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(54) Title: WHITENING COMPOSITION

(57) Abstract: The present invention provides a domestic laundry whitening and brightening composition comprising a charged surfactant, a negatively charged alkoxyated polyalkylphenol and a perfume.



WO 2016/041676 A1

WHITENING COMPOSITION

Field of Invention

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The present invention concerns the use of whitening and brightening laundry compositions.

Background of the Invention

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Maintaining and improving the whiteness and brightness of textiles during domestic laundry are desirable. A problem is the redeposition of soil removed from one garment onto another. The problem is exacerbated by the presence of human oils (sebum) on garments and in the wash which serves to enhance the deposition of soil in the wash. This process

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leads to an overall loss of whiteness and cleaning across the washing load. To ameliorate this problem, dispersing polymer such as an alkoxyated polyethylene imines have been widely added to washing detergents. Ethoxylated PEI (PEI = polyethylene imine) is known as an anti redeposition polymer from CA 121 0009. Certain Cellulase enzymes have also

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Novozymes describes in WO02/099091 and WO04/053039 cellulases for use in domestic laundry.

EP1321510 (Shipley) describes an industrial cleaning composition that contain an alkoxyated polyarylphenol for stripping organic chemical residues from photoresists that are used in the manufacture of semi-conductors and other electronic devices and circuits. The organic chemical residues are materials left over from the production process and include photoinitiators, thermoinitiators, acrylic and methacrylic monomers.

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Summary of the Invention

There is a need for further technologies to reduce redeposition and enhance cleaning in domestic laundry products.

- 2 -

We have found that negatively charged alkoxyated polyalkylphenols enhance whiteness and brightness of garments during domestic laundry.

In one aspect the present invention provides a laundry detergent composition comprising:

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(i) charged surfactant, preferably the level of charged surfactant is from 4 to 50 wt%, more preferably 6 to 30 wt%, most preferably 8 to 20 wt%;

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(ii) negatively charged alkoxyated polyalkylphenol, preferably at a level of from 0.1 to 20 wt%, more preferably 0.5 to 10wt%, most preferably 2 to 9 wt%; and.

(iii) perfume, preferably 0.05 to 0.5 wt% perfume.

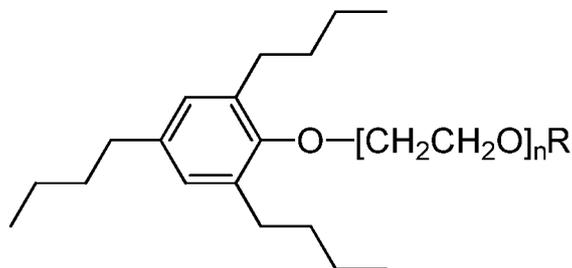
In another aspect the present invention provides a laundry detergent composition

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(i) from 4 to 50 wt%, preferably 6 to 30 wt%, more preferably 8 to 20 wt%, of anionic surfactant selected from: linear alkyl benzene sulphonates; alkyl sulphates; alkyl ether sulphates; and mixtures thereof.

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(ii) from 0.5 to 10 wt%, preferably 2 to 9 wt%, of negatively charged alkoxyated polyalkylphenol of the following structure:



25

wherein R is selected from SO_3^- ; COO^- ; and, PO_3^{2-} , preferably selected from selected from: SO_3^- ; and, COO^- ;

- 3 -

wherein n is selected from: 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 20; 21; 22; 23; 24; 25; 26; 27; 28; 29; 30; 31; 32; 33; 34; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 46; 47; 48; 49; and, 50; and,

- 5 (iii) perfume, preferably 0.05 to 0.5 wt% perfume.

In a further aspect the present invention provides a domestic method of treating a textile, the method comprising the steps of:

- 10 (i) treating a textile with an aqueous solution of the negatively charged alkoxyated polyalkylphenols, the aqueous solution comprising from 10 ppm to 5000 ppm of the negatively charged alkoxyated polyalkylphenol; and, from 0.0 g/L to 6 g/L, preferably 0.2 to 4 g/L, of one or more surfactants; and,
- 15 (ii) optionally rinsing and drying the textile.

In the method the level of the perfume in the aqueous solution is preferably from 0.1 to 100 ppm, more preferably 1 to 10 ppm.

- 20 In the method aspects of the present invention the surfactant used is preferably as preferred for the composition aspects of the present invention.

The textile is preferably an item of clothing, bedding or table cloth. Preferred items of clothing are cotton containing shirts, trousers, underwear and jumpers.

