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(54) Title: COMPOSITION

(57) **Abstract**: A laundry liquid composition comprises: -cleaning surfactant component, -from 5 to 20% wt. water, -soil release polymer, and -at least one of (i) polyethylene imine or derivative thereof and / or (ii) enzyme. Soil release polymer may be used to reduce the irritancy of a laundry liquid composition which comprises cleaning surfactant, from 5 to 20%wt water and at least one of (i) polyethylene imine (or derivative thereof) and / or (ii) enzyme.



COMPOSITIONTechnical Field

- 5 The present invention relates to a laundry liquid formulation with an improved safety profile.

Background

- 10 There is a trend towards increasing the concentration of laundry liquid formulations to permit them to be used in smaller doses and thereby reduce packaging costs.

WO2013/074589 A proposes concentrated liquid laundry detergent compositions which may be packaged in a unit dose capsule and which contain 21% to 74% alkyl ether
15 sulfate amine salt(s) with 2% to 50% nonionic surfactants and less than 50% water. US 5723425 A shows concentrated aqueous liquid detergent compositions containing polyvinylpyrrolidone for superior colour maintenance, in which the anionic surfactant mainly consists of alkyl ethoxy sulfate.

- 20 EP 0576777 A concerns liquid compositions which contain, based on the total weight of the composition, 2% to 35% by weight of water, 0.05% to 2% by weight of polyvinylpyrrolidone and 0.05 to 2% of a terephthalate-based soil release polymer. The combination of polyvinylpyrrolidone and terephthalate-based soil release polymer is proposed to have improved stability in the concentrated aqueous liquid detergent matrix
25 as compared to the individual components alone. The two example formulations contain 19 and 23wt% water, respectively.

- WO94/11480 A discloses concentrated liquid detergent compositions containing 0.01% to 1% cotton-substantive brighteners and 0.01% to 5% polyvinylpyrrolidone to inhibit dye
30 transfer. Example formulations also contain 0.5% terephthalate-based polymer.

WO2013/160025 A relates to less concentrated aqueous detergent liquids which contain about 30wt% water and an external structurant derived from pulped apple fibre. Example formulations contain a soil release polymer.

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Despite the prior art there remains a need for concentrated laundry liquid compositions which exhibit reduced irritancy.

5 Summary of the invention

We have surprisingly found that the presence of soil release polymer in a concentrated laundry liquid composition, which contains at least one component selected from polyethylene imine or a derivative thereof and enzyme, is effective to reduce the irritancy
10 of the composition.

Accordingly, a first aspect of the present invention relates to:

(1) a laundry liquid composition comprising:

-cleaning surfactant component,

15 -from 5 to 20% wt. water,

-soil release polymer,

-at least one of: (i) polyethylene imine or derivative thereof and / or (ii) enzyme.

We have surprisingly found that through using soil release polymer the irritancy of the
20 composition can be reduced. In the absence of the soil release polymer the levels of actives such as enzyme, polyethylene imine (and derivatives thereof) need to be reduced such that the overall irritancy of the product is reduced.

The improved technical effect, in terms of reduced irritancy, observed when soil release
25 polymer is present in the composition permits more polyethylene imine (or derivative thereof) and / or more enzyme to be incorporated in the composition. This further enables less water to be used and so permits smaller effective doses.

Embodiments of the invention may provide the following:

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(2) Composition according to (1) disposed within a water-soluble film.

(3) Composition according to (1) or (2) wherein soil release polymer is present at from 0.5% wt. of the composition.

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(4) Composition according to (3) wherein soil release polymer is present at from 1% wt. of the composition.

5 (5) Composition according to any of (1) to (4), in which from 0.01 to 20% wt. of the composition comprises polyethylene imine or a derivative thereof.

(6) Composition according to (5) wherein the composition contains an ethoxylated polyethyleneimine, and preferably contains an ethoxylated polyethyleneimine represented
10 as PEI(X)YEO where X represents the molecular weight of the unmodified polyethyleneimine and is in the range of 300 to 10000 and Y represents the average moles of ethoxylation per nitrogen atom in the polyethylene backbone and is in the range of 9 to 40.

15 (7) Composition according to any of (1) to (6) which contains a polyester-based soil release polymer and preferably wherein the soil release polymer contains terephthalate-based units.

(8) Composition according to any of (1) to (7) which comprises enzyme selected from
20 lipase, phospholipase, protease, cutinase, amylase, cellulose, (per)oxidase, pectate lyase, mannanase and mixtures thereof.

