyces*), e.g. from *H. lanuginosa* (*T. lanuginosus*) as described in EP 258 068 and EP 305 216 or from *H. insolens* as described in WO

5 96/13580, a *Pseudomonas* lipase, e.g. from *P. alcaligenes* or *P. pseudoalcaligenes* (EP 218 272), *P. cepacia* (EP 331 376), *P. stutzeri* (GB 1,372,034), *P. fluorescens*, *Pseudomonas* sp. strain SD 705 (WO 95/06720 and WO 96/27002), *P. wisconsinensis* (WO 96/12012), a *Bacillus* lipase, e.g. from *B. subtilis* (Dartois et al. (1993), Biochemica et Biophysica Acta, 1131, 253-360), *B. stearothermophilus* (JP 64/744992) or *B. pumilus*
10 (WO 91/16422). As noted above the preferred ones have a high degree of homology with the wild-type lipase derived from *Humicola lanuginosa*.

Other examples are lipase variants for example those described in WO 92/05249, WO 94/01541, EP 407 225, EP 260 105, WO 95/35381, WO 96/00292,

15 WO 95/30744, WO 94/25578, WO 95/14783, WO 95/22615, WO 97/04079 and WO 97/07202.

Preferred commercially available lipase enzymes include Lipolase™ and Lipolase Ultra™, Lipex™ and Lipoclean™ (Novozymes A/S).

Phospholipase

As used herein, the term phospholipase is an enzyme which has activity towards
20 phospholipids. Phospholipids, for example lecithin or phosphatidylcholine, consist of glycerol esterified with two fatty acids in an outer (sn-1) and the middle (sn-2) positions and esterified with phosphoric acid in the third position; the phosphoric acid, in turn, may be esterified to an amino-alcohol. Phospholipases are enzymes which participate in the hydrolysis of phospholipids. Several types of phospholipase activity can be distinguished,
25 including phospholipases A₁ and A₂ which hydrolyze one fatty acyl group (in the sn-1 and sn-2 position, respectively) to form lysophospholipid; and lysophospholipase (or phospholipase B) which can hydrolyze the remaining fatty acyl group in lysophospholipid. Phospholipase C and phospholipase D (phosphodiesterases) release diacyl glycerol or phosphatidic acid respectively.

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Cutinase

The compositions may contain a cutinase, classified in EC 3.1.1.74. The cutinase used in the invention may be of any origin. Preferably cutinases are of microbial origin, in particular of bacterial, of fungal or of yeast origin.

5 Enzyme Stabilizers:

Any enzyme present in the composition may be stabilized using conventional stabilizing agents, e.g., a polyol for example propylene glycol or glycerol, a sugar or sugar alcohol, lactic acid, boric acid, or a boric acid derivative, e.g., an aromatic borate ester, or a phenyl boronic acid derivative for example 4-formylphenyl boronic acid, and the

10 composition may be formulated as described in e.g. WO 92/19709 and WO 92/19708.

Lignin compounds:

When a lipase enzyme is included a lignin compound may be used in the composition in an amount that can be optimised by trial and error. Lignin is a component of all vascular
15 plants, found mostly between cellular structures but also within the cells and in the cell walls.

Preferably the lignin compound comprises a lignin polymer and more preferably it is a modified lignin polymer. A modified lignin polymer as used herein is lignin that has been
20 subjected to a chemical reaction to attach chemical moieties to the lignin covalently. The attached chemical moieties are preferably randomly substituted.

Preferred modified lignin polymers are lignins that have been substituted with anionic, cationic or alkoxy groups, or mixtures thereof. Preferably the substitution occurs on the
25 aliphatic portion of the lignin and is random. Preferably the modified lignin polymer is substituted with an anionic group, and preferably it is a sulfonate. A preferred cationic group is a quaternary amine. Preferred alkoxy groups are polyalkylene oxide chains having repeat units of alkoxy moieties in the range from 5 to 30, most preferably ethoxy. Preferably the modified lignin sulfonate is substituted with anionic or alkoxy groups.
30 Modified lignin polymers are discussed in WO/2010/033743. Most preferably the modified lignin polymer is lignin sulfonate (lignosulfonate). Lignin sulfonate may be obtained by the Howard process.