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Detailed Description of the Invention

Alkoxyated polyalkylphenol

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Preferably the negatively charged alkoxyated polyalkylphenolis an negatively charged alkoxyated trialkylphenol, most preferably alkoxyated tri(n-butyl)phenol.

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Preferably the negatively charged alkoxyated trialkylphenol is a negatively charged polyethylene glycol mono(2,4,6-tris(n-butyl)phenyl) ether.

Preferably the negatively charged alkoxyated polyalkylphenol contains an average of 2 to 70 alkoxy groups, most preferably 6 to 50 alkoxy groups.

Preferably the alkoxylation is ethoxylation.

The alkyl group in the alkoxyated polyalkylphenol is preferably selected from, linear or branched C3 to C15 alkyl groups.

Preferably the negatively charged alkoxyated polyalkylphenol has 3 alkyl groups attached to the phenol. Preferably they are in the 2,4,6 position on the phenol. The alkoxyate is attached to the 1 position.

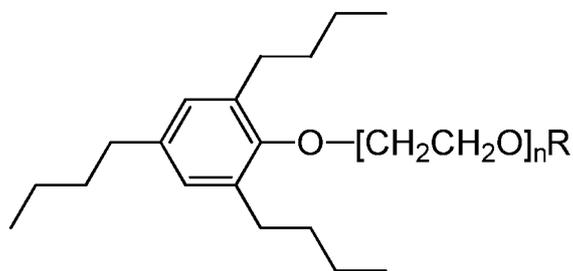
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Preferably the alkoxyate is capped by a negatively charged group selected from SO_3^- , COO^- , and PO_3^{2-} , preferably selected from SO_3^- and COO^- .

The alkyl group in the alkoxyated polyalkylphenol is preferably selected from, linear or branched C3 to C15 alkyl groups.

20

Most preferably the alkoxyated polyethylene glycol mono(2,4,6-tris(n-butyl)phenyl) is a negatively charged alkoxyated polyalkylphenol of the following structure:



25

wherein R is selected from SO_3^- , COO^- and PO_3^{2-} , preferably selected from SO_3^- and COO^- , most preferably SO_3^- .

- 5 -

Preferably $n = 2$ to 70, more preferably $n = 6$ to 50, even more preferably 6 to 18,

The designation n is the average numbers of moles of alkoxy units in the polyalkoxy chain.

- 5 Compounds are available from industrial suppliers, for example Rhodia, Clariant; Aoki Oil; Stepan; TOHO Chemical Industry Co.

In the context of the current invention the negatively charged alkoxyated polyalkylphenol is not considered a surfactant and does not contribute numerically to the surfactant as defined
10 herein.

Surfactant

The laundry composition comprises charged surfactant and it is most preferred that
15 the charged surfactant is anionic surfactant (which includes a mixture of the same).

Suitable anionic detergent compounds which may be used are usually water-soluble alkali metal salts of organic sulphates and sulphonates having alkyl radicals containing from about 8 to about 22 carbon atoms, the term alkyl being used to
20 include the alkyl portion of higher alkyl radicals.

Examples of suitable synthetic anionic detergent compounds are sodium and potassium alkyl sulphates, especially those obtained by sulphating higher Cs to Cie alcohols, produced for example from tallow or coconut oil, sodium and potassium
25 alkyl C₉ to C₂₀ benzene sulphonates, particularly sodium linear secondary alkyl C₁₀ to C₁₅ benzene sulphonates; and sodium alkyl glyceryl ether sulphates, especially those ethers of the higher alcohols derived from tallow or coconut oil and synthetic alcohols derived from petroleum.

30 The anionic surfactant is preferably selected from: linear alkyl benzene sulphonate; alkyl sulphates; alkyl ether sulphates; soaps; alkyl (preferably methyl) ester sulphonates, and mixtures thereof.

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The most preferred anionic surfactants are selected from: linear alkyl benzene sulphonate; alkyl sulphates; alkyl ether sulphates and mixtures thereof. Preferably the alkyl ether sulphate is a C12-C14 n-alkyl ether sulphate with an average of 1 to 3EO (ethoxylate) units. Sodium lauryl ether sulphate is particularly preferred (SLES). Preferably the linear alkyl benzene sulphonate is a sodium C 11 to C15 alkyl benzene sulphonates. Preferably the alkyl sulphates is a linear or branched sodium C12 to C18 alkyl sulphates. Sodium dodecyl sulphate is particularly preferred, (SDS, also known as primary alkyl sulphate).