(9) Composition according to (8) comprising at least two selected from lipase, phospholipase, protease, cutinase, amylase, cellulose, (per)oxidase, pectate lyase and
25 mannanase.

(10) Composition according to any of (1) to (9) comprising from 0.5 to 20% wt. sequestrant.

30 (11) Composition according to any one of (2) to (10) which is disposed in a water-soluble film in an amount of from 15 to 30 ml.

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A second aspect of the invention concerns the use of soil release polymer to reduce the irritancy in a composition which contains cleaning surfactant, 5 to 20% wt. water and at least one of (i) polyethylene imine or derivative thereof and / or (ii) enzyme.

- 5 Preferred embodiments may involve one or more of the following combinations of features.

Preferably, the composition is disposed within a compartment defined by a water-soluble film. Suitable water-soluble films include polyvinyl alcohol.

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In such embodiments, the film thickness of the first compartment is preferably 90 microns or less. More preferably, in the capsule of the present invention the film thickness of the first compartment is in the range 70 to 88 microns. Even more preferably in the capsule of the present invention the film thickness of the first compartment is in the range 72 to 85
15 microns. A film thickness of 75 to 82 microns is most preferred.

Soil Release Polymer

- 20 The composition preferably comprises at least 0.5 wt% of a 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. We have also now found that soil release polymers reduce the eye and / or skin irritancy of detergent
25 compositions which contain relatively low levels of water.

- 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
30 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.

The soil release polymer may generally comprise up to 10.0 wt%, of the detergent composition, preferably up to 9 wt%, more preferably up to 8 wt% in the composition and

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most preferably up to 6 wt%. Preferably the compositions contain at least 0.5 wt% or more, more preferably 1.0 wt% or more and especially 1.5 wt% or more soil release polymer.

- 5 Generally the soil release polymers for polyester will comprise polymers of aromatic dicarboxylic acids and alkylene glycols (including polymers containing polyalkylene glycols).
- 10 The polymeric soil release agents useful herein especially include those soil release agents having:
- (a) one or more nonionic hydrophilic components consisting essentially of:
- 15 (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
- 20 linkages, or
- (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
- 25 enough to increase the hydrophilicity of conventional polyester synthetic fibre surfaces upon deposit of the soil 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
- 30 (b) one or more hydrophobic components comprising:
- (i) C₃ oxyalkylene terephthalate segments, wherein, if said hydrophobic components also comprise oxyethylene terephthalate, the ratio of

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oxyethylene terephthalate: C₃ oxyalkylene terephthalate units is about 2:1 or lower,

(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 or C₄ hydroxyalkyl ether cellulose derivatives, or mixtures therein, and such cellulose 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 MO₃ S(CH₂)_n OCH₂ CH₂ O--, 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.

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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 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 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. 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 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 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 2006133867 (Clariant); WO 2006133868 (Clariant); WO 2005097959 (Clariant); WO

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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 (Procter & Gamble); EP 201124
 5 (Procter & Gamble); EP 199403 (Procter & Gamble); DE 2527793 (Procter & Gamble); WO 9919429 (Procter & Gamble); WO 9859030 (Procter & Gamble); US 5834412 (Procter & Gamble); WO 9742285 (Procter & Gamble); WO 9703162 (Procter & Gamble); WO 9502030 (Procter & Gamble); WO 9502028 (Procter & Gamble); EP 357280 (Procter & Gamble); US 4116885 (Procter & Gamble); WO 9532232 (Henkel); WO 9532232
 10 (Henkel); WO 9616150 (Henkel); WO 9518207 (Henkel); EP 1099748 (Henkel); FR 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
 15 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 SRN170, and heavily
 20 branched polyesters such as those available from Sasol and described in US 7119056.

These most preferred soil release polymers are polyesters which 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.

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Polyethylene imine and derivatives thereof (EPEI)

A particularly preferred class of polymer for use in the composition is polyethylene imine, preferably modified polyethylene imine. Polyethylene imines are materials composed of
 30 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 for example carbon 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; and U.S. Pat. No. 2,553,696, Wilson, issued May 21, 1951.

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Preferably, the EPEI comprises a polyethyleneimine backbone of about 300 to about 10000 weight average molecular weight; 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

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molecular weight of the unmodified PEI and Y represents the average moles of ethoxylation per nitrogen atom in the polyethyleneimine backbone. The ethoxylation 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.