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Exemplary lignin sulfonate may be obtained from a variety of sources including hardwoods, softwoods and recycling or effluent streams. The lignin sulfonate may be utilized in crude or pure forms, e.g., in an "as is" or whole liquor condition, or in a purified lignin sulfonate form from which or in which sugars and other saccharide constituents
5 have been removed or destroyed, or from which or in which inorganic constituents have been partially or fully eliminated. The lignin sulfonate may be utilized in salt forms including calcium lignin sulfonate, sodium lignin sulfonate, ammonium lignin sulfonate, potassium lignin sulfonate, magnesium lignin sulfonate and mixtures or blends thereof.

10 The lignin sulfonate preferably has a weight average molecular weight of from 2000 to 100000. Their basic structural unit is phenylpropane. The degree of sulphonation is preferably from 0.3 and 1.0 sulfate groups per phenylpropane unit.

Lignin sulfonates are available from a number of suppliers including Borregaard LignoTech, Georgia-Pacific Corporation, Lenzing AG and Tembec Inc.

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Lignin sulphonates are discussed in Lauten, R. A., Myrvold, B. O. and Gundersen, S. A. (2010) New Developments in the Commercial Utilization of Lignosulphonates, in Surfactants from Renewable Resources (eds M. Kjellin and I. Johansson), John Wiley & Sons, Ltd, Chichester, UK.

20

Fluorescent Agents:

It may be advantageous to include fluorescer in the compositions. Usually, these fluorescent agents are supplied and used in the form of their alkali metal salts, for example, the sodium salts. The total amount of the fluorescent agent or agents used in
25 the composition is generally from 0.005 to 2 wt %, more preferably 0.01 to 0.5 wt %.

Preferred classes of fluorescer are: Di-styryl biphenyl compounds, e.g. Tinopal (Trade Mark) CBS-X, Di-amine stilbene di-sulphonic acid compounds, e.g. Tinopal DMS pure Xtra, Tinopal 5BMGX, and Blankophor (Trade Mark) HRH, and Pyrazoline compounds,
30 e.g. Blankophor SN.

Preferred fluorescers are: sodium 2 (4-styryl-3-sulfophenyl)-2H-naphthol[1,2-d]triazole, disodium 4,4'-bis{[(4-anilino-6-(N methyl-N-2 hydroxyethyl) amino 1,3,5-triazin-2-yl)]amino}stilbene-2-2' disulfonate, disodium 4,4'-bis{[(4-anilino-6-morpholino-1,3,5-triazin-2-yl)]amino} stilbene-2-2' disulfonate, and disodium 4,4'-bis(2-sulfoslyryl)biphenyl.
35

Perfume

When the composition is used at very low levels of product dosage, it is advantageous to ensure that perfume is employed efficiently.

5

A particularly preferred way of ensuring that perfume is employed efficiently is to use an encapsulated perfume. Use of a perfume that is encapsulated reduces the amount of perfume vapour that is produced by the composition before it is diluted. This is important when the perfume concentration is increased to allow the amount of perfume per wash to be kept at a reasonably high level.

10

It is even more preferable that the perfume is not only encapsulated but also that the encapsulated perfume is provided with a deposition aid to increase the efficiency of perfume deposition and retention on fabrics. The deposition aid is preferably attached to the encapsulate by means of a covalent bond, entanglement or strong adsorption, preferably by a covalent bond or entanglement.

15

Shading dyes

Shading dye can be used to improve the performance of the compositions. Preferred dyes are violet or blue. It is believed that the deposition on fabrics of a low level of a dye of these shades, masks yellowing of fabrics. A further advantage of shading dyes is that they can be used to mask any yellow tint in the composition itself.

20

Suitable and preferred classes of dyes are discussed below.

25

Direct Dyes:

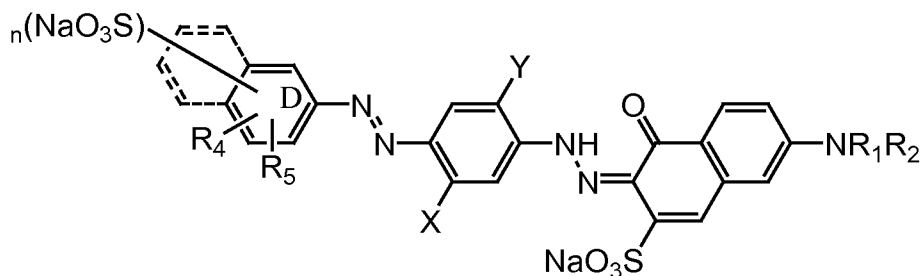
Direct dyes (otherwise known as substantive dyes) are the class of water soluble dyes which have an affinity for fibres and are taken up directly. Direct violet and direct blue dyes are preferred.

