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(54) **WHITENING COMPOSITION**

BLEICHUNGSZUSAMMENSETZUNG

COMPOSITION DE BLANCHIMENT

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**WO-A1-2013/011071 CA-A1- 1 210 009**  
**US-A1- 2004 087 458 US-A1- 2005 107 281**

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**Description**

**Field of Invention**

5 **[0001]** The present invention concerns the use of whitening and brightening laundry compositions.

**Background of the Invention**

10 **[0002]** 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 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. Ethoxyated PEI (PEI = polyethylene imine) is known as an anti redeposition polymer from CA 121 0009. Certain Cellulase enzymes have also been used to prevent redeposition by altering the surface properties of cotton fabrics. Novozymes describes in WO02/099091 and WO04/053039 cellulases for use in domestic laundry.

15 **[0003]** 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.

20 **[0004]** WO 2013/011071 A1 discloses a liquid laundry detergent composition comprising a blue or violet shading dye, surfactant and a sulphonated aromatic formaldehyde polycondensate for improved whitening or ameliorating greying of textiles during laundering.

25 **[0005]** US 2005/107281 A1 discloses ether carboxylic acids based on alkoxyated styrylphenols and to their use as surface-active additives.

**Summary of the Invention**

30 **[0006]** There is a need for further technologies to reduce redeposition and enhance cleaning in domestic laundry products.

**[0007]** We have found that negatively charged alkoxyated polyarylphenols enhance whiteness and brightness of garments during domestic laundry.

**[0008]** In one aspect the present invention provides a laundry detergent composition comprising:

35 (i) from 4 to 50 wt% of a charged surfactant, preferably 6 to 30 wt%, most preferably 8 to 20 wt%;

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

40 (iii) from 0.001 to 3 wt% of a perfume, preferably 0.05 to 0.5 wt% perfume, wherein the negatively charged alkoxyated polyarylphenol is not considered a surfactant and does not contribute numerically to the surfactant.

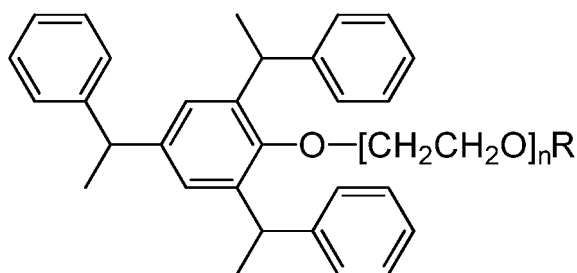
**[0009]** In a preferred embodiment the present invention provides a laundry detergent composition comprising:

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

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

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wherein R is selected: from  $\text{SO}_3^-$ ;  $\text{COO}^-$ ; and,  $\text{PO}_3^{2-}$ , preferably selected from:  $\text{SO}_3^-$ ; and,  $\text{COO}^-$ , wherein n is selected from: 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; 50; 51; 52; 53; and, 54; and

15 (iii) from 0.001 to 3 wt% of a perfume, preferably from 0.05 to 0.5 wt% perfume.

**[0010]** In a further aspect the present invention provides a domestic method of treating a textile, the method comprising the steps of:

20 (i) treating a textile with an aqueous solution of the laundry detergent composition, the aqueous solution comprising from 10 ppm to 5000 ppm of the negatively charged alkoxyated polyarylphenol; and, up to 6 g/L, preferably 0.2 to 4 g/L, of a surfactant; and,

25 (ii) optionally rinsing and drying the textile.

**[0011]** In the method the level of the perfume in the aqueous solution is preferably from 0.1 to 100 ppm, more preferably from 1 to 10 ppm.

**[0012]** In the method aspects of the present invention the surfactant used is preferably as preferred for the composition aspects of the present invention.

30 **[0013]** The textile is preferably an item of clothing, bedding or table cloth. Preferred items of clothing are cotton containing shirts, trousers, underwear and jumpers.

### Detailed Description of the Invention

#### Alkoxyated polyarylphenol

35 **[0014]** Preferably the negatively charged alkoxyated polyarylphenol is an alkoxyated tristyrylphenol.

**[0015]** Preferably the negatively charged alkoxyated tristyrylphenol is a polyethylene glycol mono(2,4,6-tris(1-phenylethyl)phenyl) ether derivative. Preferably the alkoxyated polyarylphenol contains an average of 2 to 70 alkoxy groups, most preferably 10 to 54 alkoxy groups.

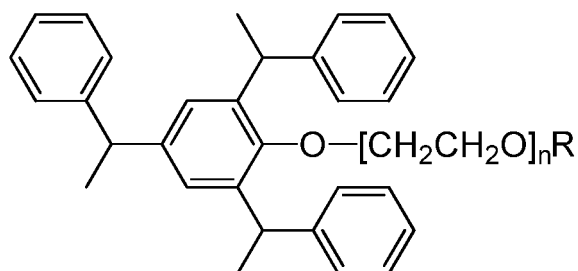
40 **[0016]** Preferably the alkoxylation is ethoxylation.