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The polyethyleneimine polymer is present in the composition preferably at a level of between 0.01 and 25 wt%, but more preferably at a level of at least 2 wt% and/or less than 9.5 wt%, most preferably from 3 to 9 wt%.

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A ratio of non-soap surfactant to EPEI could optionally be from 2:1 to 15:1, conveniently from 2:1 to 12:1 or 7:1, preferably from 3:1 to 6:1, or even to 5:1.

Other polymer types

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In addition to a soil release polymer there may be used dye transfer inhibition polymers, anti redeposition polymers and cotton soil release polymers, especially those based on modified cellulosic materials.

Enzymes

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It is preferable that at least one or more enzymes may be present in the compositions. Preferably at least two, more preferably at least three different classes of enzymes are used in combination.

Lipase

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Lipase is a particularly preferred enzyme. The composition preferably contains from about 5 to about 20000 LU/g of a lipase. Preferred lipase enzymes include those of bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Examples
5 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-soap surfactant to lipase enzyme, in particular. A
10 particularly preferred lipase enzyme is available under the trademark Lipoclean™ from Novozymes.

As noted above, suitable lipases include those of bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Examples of useful lipases include
15 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 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.*
20 *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* (WO 91/16422). As noted above the preferred ones have a high degree of homology with the wild-type lipase derived from *Humicola lanuginosa*.

25 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, 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
30 Ultra™, Lipex™ and Lipoclean™ (Novozymes A/S).

In addition to or as an alternative to lipase one or more other enzymes may be present. However lipase is particularly preferred.

Advantageously, the presence of relatively high levels of calcium in the poorly built or unbuilt compositions has a beneficial effect on the turnover of certain enzymes, particularly lipase enzymes and preferably lipases from *Humicola*.

- 5 The preferred lipases include first wash lipases derived from *Humicola lanuginosa* strain DSM 4109 available under the Lipex™ brand from Novozymes. A similar enzyme from Novozymes but believed to fall outside of the above definition is sold by Novozymes under the name Lipoclean™ and this is also preferred.

10 Phospholipase:

Phospholipase classified as EC 3.1.1.4 and/or EC 3.1.1.32 is an enzyme which has activity towards 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, 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.

Protease:

25 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 include Alcalase™, Savinase™, Primase™, Relase™, Coronase™, Duralase™, Dyrazym™, Esperase™, Everlase™, Polarzyme™, and Kannase™, (Novozymes A/S), Maxatase™, Maxacal™, Maxapem™, Properase™, Purafect™, Purafect OxP™, FN2™, and FN3™ (Genencor International Inc.).

Cutinase:

The compositions may comprise cutinase. classified in EC 3.1.1.74. The cutinase may be of any origin. Preferably cutinases are of microbial origin, in particular of bacterial, of
5 fungal or of yeast origin.

Amylase:

Suitable amylases (alpha and/or beta) include those of bacterial or fungal origin.
10 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™, Termamyl™, Termamyl Ultra™, Natalase™, Stainzyme™, Fungamyl™ and BAN™
15 (Novozymes A/S), Rapidase™ and Purastar™ (from Genencor International Inc.).

Cellulase:

Suitable cellulases include those of bacterial or fungal origin. Chemically modified or
20 protein engineered mutants are included. Suitable cellulases include cellulases from the genera *Bacillus*, *Pseudomonas*, *Humicola*, *Fusarium*, *Thielavia*, *Acremonium*, e.g. the 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.
25 Commercially available cellulases include Celluzyme™, Carezyme™, Endolase™, Renozyme™ (Novozymes A/S), Clazinase™ and Puradax HA™ (Genencor International Inc.), and KAC-500(B)™ (Kao Corporation).

Peroxidases/oxidases:

30 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 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).

Pectate Lyases:

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Pectate lyases (also called polygalacturonate lyases): Examples of pectate lyases include pectate lyases that have been cloned from different bacterial genera for example *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.

10 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. 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
15 (Kelly and Fogarty (1978) Can. J. Microbiol. 24:1164-1172) have also been described.

Any of the above, as well as divalent cation-independent and/or thermostable pectate lyases, may be used in the compositions. 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
20 contemplated pectate lyases are disclosed in WO 99/27083 and WO 99/27084. Other specifically contemplated pectate lyases (derived from *Bacillus licheniformis*) are disclosed in US patent no. 6,284,524 (which document is hereby incorporated by reference). Specifically contemplated pectate lyase variants are disclosed in WO 02/006442, especially the variants disclosed in the Examples in WO 02/006442.