30

Preferably bis-azo or tris-azo dyes are used.

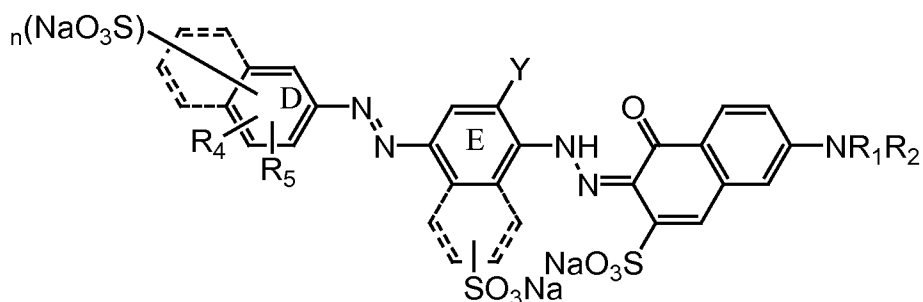
Most preferably, the direct dye is a direct violet of the following structures:

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or

5



wherein:

10

ring D and E may be independently naphthyl or phenyl as shown;

R₁ is selected from: hydrogen and C₁-C₄-alkyl, preferably hydrogen;

R₂ is selected from: hydrogen, C₁-C₄-alkyl, substituted or unsubstituted phenyl and substituted or unsubstituted naphthyl, preferably phenyl;

15 R₄ and R₅ are independently selected from: hydrogen and C₁-C₄-alkyl, preferably hydrogen or methyl;

X and Y are independently selected from: hydrogen, C₁-C₄-alkyl and C₁-C₄-alkoxy; preferably the dye has X= methyl; and, Y = methoxy and n is 0, 1 or 2, preferably 1 or 2.

20

Preferred dyes are direct violet 7, direct violet 9, direct violet 11, direct violet 26, direct violet 31, direct violet 35, direct violet 40, direct violet 41, direct violet 51, and direct violet 99. Bis-azo copper containing dyes for example direct violet 66 may be used. The benzidine based dyes are less preferred.

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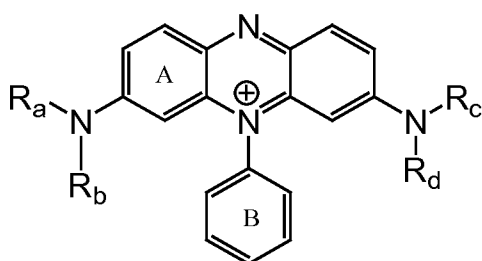
Preferably the direct dye is present at 0.000001 to 1 wt% more preferably 0.00001 wt% to 0.0010 wt% of the composition.

In another embodiment the direct dye may be covalently linked to the photo-bleach, for example as described in WO2006/024612.

Acid dyes:

Cotton substantive acid dyes give benefits to cotton containing garments. Preferred dyes and mixes of dyes are blue or violet. Preferred acid dyes are:

(i) azine dyes, wherein the dye is of the following core structure:



wherein R_a , R_b , R_c and R_d are selected from: H, a branched or linear C1 to C7-alkyl chain, benzyl a phenyl, and a naphthyl;

the dye is substituted with at least one SO_3^- or $-\text{COO}^-$ group;

the B ring does not carry a negatively charged group or salt thereof; and

the A ring may further substituted to form a naphthyl; the dye is optionally substituted by groups selected from: amine, methyl, ethyl, hydroxyl, methoxy, ethoxy, phenoxy, Cl, Br, I, F, and NO_2 .

Preferred azine dyes are: acid blue 98, acid violet 50, and acid blue 59, more preferably acid violet 50 and acid blue 98.

Other preferred non-azine acid dyes are acid violet 17, acid black 1 and acid blue 29.

Preferably the acid dye is present at 0.0005 wt% to 0.01 wt% of the formulation.