5 The level of anionic surfactant in the laundry composition is preferably from 4 to 50 wt%, more preferably 6 to 30 wt%, and most preferably 8 to 20 wt%.

Preferably two or more anionic surfactant are present, for example linear alkyl benzene sulphonate together with an alkyl ether sulphate.

15

Preferably the laundry composition in addition to the anionic surfactant comprises alkyl ethoxylated non-ionic surfactant, preferably from 2 to 8 wt% of alkyl alkoxyated, preferably ethoxylated, non-ionic surfactant.

20 Suitable nonionic detergent compounds which may be used include, in particular, the reaction products of compounds having an aliphatic hydrophobic group and a reactive hydrogen atom, for example, aliphatic alcohols, acids or amides, especially ethylene oxide either alone or with propylene oxide. Specific nonionic detergent compounds are the condensation products of aliphatic C_s to C₁₈ primary or
25 secondary linear or branched alcohols with ethylene oxide.

Preferably the alkyl ethoxylated non-ionic surfactant is a C_s to C₁₈ primary alcohol with an average ethoxylation of 7EO to 9EO units.

30 The nonionic and anionic surfactants of the surfactant system may be chosen from the surfactants described "Surface Active Agents" Vol. 1, by Schwartz & Perry,

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

5

Preferably the surfactants used are saturated.

Also applicable are surfactants such as those described in EP-A-328 177 (Unilever), which show resistance to salting-out, the alkyl polyglycoside surfactants described in EP-A-070 074, and alkyl monoglycosides.

10

In another aspect the charged surfactant may be a cationic such that the formulation is a fabric conditioner. The detergent compositions based on anionic or anionic/non-ionic surfactants is however the more preferred embodiment.

15

Cationic Compound

When the present invention is used as a fabric conditioner it needs to contain a cationic compound.

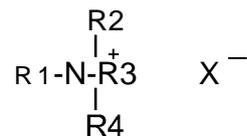
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Most preferred are quaternary ammonium compounds.

It is advantageous if the quaternary ammonium compound is a quaternary ammonium compound having at least one C₁₂ to C₂₂ alkyl chain.

25

It is preferred if the quaternary ammonium compound has the following formula:



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in which R¹ is a C₁₂ to C₂₂ alkyl or alkenyl chain; R², R³ and R⁴ are independently selected from C_i to C₄ alkyl chains and X⁻ is a compatible anion. A preferred compound of this type is the quaternary ammonium compound cetyl trimethyl quaternary ammonium bromide.

- 5 A second class of materials for use with the present invention are the quaternary ammonium of the above structure in which R¹ and R² are independently selected from C₁₂ to C₂₂ alkyl or alkenyl chain; R³ and R⁴ are independently selected from C_i to C₄ alkyl chains and X⁻ is a compatible anion.
- 10 The composition optionally comprises a silicone.

Builders or Complexing Agents

- 15 Builder materials may be selected from 1) calcium sequestrant materials, 2) precipitating materials, 3) calcium ion-exchange materials and 4) mixtures thereof.

Examples of calcium sequestrant builder materials include alkali metal polyphosphates, such as sodium tripolyphosphate and organic sequestrants, such as ethylene diamine tetra-acetic acid.

20

Examples of precipitating builder materials include sodium orthophosphate and sodium carbonate.

- 25 Examples of calcium ion-exchange builder materials include the various types of water-insoluble crystalline or amorphous aluminosilicates, of which zeolites are the well known representatives, e.g. zeolite A, zeolite B (also known as zeolite P), zeolite C, zeolite X, zeolite Y and also the zeolite P-type as described in EP-A-0,384,070.

- 30 The composition may also contain 0-65 % of a builder or complexing agent such as ethylenediaminetetraacetic acid, diethylenetriamine-pentaacetic acid, alkyl- or alkenylsuccinic acid, nitrilotriacetic acid or the other builders mentioned below. Many builders are also bleach-stabilising agents by virtue of their ability to complex metal ions.

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Zeolite and carbonate (carbonate (including bicarbonate and sesquicarbonate) are preferred builders with carbonates being particularly preferred.