25

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

Mannanases:

30

Mannanase: 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 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. 551-555 (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 *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 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.

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

The enzyme and any perfume/fragrance or pro-fragrance present may show some interaction and should be chosen such that this interaction is not negative. Some negative interactions may be avoided by encapsulation of one or other of enzyme and pro-fragrance and/or other segregation within the product.

Builders and sequestrants

The detergent compositions may also optionally contain relatively low levels of organic detergent 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, ethylene diamine tetraacetic acid, diethylenetriamine- pentaacetic acid, alkyl- or alkenylsuccinic acid,

- 15 -

nitrilotriacetic acid, and citric acid. Other examples are DEQUEST™, organic phosphonate type sequestering agents sold by Monsanto and alkanehydroxy phosphonates. Other suitable organic builders include the higher molecular weight polymers and copolymers known to have builder properties. For example, such materials
5 include appropriate polyacrylic acid, polymaleic acid, and polyacrylic/polymaleic acid copolymers and their salts, such as those sold by BASF under the name SOKALAN™. Another suitable builder is sodium carbonate.

10 If utilized, the builder or sequestrant materials may comprise from about 0.5 percent to 20 wt percent, preferably from 1 wt percent to 10 wt percent, of the composition. The preferred builder level is less than 10 wt percent and preferably less than 5 wt percent of the composition.

15 A preferred sequestrant is HEDP (1-Hydroxyethylidene -1,1,-diphosphonic acid), for example sold as Dequest 2010. Also suitable but less preferred as it gives inferior cleaning results is Dequest® 2066 (Diethylenetriamine penta(methylene phosphonic acid or Heptasodium DTPMP).

20 Preferably the laundry detergent formulation is a non-phosphate built laundry detergent formulation, i.e., contains less than 1 weight percent of phosphate.

The amount of deterative surfactant makes up at least 10 wt% of the total liquid composition, preferably it makes up from 12 to 60 wt%. The compositions most preferably have total active deterative surfactant levels of at least 15 wt% and more
25 preferably at least 20 wt%.

The compositions may be concentrated compositions designed to be added to a 10 litre wash in small doses that require them to be diluted in at least 500 times their own volume of water to form a main wash liquor comprising at most 0.5 g/l surfactant. They may also
30 be concentrated compositions designed for hand wash or top loading automatic washing machines. In hand wash less water may be used and in top loading automatic washing machines a higher amount of water would normally be used. The dose of detergent liquid is adjusted accordingly to give similar wash liquor concentrations.

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
5 and nonionic surfactants are a preferred feature of the compositions. The amount of anionic surfactant is preferably at least 5 wt%.

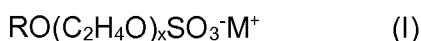
The anionic surfactant may form the majority or the minority of the non soap surfactant
10 (a).

Anionic

Preferred alkyl sulphonates are alkylbenzene sulphonates, particularly linear alkylbenzene sulphonates having an alkyl chain length of C₈-C₁₅. The counter ion for
15 anionic surfactants is generally an alkali metal, typically sodium, although other counter-ions for example MEA, TEA or ammonium can be used.

Suitable linear alkyl benzene sulphonate surfactants include Detal LAS with an alkyl chain length of from 8 to 15, more preferably 12 to 14.

20 It is further desirable that the composition comprises an alkyl polyethoxylate sulphate anionic surfactant of the formula (I):



25 where R is an alkyl chain having from 10 to 22 carbon atoms, 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.

30 Preferably R is an alkyl chain having from 12 to 16 carbon atoms, M is Sodium and x averages from 1 to 3, preferably x is 3; This is the anionic surfactant sodium lauryl ether sulphate (SLES). It 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.

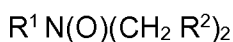
Nonionic

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 suitably contains from 0.2 wt% to 40 wt%, preferably 1 wt% to 25 wt%, more preferably 5 to 20 wt% or 15 wt% of a non-ionic surfactant, for example alcohol ethoxylate, nonylphenol ethoxylate, alkylpolyglycoside, alkyl dimethylamineoxide, 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.