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Hydrophobic dyes:

The composition may comprise one or more hydrophobic dyes selected from benzodifuranes, methine, triphenylmethanes, naphthalimides, pyrazole, naphthoquinone, anthraquinone and mono-azo or di-azo dye chromophores. Hydrophobic dyes are dyes which do not contain any charged water solubilising group. Hydrophobic dyes may be selected from the groups of disperse and solvent dyes. Blue and violet anthraquinone and mono-azo dye are preferred.

Preferred dyes include solvent violet 13, disperse violet 27, disperse violet 26, disperse violet 28, disperse violet 63 and disperse violet 77.

Preferably the hydrophobic dye is present at 0.0001 wt% to 0.005 wt% of the formulation.

Basic dyes:

Basic dyes are organic dyes which carry a net positive charge. They deposit onto cotton. They are of particular utility for use in composition that contain predominantly cationic surfactants. Dyes may be selected from the basic violet and basic blue dyes listed in the Colour Index International.

Preferred examples include triarylmethane basic dyes, methane basic dye, anthraquinone basic dyes, basic blue 16, basic blue 65, basic blue 66, basic blue 67, basic blue 71, basic blue 159, basic violet 19, basic violet 35, basic violet 38, basic violet 48; basic blue 3, basic blue 75, basic blue 95, basic blue 122, basic blue 124, basic blue 141.

Reactive dyes:

Reactive dyes are dyes which contain an organic group capable of reacting with cellulose and linking the dye to cellulose with a covalent bond. They deposit onto cotton.

Preferably the reactive group is hydrolysed or reactive group of the dyes has been reacted with an organic species for example a polymer, so as to link the dye to this species. Dyes may be selected from the reactive violet and reactive blue dyes listed in the Colour Index International.

- 30 -

Preferred examples include reactive blue 19, reactive blue 163, reactive blue 182 and reactive blue, reactive blue 96.

Dye conjugates:

- 5 Dye conjugates are formed by binding direct, acid or basic dyes to polymers or particles via physical forces. Dependent on the choice of polymer or particle they deposit on cotton or synthetics. A description is given in WO2006/055787.

Particularly preferred dyes are: direct violet 7, direct violet 9, direct violet 11, direct violet
10 26, direct violet 31, direct violet 35, direct violet 40, direct violet 41, direct violet 51, direct violet 99, acid blue 98, acid violet 50, acid blue 59, acid violet 17, acid black 1, acid blue 29, solvent violet 13, disperse violet 27 disperse violet 26, disperse violet 28, disperse violet 63, disperse violet 77 and mixtures thereof.

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Shading dye can be used in the absence of fluoescer, but it is especially preferred to use a shading dye in combination with a fluoescer, for example in order to reduce yellowing due to chemical changes in adsorbed fluoescer.

20 Bleaches

Bleaching components such as halogen bleaches, peroxy acid bleaches and inorganic percompound bleaches, are preferably avoided in the present compositions on the grounds that the compositions preferably exhibit a pH in the range of 5 to 9 and more preferably 6 to 7. Suitably the compositions contain less than 0.5wt% of bleaching
25 component, preferably less than 0.1wt% and most preferably bleaching components are substantially absent from the compositions. Similarly bleach activators are not required.

Builders and sequestrants

The detergent compositions preferably contain only low levels of organic detergent
30 builder or sequestrant material. Examples include the alkali metal, citrates, succinates, malonates, carboxymethyl succinates, carboxylates, polycarboxylates and polyacetyl carboxylates. Specific examples include sodium, potassium and lithium salts of oxydisuccinic acid, mellitic acid, benzene polycarboxylic acids, and citric acid. Other examples are DEQUEST™, organic phosphonate type sequestering agents sold by
35 Monsanto and alkanehydroxy phosphonates.

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Other suitable organic builders include the higher molecular weight polymers and copolymers known to have builder properties. For example, such materials include appropriate polyacrylic acid, polymaleic acid, and polyacrylic/polymaleic acid copolymers and their salts, for example those sold by BASF under the name SOKALAN™.

If utilized, the organic builder materials may comprise up to 2 wt%, preferably up to 1wt%, more preferably up to 0.5wt% of the composition.