5 The composition may contain as builder a crystalline aluminosilicate, preferably an alkali metal aluminosilicate, more preferably a sodium aluminosilicate. This is typically present at a level of less than 15%w. Aluminosilicates are materials having the general formula:



10 where M is a monovalent cation, preferably sodium. These materials contain some bound water and are required to have a calcium ion exchange capacity of at least 50 mg CaO/g. The preferred sodium aluminosilicates contain 1.5-3.5 SiO₂ units in the formula above. They can be prepared readily by reaction between sodium silicate and sodium aluminate, as amply described in the literature. The ratio of surfactants to
15 aluminosilicate (where present) is preferably greater than 5:2, more preferably greater than 3:1.

Alternatively, or additionally to the aluminosilicate builders, phosphate builders may be used. In this art the term 'phosphate' embraces diphosphate, triphosphate, and
20 phosphonate species. Other forms of builder include silicates, such as soluble silicates, metasilicates, layered silicates (e.g. SKS-6 from Hoechst).

Preferably the laundry detergent formulation is a non-phosphate built laundry detergent formulation, i.e., contains less than 1 wt% of phosphate. Preferably
25 powder laundry detergent formulations are predominantly carbonate built. Powders, should preferably give an in use pH of 9.5-11.

Most preferably the laundry detergent is an aqueous liquid laundry detergent, preferably with a pH of from 7 to 9.

30

In the aqueous liquid laundry detergent it is preferred that mono propylene glycol is present at a level from 1 to 30 wt%, most preferably 2 to 18 wt%, to provide the formulation with appropriate, pourable viscosity.

Fluorescent Agent

The composition preferably comprises a fluorescent agent (optical brightener). Fluorescent agents are well known and many such fluorescent agents are available commercially.

- 5 Usually, these fluorescent agents are supplied and used in the form of their alkali metal salts, for example, the sodium salts.

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
10 and Blankophor (Trade Mark) HRH, and Pyrazoline compounds, e.g. Blankophor SN.

Preferred fluorescers are: sodium 2 (4-styryl-3-sulphophenyl)-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'-disulphonate, disodium 4,4'-bis[[4-anilino-6-morpholino-1,3,5-triazin-2-yl]amino]stilbene-2-2'-disulphonate, and disodium 4,4'-bis(2-sulphostyryl)biphenyl.
15

Perfume

20 The composition comprises a perfume. The perfume is preferably in the range from 0.001 to 3 wt %, more preferably 0.05 to 0.5wt%, most preferably 0.1 to 1 wt %. Many suitable examples of perfumes are provided in the CTFA (Cosmetic, Toiletry and Fragrance Association) 1992 International Buyers Guide, published by CFTA Publications and OPD 1993 Chemicals Buyers Directory 80th Annual Edition, published by Schnell Publishing Co.

25

Preferably the perfume comprises at least one note (compound) from: alpha-isomethyl ionone, benzyl salicylate; citronellol; coumarin; hexyl cinnamal; linalool; pentanoic acid, 2-methyl-, ethyl ester; octanal; benzyl acetate; 1,6-octadien-3-ol, 3,7-dimethyl-, 3-acetate; cyclohexanol, 2-(1,1-dimethylethyl)-, 1-acetate; delta-damascone; beta-ionone; verdyl acetate; dodecanal; hexyl cinnamic aldehyde; cyclopentadecanolate; benzeneacetic acid,
30 2-phenylethyl ester; amyl salicylate; beta-caryophyllene; ethyl undecylenate; geranyl anthranilate; alpha-irone; beta-phenyl ethyl benzoate; alpa-santalol; cedrol; cedryl acetate; cedryl formate; cyclohexyl salicylate; gamma-dodecalactone; and, beta phenylethyl phenyl acetate.

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Useful components of the perfume include materials of both natural and synthetic origin. They include single compounds and mixtures. Specific examples of such components may be found in the current literature, e.g., in Fenaroli's Handbook of Flavor Ingredients, 1975, CRC Press; Synthetic Food Adjuncts, 1947 by M. B. Jacobs, edited by
5 Van Nostrand; or Perfume and Flavor Chemicals by S. Arctander 1969, Montclair, N.J. (USA).

It is commonplace for a plurality of perfume components to be present in a formulation. In the compositions of the present invention it is envisaged that there will be four or more,
10 preferably five or more, more preferably six or more or even seven or more different perfume components.

In perfume mixtures preferably 15 to 25 wt% are top notes. Top notes are defined by Poucher (Journal of the Society of Cosmetic Chemists 6(2):80 [1955]). Preferred top-notes
15 are selected from citrus oils, linalool, linalyl acetate, lavender, dihydromyrcenol, rose oxide and cis-3-hexanol.