Amine Oxide

The composition may comprise up to 10 wt% of an amine oxide of the formula:



In which R¹ is a long chain moiety each CH₂R² are short chain moieties. R² is preferably selected from hydrogen, methyl and -CH₂OH. In general R¹ is a primary or branched hydrocarbyl moiety which can be saturated or unsaturated, preferably, R¹ is a primary alkyl moiety. R¹ is a hydrocarbyl moiety having chain length of from about 8 to about 18.

- 18 -

Preferred amine oxides have R¹ is C₈-C₁₈ alkyl, and R² is H. These amine oxides are illustrated by C₁₂₋₁₄ alkyldimethyl amine oxide, hexadecyl dimethylamine oxide, octadecylamine oxide.

- 5 A preferred amine oxide material is Lauryl dimethylamine oxide, also known as dodecyldimethylamine oxide or DDAO. Such an amine oxide material is commercially available from Huntsman under the trade name Empigen® OB.

- 10 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.

- Whereas in certain of the preferred embodiments R² is H, it is possible to have R² slightly larger than H. Specifically, R² may be CH₂OH, for example: hexadecylbis(2-
15 hydroxyethyl)amine oxide, tallowbis(2-hydroxyethyl)amine oxide, stearylbis(2-hydroxyethyl)amine oxide and oleylbis(2-hydroxyethyl)amine oxide.

Preferred amine oxides have the formula:

- 20 $O^- - N^+(Me)_2R^1 \quad (3)$

where R¹ is C₁₂₋₁₆ alkyl, preferably C₁₂₋₁₄ alkyl; Me is a methyl group.

Zwitterionic

- 25 Nonionic-free systems with up to 95 %wt LAS can be made provided that some zwitterionic surfactant, for example carbobetaine, is present. A preferred zwitterionic material is a carbobetaine available from Huntsman under the name Empigen® BB. Betaines and / or amine oxides, improve particulate soil detergency in the compositions.

30

Additional surfactants

Other surfactants than the preferred LAS, SLES, nonionic and amine oxide/ carbobetaine) may be added to the mixture of deterative surfactants. However cationic surfactants are preferably substantially absent.

Although less preferred, some alkyl sulphate surfactant (PAS) may be used, especially
5 the non-ethoxylated C₁₂₋₁₅ primary and secondary alkyl sulphates. A particularly preferred material, commercially available from BASF, is Sulfozon 1214G.

Hydrotrope

10 A hydrotrope is a solvent that is neither water nor conventional surfactant that aids the solubilisation of the surfactants and other components in the aqueous liquid to render it isotropic. Among suitable hydrotropes there may be mentioned as preferred: MPG (monopropylene glycol), glycerol, sodium cumene sulphonate, ethanol, other glycols, e.g. di propylene glycol, diethers and urea.

15

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

Lignin compounds:

25

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 plants, found mostly between cellular structures but also within the cells and in the cell walls.

30

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 subjected to a chemical reaction to attach chemical moieties to the lignin covalently. The attached chemical moieties are preferably randomly substituted.

- 20 -

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 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. 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.

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 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.

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.

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.

Fluorescent Agents:

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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 the composition is generally from 0.005 to 2 wt %, more preferably 0.01 to 0.5 wt %.

- 5 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, e.g. Blankophor SN.
- 10 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.
- 15 Bleach Catalyst:

- Compositions may comprise a weight efficient bleach system. Such systems typically do not utilise the conventional percarbonate and bleach activator approach. An air bleach catalyst system is preferred. Suitable complexes and organic molecule (ligand)
- 20 precursors for forming complexes are available to the skilled worker, for example, from: WO 98/39098; WO 98/39406, WO 97/48787, WO 00/29537; WO 00/52124, and WO00/60045, incorporated by reference. An example of a preferred catalyst is a transition metal complex of MeN4Py ligand (N,N-bis(pyridin-2-yl-methyl)-1-,1-bis(pyridin-2-yl)-1-aminoethane). Suitable bispidon catalyst materials and their action are described
 - 25 in WO02/48301. The bleach catalyst may be encapsulated to reduce interaction with other components of the liquid during storage.

- Photobleaches may also be employed. A "photobleach" is any chemical species that forms a reactive bleaching species on exposure to sunlight, and preferably is not
- 30 permanently consumed in the reaction. Preferred photo-bleaches include singlet oxygen photo-bleaches and radical photo-bleaches. Suitable singlet oxygen photo-bleaches may be selected from, water soluble phthalocyanine compounds, particularly metallated phthalocyanine compounds where the metal is Zn or Al-Z1 where Z1 is a halide, sulphate, nitrate, carboxylate, alkanolate or hydroxyl ion. Preferably the phthalocyanin has 1-4

- 22 -

SO₃X groups covalently bonded to it where X is an alkali metal or ammonium ion. Such compounds are described in WO2005/014769 (Ciba).