Example sequestrants are HEDP (1-Hydroxyethylidene -1,1,-diphosphonic acid), for example sold as Dequest 2010, and (Diethylenetriamine penta(methylene phosphonic acid or Heptasodium DTPMP), Dequest® 2066. Preferably the compositions contain less than 1 wt%, more preferably less than 0.5wt% sequestrant.

Typically the compositions contain no more than 2 wt%, especially no more than 1 wt% and especially no more than 0.5 wt% of any inorganic builders.

Buffers

The presence of some buffer is preferred for pH control. In the present compositions the fatty acid provides at least some buffering.

External Structurants

The compositions may have their rheology further modified by use of a material or materials that form a structuring network within the composition. Suitable structurants include hydrogenated castor oil, microfibrinous cellulose and natural based structurants for example citrus pulp fibre. Citrus pulp fibre is particularly preferred especially if lipase enzyme is included in the composition. Preferably, if utilised, such external structurants are present in an amount of less than 2wt%, preferably less than 1wt%.

Visual Cues

The compositions may comprise visual cues of solid material that is not dissolved in the composition. Preferred visual cues are lamellar cues formed from polymer film and possibly comprising functional ingredients that may not be as stable if exposed to the alkaline liquid. Enzymes and bleach catalysts are examples of such ingredients. Also perfume, particularly microencapsulated perfume.

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Packaging and dosing

The liquids may be supplied in multidose systems or in unit dose systems. In typical use conditions this would involve a dosage of 13ml to 25ml into a washing machine that may hold 10 to 15 litres of water.

A method of laundering fabric using the present compositions may involve diluting the dose of detergent composition by a factor of 600 to 1200 to obtain a wash liquor which comprises 1.3 to 0.2g/L of non-soap surfactant (based on a volume of water of 15L in the dilution step) and washing fabrics with the wash liquor so formed.

According to the method aspect, a dilution step preferably provides a wash liquor which comprises 3 to 20 g/ wash of non-soap surfactant. A preferred method provides at least 3.5 g/wash especially at least 4g/wash and more preferably at least 5 g/wash. Preferred methods also provide up to 19g/wash, especially up to 18g/wash. Such g/wash calculations are typically based on a 15L wash volume, using a detergent composition at a dose level of at least 13mL and preferably at least 14mL.

Preferably dose volumes are up to 25ml, especially no more than 24.5ml. A dilution step also preferably provides a polymer system in an amount corresponding to 0.6 to 9 g/wash, preferably 0.8 to 4 and more preferably 1 to 3 g/wash.

In the context of the present invention, pourable means that the composition can be poured and as such it preferably has a shear viscosity (at 25 °C) of below 2 Pas at a shear rate of 21s^{-1} . Preferred viscosities are in the range of 0.1 to 1.0 Pas.

The compositions are preferably isotropic and generally exhibit Newtonian flow characteristics.

The invention will now be further described with reference to the following non-limiting examples.

EXAMPLES

Examples 1 to 4 and Comparative Examples 1 to 5

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Concentrated laundry detergent compositions were prepared using relatively high levels of surfactant (at about 48 wt%) in combination with various levels of added water and various levels of a polymer system (containing EPEI and SRN 100 soil release polymer). The tables show the amounts by weight of active materials; water / solvent from raw materials will bring the totals to 100%.

MPG is monopropylene glycol,

MEA is monoethanolamine,

Neodol 25_7 is a C12-C15 alcohol ethoxylate 7EO nonionic ex Shell Chemical,

LAS acid is C12-C14 linear alkylbenzene sulphonic acid,

Prifac 5908 is a saturated lauric fatty acid,

EPEI is an ethoxylated polyethylene imine polymer PEI(600)20EO

Texcare SRN 100 is a soil release polymer

Tinopal CBS-CL is a fluorescent agent

The concentrated laundry detergent compositions illustrate potential 17ml dose formulations. All the examples and comparative examples contain less than 30wt% in total of added water and solvent/hydrotrope (MPG). Also all the examples and comparative examples provide about 8.2 g / wash non-soap surfactant.

Examples 1 to 4 contain amounts of added water ranging from 0 wt% to 11.5 wt%. The comparative examples show amounts of added water ranging from 16.5 wt% to 26.3 wt%.