The International Fragrance Association has published a list of fragrance ingredients (perfums) in 2011. (<http://www.ifra.org/en-us/ingredients#.U7Z4hPldWzk>)
20

The Research Institute for Fragrance Materials provides a database of perfumes (fragrances) with safety information.

Perfume top note may be used to cue the whiteness and brightness benefit of the
25 invention.

Some or all of the perfume may be encapsulated, typical perfume components which it is advantageous to encapsulate, include those with a relatively low boiling point, preferably those with a boiling point of less than 300, preferably 100-250 Celsius. It is also
30 advantageous to encapsulate perfume components which have a low CLog P (ie. those which will have a greater tendency to be partitioned into water), preferably with a CLog P of less than 3.0. These materials, of relatively low boiling point and relatively low CLog P have been called the "delayed blooming" perfume ingredients and include one or more of the following materials:

allyl caproate, amyl acetate, amyl propionate, anisic aldehyde, anisole,
benzaldehyde, benzyl acetate, benzyl acetone, benzyl alcohol, benzyl formate,
benzyl iso valerate, benzyl propionate, beta gamma hexenol, camphor gum, laevo-
carvone, d-carvone, cinnamic alcohol, cinamyl formate, cis-jasmone, cis-3-hexenyl
5 acetate, cuminic alcohol, cyclal c, dimethyl benzyl carbinol, dimethyl benzyl carbinol
acetate, ethyl acetate, ethyl aceto acetate, ethyl amyl ketone, ethyl benzoate, ethyl
butyrate, ethyl hexyl ketone, ethyl phenyl acetate, eucalyptol, eugenol, fenchyl
acetate, flor acetate (tricyclo decenyl acetate) , frutene (tricyclo decenyl
propionate) , geraniol, hexenol, hexenyl acetate, hexyl acetate, hexyl formate,
10 hydratropic alcohol, hydroxycitronellal, indone, isoamyl alcohol, iso menthone,
isopulegyl acetate, isoquinolone, ligustral, linalool, linalool oxide, linalyl formate,
menthone, menthyl acetphenone, methyl amyl ketone, methyl anthranilate, methyl
benzoate, methyl benyl acetate, methyl eugenol, methyl heptenone, methyl heptine
carbonate, methyl heptyl ketone, methyl hexyl ketone, methyl phenyl carbiny
15 acetate, methyl salicylate, methyl-n-methyl anthranilate, nerol, octalactone, octyl
alcohol, p-cresol, p-cresol methyl ether, p-methoxy acetophenone, p-methyl
acetophenone, phenoxy ethanol, phenyl acetaldehyde, phenyl ethyl acetate, phenyl
ethyl alcohol, phenyl ethyl dimethyl carbinol, prenyl acetate, propyl bornate,
pulegone, rose oxide, safrole, 4-terpinenol, alpha-terpinenol, and /or viridine. It is
20 commonplace for a plurality of perfume components to be present in a formulation. In the
compositions of the present invention it is envisaged that there will be four or more,
preferably five or more, more preferably six or more or even seven or more different
perfume components from the list given of delayed blooming perfumes given above present
in the perfume.

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Another group of perfumes with which the present invention can be applied are the so-
called 'aromatherapy' materials. These include many components also used in perfumery,
including components of essential oils such as Clary Sage, Eucalyptus, Geranium,
Lavender, Mace Extract, Neroli, Nutmeg, Spearmint, Sweet Violet Leaf and Valerian.

30

It is preferred that the laundry treatment composition does not contain a peroxygen bleach,
e.g., sodium percarbonate, sodium perborate, and peracid.

Polymers

The composition may comprise one or more further polymers. Examples are carboxymethylcellulose, poly (ethylene glycol), poly(vinyl alcohol), polycarboxylates such
5 as polyacrylates, maleic/acrylic acid copolymers and lauryl methacrylate/acrylic acid copolymers.

Polymers present to prevent dye deposition may be present, for example poly(vinylpyrrolidone), poly(vinylpyridine-N-oxide), and poly(vinylimidazole).

10

Enzymes

One or more enzymes are preferred present in a laundry composition of the invention and when practicing a method of the invention.

15

Preferably the level of each enzyme in the laundry composition of the invention is from 0.0001 wt% to 0.1 wt% protein.

The enzyme is preferably selected from: proteases; lipases; and, cellulases, more
20 preferably a protease.