When present, the bleach catalyst is typically incorporated at a level of about 0.0001 to about 10wt%, preferably about 0.001 to about 5wt%.

5

Perfume

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

10

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.

15

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.

20

Further Optional Ingredients:

The compositions may contain one or more other ingredients. Such ingredients include viscosity modifiers, foam boosting agents, preservatives (e.g. bactericides), pH buffering agents, polyelectrolytes, anti-shrinking agents, anti-wrinkle agents, anti-oxidants, sunscreens, anti-corrosion agents, drape imparting agents, anti-static agents and ironing aids. The compositions may further comprise colorants, pearlisers and/or opacifiers, and shading dye.

30

Shading dyes

- 23 -

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.

5 Suitable and preferred classes of dyes are discussed below.

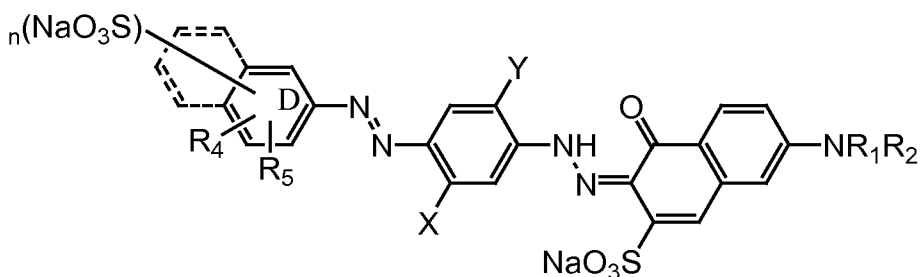
Direct Dyes:

10 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.

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

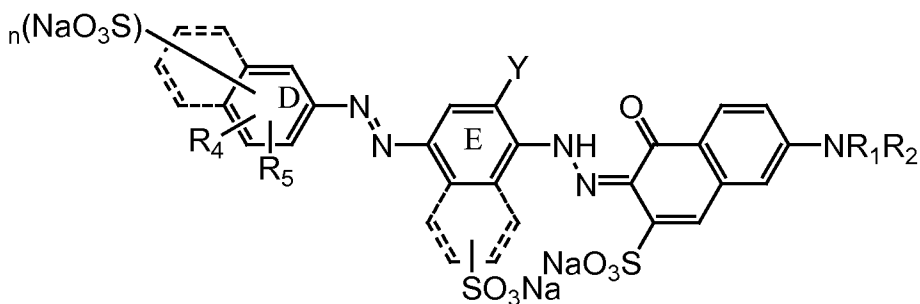
Most preferably, the direct dye is a direct violet of the following structures:

15



or

20



wherein:

- 24 -

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

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

5

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

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

10

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.

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.

15

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

20

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

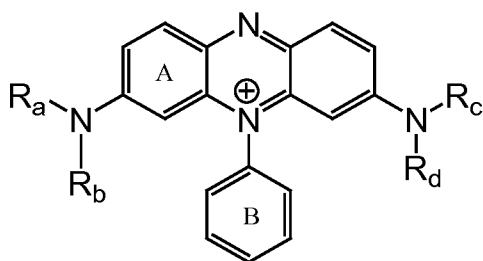
25 *Acid dyes:*

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

30

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

- 25 -



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;

5

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 .

10

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

15

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.

Hydrophobic dyes:

20

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.

25

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

30

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 used in composition that contain predominantly cationic
5 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,
10 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:

15 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 the link the dye to this
20 species. Dyes may be selected from the reactive violet and reactive blue dyes listed in the Colour Index International.

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

25

Dye conjugates:

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
30 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 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

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29, solvent violet 13, disperse violet 27 disperse violet 26, disperse violet 28, disperse violet 63, disperse violet 77 and mixtures thereof.

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

Buffers

- 10 The presence of some buffer is preferred for pH control; preferred buffers are MEA, and TEA. If present they are preferably used in the composition at levels of from 1 to 15 wt%.

External Structurants

- 15 The compositions may have their rheology 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.

20

Visual Cues

- The compositions may, and preferably do, comprise visual cues of solid material that is not dissolved in the composition. Preferably they are used in combination with an
25 external structurant to ensure that they remain in suspension. 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.
- 30 Preferably, the composition is dosed in individual units which contain from 15 to 30 ml of the composition.