Table 1 Examples 1 - 4

Examples	Ex 1	Ex 2	Ex 3	Ex 4
Water	11.5	6.5	7.3	0.0
MPG	10.0	15.0	21.5	21.5
MEA	5.0	5.0	5.0	5.0
Neodol 25_7	24.1	24.1	24.1	24.1
LAS acid	24.1	24.1	24.1	24.1
Prifac 5908	4.3	4.3	4.3	4.3
EPEI	6.9	6.9	3.1	6.9
Texcare SRN 100	4.4	4.4	1.9	4.4
Amylase	1.3	1.3	1.3	1.3
Protease	2.7	2.7	2.7	2.7
Fragrance	2.8	2.8	2.8	2.8

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Table 2 Comparative examples 1 - 5

Comparative Examples	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5
Water	26.3	19.0	23.8	16.5	18.8
MPG	2.5	2.5	5.0	5.0	10.0
MEA	5.0	5.0	5.0	5.0	5.0
Neodol 25_7	24.1	24.1	24.1	24.1	24.1
LAS acid	24.1	24.1	24.1	24.1	24.1
Prifac 5908	4.3	4.3	4.3	4.3	4.3
EPEI	3.1	6.9	3.1	6.9	3.1
Texcare SRN 100	1.9	4.4	1.9	4.4	1.9
Amylase	1.3	1.3	1.3	1.3	1.3
Protease	2.7	2.7	2.7	2.7	2.7
Fragrance	2.8	2.8	2.8	2.8	2.8

Tests and Results

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The compositions were tested to see if they were lamellar or isotropic by a visual assessment using a microscope. A lamellar sample was regarded as a “fail”.

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A dissolution test was also performed on each sample in which 1g was dropped in to 100ml of water to see if the sample dispersed. If it did not disperse it was also regarded as a “fail”.

The results are provided in the table 3 below:

Table 3

Sample Number	Status
Example 1	Passed
Example 2	Passed
Example 3	Passed
Example 4	Passed
Comparative example 1	Failed
Comparative example 2	Failed
Comparative example 3	Failed
Comparative example 4	Failed
Comparative example 5	Failed

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The illustrative examples provide highly weight efficient low viscosity isotropic liquids which exhibit excellent dissolution in a wash liquor. In contrast, the comparative example compositions were either lamellar or showed poor dissolution characteristics.

- 5 The illustrative examples thus provide concentrated detergent formulations containing high levels of active ingredients, in terms of surfactant and cleaning polymers, which are in a desirable product form of isotropic liquids. These formulations exhibit good dissolution characteristics without the need for high levels of solvent or water to be contained within them and, as a result, the formulations are highly weight efficient.

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CLAIMS

1. A pourable liquid detergent composition comprising:

(a) a non-soap surfactant system which comprises at least nonionic or anionic surfactant
5 such that the total content of non-soap surfactant in the composition is at least 30wt%,
preferably at least 35wt%;

(b) a polymer system which comprises at least one of the following (bi) to (biii) such that
the total content of (bi), (bii) and (biii) in the composition is in the range of 5 to 35wt%:

(bi) one or more particulate soil removal polymer(s) and/or

10 (bii) one or more anti-redeposition polymer(s) and/or

(biii) one or more soil release polymer(s);

(c) up to 12wt% total added water;

(d) from 0.1wt% up to 10wt% total fatty acid/soap;

(e) 1 to 15wt% in total of base, optionally providing one or more counterions for any
15 anionic surfactant;

(f) less than 40wt% in total of any non-amino functional solvents and hydrotropes ; and

(g) additional ingredients up to 100% optionally including fragrance, enzymes, shading
dyes, fluorescer and dye transfer inhibitor.

20 2. A pourable liquid detergent composition according to claim 1 wherein the
surfactant system (a) comprises nonionic and anionic surfactant in a weight ratio
in the range of 40:60 to 80:20, more preferably in the range of 40:60 to 70:30.

25 3. A pourable liquid detergent composition according to any preceding claim wherein
the polymer system (b) comprises an ethoxylated polyethyleneimine polymer
EPEI as a particulate soil removal polymer (bi) and/or anti-redeposition polymer
(bii), provided in a total amount of between 1 to 18wt% of the composition.