Especially contemplated enzymes include proteases, alpha-amylases, cellulases, lipases, peroxidases/oxidases, pectate lyases, and mannanases, or mixtures thereof.

Suitable lipases include those of bacterial or fungal origin. Chemically modified or protein
25 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 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
30 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* (WO 91/16422).

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Other examples are lipase variants such as 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, WO 00/60063.

5

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

10 The method of the invention may be carried out in the presence of phospholipase classified as EC 3.1 .1.4 and/or EC 3.1 .1.32. As used herein, the term phospholipase is an enzyme which has activity towards phospholipids.

15 Phospholipids, such as 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 20 B) which can hydrolyze the remaining fatty acyl group in lysophospholipid. Phospholipase C and phospholipase D (phosphodiesterases) release diacyl glycerol or phosphatidic acid respectively.

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™, Duralase™, Dyrazym™, Esperase™, Everlase™, Polarzyme™, and Kannase™, (Novozymes A/S), Maxatase™, Maxacal™, Maxapem™, 30 Properase™, Purafect™, Purafect OxP™, FN2™, and FN3™ (Genencor International Inc.).

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The method of the invention may be carried out in the presence of cutinase. classified in EC 3.1.1.74. The cutinase used according to the invention may be of any origin. Preferably cutinases are of microbial origin, in particular of bacterial, of fungal or of yeast origin.

5 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
10 Duramyl™, Termamyl™, Termamyl Ultra™, Natalase™, Stainzyme™, Fungamyl™ and BAN™ (Novozymes A/S), Rapidase™ and Purastar™ (from Genencor International Inc.).

Suitable cellulases include those of bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Suitable cellulases include cellulases from the
15 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. Commercially available cellulases include Celluzyme™, Carezyme™, Celluclean™,
20 Endolase™, Renozyme™ (Novozymes A/S), Clazinase™ and Puradax HA™ (Genencor International Inc.), and KAC-500(B)™ (Kao Corporation). Celluclean™ is preferred.

Suitable peroxidases/oxidases include those of plant, bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Examples of useful peroxidases
25 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).

Further enzymes suitable for use are discussed in WO2009/087524, WO2009/090576,
30 WO2009/1 07091, WO2009/1 11258 and WO2009/1 48983.

Enzyme Stabilizers

Any enzyme present in the composition may be stabilized using conventional stabilizing agents, e.g., a polyol such as 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 such as 4-formylphenyl boronic acid, and the composition may be formulated as described in e.g. WO 92/19709 and WO 92/19708.

10 Where alkyl groups are sufficiently long to form branched or cyclic chains, the alkyl groups encompass branched, cyclic and linear alkyl chains. The alkyl groups are preferably linear or branched, most preferably linear.

15 The indefinite article "a" or "an" and its corresponding definite article "the" as used herein means at least one, or one or more, unless specified otherwise.

Experimental**20 Example 1**

An aqueous liquid laundry detergent was prepared of the following formulation:

Ingredient	Weight%
Mono propylene glycol	2
triethylamine	1.5
C12-C15 alcohol ethoxylate with 7 moles of ethylene oxide	2.1
Linear alkyl benzene sulfonate	8.4
Sodium laureth ether sulphate with 3 moles of ethylene oxide	10.5
Citric acid	0.5
perfume	0.3
Anti-redeposition technology	See text
Sodium Hydroxide	To pH=8.4
Water	balance

25 The formulation was used to wash eight 5 x 5cm knitted cotton cloth pieces in a tergotometer set at 200rpm. A one hour wash was conducted in 800ml of 6° French Hard water at 20°C, with 2.3 g/L of the formulation. To simulate particulate soil 0.04g/L of 100%

compressed carbon black (ex Sigma-Aldrich) was added to the wash liquor. To simulate oily soil (6.3 g) of an SBL2004 soil strip (ex Warwick Equest) was added to the wash liquor.

- 5 Once the wash had been completed the cotton monitors were removed and dried and the reflectance measured on a reflectometer. The greyness was assessed from the reflectance value at 740nm, R_{740} , (UV-excluded).

10 Formulations were tested containing 8.7wt% Sokalan HP20 (BASF), an ethoxylated polyethylene imine polymer PEI(600) 20EO, as a comparison polymer for anti-redeposition benefits.

Formulation were tested containing 8.7wt% negatively charged Alkoxyated polyalkylphenol (Hostapal BV CONC ex Clariant which is 2,4,6-tributyl phenol ether sulphate with 7 EO).