In a second aspect there is provided the use of soil release polymer to reduce the irritancy in a composition which contains cleaning surfactant component, from 5 to 20

- 28 -

%wt water and at least one of polyethylene imine (or a derivative thereof) and enzyme. The second aspect may provide for the use of a soil release polymer as described herein for reducing eye and / or skin irritancy in a composition according to the first aspect.

EXAMPLES

Test formulations were made according to Table 1. The formulations are suitable for including in unit dose capsules.

5

These formulations were assessed following the OECD Guidelines for Testing of Chemicals, Test No. 438: Isolated Chicken Eye Test Method for Identifying Ocular Corrosives and Severe Irritants.

10 **Table 1**

Raw material	1	A	B
LAS acid	13.44	13.44	13.44
C12-15 Pareth-7	20.16	20.16	20.16
Fatty acid	14.00	14.00	14.00
Monoethanolamine (MEA)	6.90	6.90	6.90
SOKALAN HP20 (EPEI)	3.14	3.14	3.14
<i>Soil release polymer*</i>	<i>1.56</i>		<i>0.50</i>
Glycerin	2.87	5.10	3.98
Propylene glycol	21.87	21.87	21.87
Protease	2.74	2.74	2.74
Amylase	1.75	1.75	1.75
Perfume	2.02	2.02	2.02
dye	0.24	0.24	0.24
dye	1.37	1.37	1.37
dye	0.13	0.13	0.13
Sodium sulphite	0.20	0.20	0.20
Aqua	10.00	10.00	10.00
pH	8.7	8.7	8.7
classification	Eye Cat 2	Eye Cat 1	Eye Cat 1

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*Texcare SRN170 ex. Clariant

The results show a surprising reduction in irritancy for composition 1 comprising soil release polymer as compared to comparable compositions A and B.

CLAIMS

1. Laundry liquid composition comprising:
 - cleaning surfactant component,
 - 5 -from 5 to 20% wt. water,
 - soil release polymer, and
 - at least one of (i) polyethylene imine or derivative thereof and / or (ii) enzyme.
2. Composition according to claim 1 disposed within a water-soluble film.
- 10 3. Composition according to claim 1 or 2 wherein soil release polymer is present at from 0.5% wt. of the composition.
4. Composition according to claim 3 wherein soil release polymer is present at from 1%
15 wt. of the composition.
5. Composition according to any preceding claim, in which from 0.01 to 20% wt. of the composition comprises polyethylene imine or a derivative thereof.
- 20 6. Composition according to claim 5 wherein the composition contains an ethoxylated polyethyleneimine.
7. Composition according to any preceding claim which contains a polyester-based soil release polymer.
- 25 8. Composition according to any preceding claim which comprises enzyme selected from lipase, phospholipase, protease, cutinase, amylase, cellulose, (per)oxidase, pectate lyase, mannanase and mixtures thereof.
- 30 9. Composition according to claim 8 comprising at least two selected from lipase, phospholipase, protease, cutinase, amylase, cellulose, (per)oxidase, pectate lyase and mannanase.

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10. Composition according to any preceding claim comprising from 0.5 to 20% wt. sequestrant.

5 11. Composition according to any one of claims 2 to 10 which is disposed in a water-soluble film in an amount of from 15 to 30 ml.

10 12. Use of soil release polymer to reduce the irritancy of a composition which comprises cleaning surfactant component and 5 to 20% wt water and at least one component selected from polyethylene imine, derivatives of polyethylene imine and enzyme.

13. Use of a soil release polymer to reduce the irritancy of a composition as claimed in any one of claims 1 to 11.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/054945

A. CLASSIFICATION OF SUBJECT MATTER INV. C11D3/00 C11D3/20 C11D3/37 C11D3/386 C11D17/04 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) C11D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where 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	EP 0 576 777 A1 (PROCTER & GAMBLE [US]) 5 January 1994 (1994-01-05) claim 1; example 2	1,3, 7-10,12, 13
X	WO 2013/074589 A1 (STEPAN CO [US]) 23 May 2013 (2013-05-23) paragraphs [0065] - [0077]; claims 1,4,7,8	1-4, 8-10,12, 13
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Date of the actual completion of the international search 2 June 2016		Date of mailing of the international search report 09/06/2016
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Villányi Kelemen, K

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