30 4. A pourable liquid detergent composition according to any preceding claim wherein
the polymer system (b) comprises a polyethylene terephthalate (PET)
polyoxyethylene terephthalate (POET) polyester as a soil release polymer (biii),
provided in a total amount of between 1 to 12wt% of the composition.

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5. A pourable liquid detergent composition according to any preceding claim wherein the weight ratio of polymer system (b) to surfactant system (a) is in the range of from 0.15:1 to 0.4 :1, preferably 0.2:1 to 0.4:1, and more preferably 0.2:1 to 0.3:1.
- 5 6. A pourable liquid detergent composition according to any preceding claim which has a pH in a range of 5 to 9, preferably 6 to 8 when measured on dilution of the liquid composition to 1% using demineralised water.
- 10 7. A pourable liquid detergent composition according to any preceding claim which contains less than 10wt % of additional ingredients (g) including fragrance, enzymes, shading dyes, fluorescer and dye transfer inhibitor and is substantially free of bleach and / or sequestrant.
- 15 8. A pourable liquid detergent composition according to any preceding claim which contains less than 0.5wt% of any additional organic builder materials and / or less than 0.5wt% of any additional inorganic builder materials.
- 20 9. A pourable liquid detergent composition according to any preceding claim which contains less than 40wt% and preferably less than 35wt% in total of added water (c) and solvents and hydrotropes (f).
- 25 10. A pourable liquid detergent composition according to any preceding claim wherein the non-soap surfactant system (a) includes C₁₀-C₁₅ alcohol ethoxylated nonionic surfactant with 2 to 7 EO.
- 30 11. A pourable liquid detergent composition according to any preceding claim wherein the non-soap surfactant system (a) contains less than 20wt% of any alkylpolyethoxylate sulphate anionic surfactant.
- 35 12. A pourable liquid detergent composition according to any preceding claim wherein the surfactant system (a) includes anionic surfactant for which the anion is selected from linear alkyl benzene sulfonate (LAS), primary alkyl sulfate (PAS), alkyl ether sulfate (AES) and mixtures thereof, and wherein a counter ion for the anionic surfactant is provided by an inorganic and/or ammoniacal base (e) selected from NaOH, KOH, MEA and TEA.

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13. A method for the production of a pourable liquid detergent composition as claimed in any preceding claim which method comprises the incorporation of no more than 12wt% added water into a composition comprising (a), (b), (d), (e), (f) and (g).

14. A method of laundering fabric which comprises the steps of

(A) providing a liquid detergent composition as claimed in any one of claims 1 to 12,

(B) diluting a dose of the detergent composition in water by a factor of >500, and preferably by a factor of 600 – 1200, so as to obtain a wash liquor which comprises 3 to 20 g/wash of non-soap surfactant, and

(C) washing fabrics with the wash liquor so formed.

15. A method according to claim 14 which comprises providing less than 25ml, and preferably 15 to 20ml of the liquid detergent composition.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/050641

A. CLASSIFICATION OF SUBJECT MATTER

INV. C11D1/83 C11D3/00 C11D3/04 C11D3/20 C11D3/30
C11D3/37 C11D3/386 C11D3/40 C11D3/42 C11D3/43
C11D3/50 C11D10/04 C11D11/00

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where 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.
X	WO 2014/160820 A1 (PROCTER & GAMBLE [US]) 2 October 2014 (2014-10-02) cited in the application page 2, line 9 - page 3, line 2 pages 75-77; example 15 claims -----	1-15
X	WO 2011/032138 A2 (PROCTER & GAMBLE [US]) 17 March 2011 (2011-03-17) cited in the application page 2, paragraph 3 - page 3, paragraph 1 examples; table I claims ----- -/-	1-15



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

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INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2017/050641

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	----- WO 2012/104159 A1 (UNILEVER PLC [GB]; UNILEVER NV [NL]; UNILEVER HINDUSTAN [IN]) 9 August 2012 (2012-08-09) cited in the application page 4, line 15 - page 5, line 13 examples 8, 9; table 9 claims	1-15
A	----- WO 2013/092049 A1 (UNILEVER PLC [GB]; UNILEVER NV [NL]; UNILEVER HINDUSTAN [IN]) 27 June 2013 (2013-06-27) cited in the application page 4, line 10 - page 5, line 2 examples claims -----	1-15

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2017/050641

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