15

The results are summarised in the table below. The 95% confidence limits are also given calculated from the standard deviation on the measurements from the 8 monitors. The R_{740} value is the mean of the measurements from the 8 monitors.

20

sample	Results	
	R_{740}	95%
Control	55.1	0.5
Sokalan HP20 (reference)	54.8	0.3
Hostapal BV CONC (ex Clariant) inventive (tributyl phenol ether sulphate sodium salt)	57.9	0.7

25 The tributyl phenol ether sulphate sodium salt increased the R_{740} of the monitors. High R_{740} values equate to a cleaner whiter fabrics. The alkoxyated polyalkylphenol provides significantly better benefits than the ethoxylated polyethyleneimine, Sokalan HP20, which under current condition provided no significant benefit.

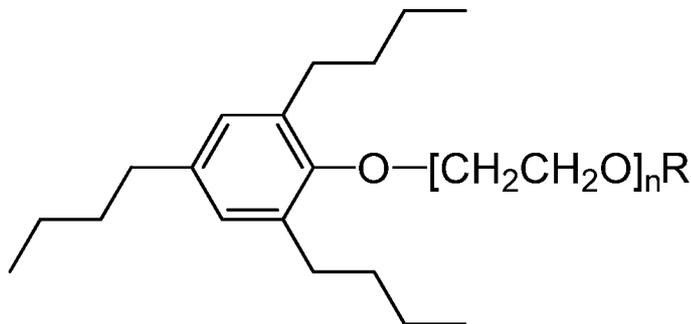
CLAIMS

1. A laundry detergent composition comprising:
 - 5 (i) from 4 to 50 wt% of a charged surfactant,
 - (ii) from 0.1 to 20 wt% of a negatively charged alkoxyated polyalkylphenol; and,
 - 10 (iii) from 0.001 to 3 wt % of a perfume.
2. A laundry detergent composition according to claim 1, wherein the negatively charged alkoxyated polyalkylphenol is negatively alkoxyated tri(n-butyl)phenol.
3. A laundry detergent composition according to claim 1, wherein the negatively charged alkoxyated polyalkylphenol is negatively charged ethoxyated polyalkylphenol.
15
4. A laundry detergent composition according to claim 2, wherein the negatively charged alkoxyated trialkylphenol is negatively charged polyethylene glycol mono(2, 4,6-tris(n-butyl)phenyl) ether.
20
5. A laundry detergent composition according to any one of claim 1 to 4, wherein the negatively charged alkoxyated polyalkylphenol contains an average of 2 to 70 alkoxy groups.
25
6. A laundry detergent composition according to claim 5, wherein the negatively charged alkoxyated polyalkylphenol contains an average of 6 to 18 alkoxy groups.
7. A laundry detergent composition according to any one of the preceding claims, wherein negatively charged alkoxyated polyalkylphenol is present at a level of from 30 0.5 to 10 wt%, most preferably 2 to 9 wt%.
8. A laundry detergent composition according to any one of the preceding claims, wherein the charged surfactant is an anionic surfactant.

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9. A laundry detergent composition according to claim 8, wherein the anionic surfactant is selected from: linear alkyl benzene sulphonate; alkyl sulphates; alkyl ether sulphates; soaps; methyl ester sulphonates and mixtures thereof.
- 5 10. A laundry detergent composition according to claim 9, wherein the anionic surfactant is selected from: linear alkyl benzene sulphonate; alkyl sulphates; alkyl ether sulphates and mixtures thereof.
11. A laundry detergent composition according to any one of the preceding claims,
10 wherein the level of anionic surfactant is from 4 to 50 wt%.
12. A laundry detergent composition according to any one of the preceding claims,
wherein the composition comprises from 2 to 8 wt% of alkyl ethoxylated non-ionic
surfactant.
- 15 13. A laundry detergent composition according to any one of the preceding claims,
wherein perfume is present from 0.001 to 3 wt% and comprises one or more note
(compound) from: alpha-isomethyl ionone, benzyl salicylate; citronellol; coumarin;
hexyl cinnamal; linalool; pentanoic acid, 2-methyl-, ethyl ester; octanal; benzyl
20 acetate; 1,6-octadien-3-ol, 3,7-dimethyl-, 3-acetate; cyclohexanol, 2-(1,1-
dimethylethyl)-, 1-acetate; delta-damascone; beta-ionone; verdyl acetate; dodecanal;
hexyl cinnamic aldehyde; cyclopentadecanolide; benzeneacetic acid, 2-phenylethyl
ester; amyl salicylate; beta-caryophyllene; ethyl undecylenate; geranyl anthranilate;
alpha-irone; beta-phenyl ethyl benzoate; alpa-santalol; cedrol; cedryl acetate; cedryl
25 formate; cyclohexyl salicylate; gamma-dodecalactone; and, beta phenylethyl phenyl
acetate.
14. A laundry detergent composition according to claim 1 comprising:
- 30 (i) from 4 to 50 wt% of an anionic surfactant is selected from: linear alkyl benzene
sulphonate; alkyl sulphate; and, alkyl ether sulphate,
- (ii) from 0.5 to 10 wt% of an negatively charged alkoxyated alkoxyated
polyalkylphenol of the following structure:

- 20 -



wherein R is selected from SO_3^- , COO^- and PO_3^{2-} , and, wherein n is selected from: 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 20; 21; 22; 23; 24; 25; 26; 27; 28; 29; 30; 31; 32; 33; 34; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 46; 47; 48; 49; and 50; and,

5

(iii) perfume.

- 10 15. A laundry detergent composition according to any one of the preceding claims, wherein the composition comprises from 0.0001 wt% to 0.1 wt% protein of an enzyme selected from: proteases; lipases; cellulases; and, mixtures thereof, preferably comprising a protease.
- 15 16. A laundry detergent composition according to any one of the preceding claims, wherein the laundry detergent composition is a laundry aqueous liquid detergent composition.
- 20 17. A domestic method of treating a textile, the method comprising the steps of:
- (i) treating said textile with an aqueous solution of a laundry detergent composition as defined in any one of claims 1 to 16, said aqueous solution comprising from 10 ppm to 5000 ppm of negatively charged alkoxyated polyalkylphenol; and, up to 6 g/L of a surfactant; and,
- 25 (ii) optionally rinsing and drying said textile.

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18. A domestic method of treating a textile according to claim 17, wherein the aqueous solution comprises from 0.2 to 4 g/L of a surfactant.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/067274

A. CLASSIFICATION OF SUBJECT MATTER					
INV.	CIIDI/37	CIIDI/83	C11D3/00	C11D3/37	C11D3/50
	CIIDI/00				
ADD.	CIIDI/06	CIIDI/29	CIIDI/34	CIIDI/14	CIIDI/22
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) C1D	
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, CHEM ABS 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 2013/011071 AI (UNI LEVER PLC [GB] ; UNI LEVER NV [NL] ; UNI LEVER HINDUSTAN [IN]) 24 January 2013 (2013-01-24)	1-3 , 5-13 , 15-18
Y	page 1, line 22 - page 2, line 14 page 2, line 27 - page 3, line 6 page 11, line 9 - page 12, line 12 page 14, lines 24-29 examples claims	1-3 , 5-13 , 15-18
Y	US 2005/107281 AI (DAHLMANN UWE [DE] ET AL) 19 May 2005 (2005-05-19) paragraphs [0001] , [0009] - [0016] examples claims	1-3 , 5-13 , 15-18
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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	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 2 November 2015	Date of mailing of the international search report 11/11/2015
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 Bertran Nadal , Josep

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2015/067274

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	FR 1 313 944 A (GEN ANILINE & FILM CORP) 4 January 1963 (1963-01-04)	1-3 , 5-13 , 15-18
A	page 4; examples 11, 13 page 5, left-hand column, paragraph 3 -----	4, 14
A	US 2004/087458 AI (IKEBATA KAZU [US]) 6 May 2004 (2004-05-06) paragraphs [0007] , [0008] example 1 claims -----	1-18
A	CA 1 210 009 AI (PROCTER & GAMBLE) 19 August 1986 (1986-08-19) cited in the application page 1, lines 6-8 page 3, lines 28-30 page 6, line 24 - page 7, line 3 page 41, lines 18-26 -----	1-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/EP2015/067274
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			CN 103857781 A 11-06-2014
			EP 2734610 AI 28-05-2014
			Wo 2013011071 AI 24-01-2013

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			EP 1538140 AI 08-06 -2005
			ES 2319523 T3 08-05 -2009
			JP 2005145970 A 09-06 -2005
			US 2005107281 AI 19-05 -2005

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			US 2005215444 AI 29-09 -2005

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