**[0017]** Preferably the negatively charged alkoxyated polyarylphenol has 2 or 3 aryl groups attached to the phenol. Preferably they are in the 2,4 or 2,4,6 position on the phenol. The alkoxyate is attached to the 1 position. Preferably the alkoxyate is capped by a negatively charged group.

45 **[0018]** Preferably the charged groups have sodium or potassium as a counter ion.

**[0019]** The aryl group in the negatively charged alkoxyated polyarylphenol is preferably selected from, phenyl, tolyl, naphthyl, tetrahydronaphthyl, indanyl, indenyl, styryl, pyridyl, quinoliny, and mixtures thereof.

**[0020]** Most preferably the negatively charged alkoxyated polyarylphenol is that with the following structure:



wherein R is selected from  $\text{SO}_3^-$ ,  $\text{COO}^-$  and  $\text{PO}_3^{2-}$ , preferably selected from  $\text{SO}_3^-$  and  $\text{COO}^-$ .

[0021] Preferably  $n = 2$  to  $70$ , more preferably  $n = 4$  to  $54$ , most preferably  $n = 10$  to  $n = 54$ .

[0022] The designation  $n$  is the average numbers of moles of alkoxy units in the polyalkoxy chain.

[0023] Compounds are available from industrial suppliers, for example Rhodia, Clariant, Aoki Oil Industrial Co, Stepan and TOHO Chemical Industry Co.

[0024] In the context of the current invention the negatively charged alkoxyated polyarylphenol is not considered a surfactant and does not contribute numerically to the surfactant as defined herein.

[0025] "Negatively" charged refers to the charge at  $\text{pH} = 8$  in water.

## Surfactant

[0026] The laundry composition comprises charged surfactant and it is most preferred that the charged surfactant is anionic surfactant (which includes a mixture of the same).

[0027] Suitable anionic detergent compounds which may be used are usually watersoluble 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 include the alkyl portion of higher alkyl radicals.

[0028] Examples of suitable synthetic anionic detergent compounds are sodium and potassium alkyl sulphates, especially those obtained by sulphating higher  $\text{C}_8$  to  $\text{C}_{18}$  alcohols, produced for example from tallow or coconut oil, sodium and potassium alkyl  $\text{C}_9$  to  $\text{C}_{20}$  benzene sulphonates, particularly sodium linear secondary alkyl  $\text{C}_{10}$  to  $\text{C}_{15}$  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.

[0029] 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.

[0030] 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  $\text{C}_{12}$ - $\text{C}_{14}$  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  $\text{C}_{11}$  to  $\text{C}_{15}$  alkyl benzene sulphonates. Preferably the alkyl sulphates is a linear or branched sodium  $\text{C}_{12}$  to  $\text{C}_{18}$  alkyl sulphates. Sodium dodecyl sulphate is particularly preferred, (SDS, also known as primary alkyl sulphate).

[0031] 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%.

[0032] Preferably two or more anionic surfactant are present, for example linear alkyl benzene sulphonate together with an alkyl ether sulphate.

[0033] 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.

[0034] 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  $\text{C}_8$  to  $\text{C}_{18}$  primary or secondary linear or branched alcohols with ethylene oxide.

[0035] Preferably the alkyl ethoxylated non-ionic surfactant is a  $\text{C}_8$  to  $\text{C}_{18}$  primary alcohol with an average ethoxylation of 7EO to 9EO units.

[0036] The nonionic and anionic surfactants of the surfactant system may be chosen from the surfactants described "Surface Active Agents" Vol. 1, by Schwartz & Perry, Interscience 1949, Vol. 2 by Schwartz, Perry & Berch, Interscience 1958, in the current edition of "McCutcheon's Emulsifiers and Detergents" published by Manufacturing Confectioners Company or in "Tenside-Taschenbuch", H. Stache, 2nd Edn., Carl Hauser Verlag, 1981.

[0037] Preferably the surfactants used are saturated.

[0038] 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.

[0039] 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.

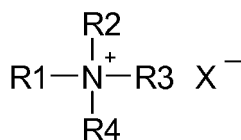
## Cationic Compound

[0040] When the present invention is used as a fabric conditioner it needs to contain a cationic compound.

[0041] Most preferred are quaternary ammonium compounds.

[0042] It is advantageous if the quaternary ammonium compound is a quaternary ammonium compound having at least one  $\text{C}_{12}$  to  $\text{C}_{22}$  alkyl chain.

[0043] It is preferred if the quaternary ammonium compound has the following formula:



in which R<sup>1</sup> is a C<sub>12</sub> to C<sub>22</sub> alkyl or alkenyl chain; R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> are independently selected from C<sub>1</sub> to C<sub>4</sub> alkyl chains and X<sup>-</sup> is a compatible anion. A preferred compound of this type is the quaternary ammonium compound cetyl trimethyl quaternary ammonium bromide.

**[0044]** A second class of materials for use with the present invention are the quaternary ammonium of the above structure in which R<sup>1</sup> and R<sup>2</sup> are independently selected from C<sub>12</sub> to C<sub>22</sub> alkyl or alkenyl chain; R<sup>3</sup> and R<sup>4</sup> are independently selected from C<sub>1</sub> to C<sub>4</sub> alkyl chains and X<sup>-</sup> is a compatible anion.

**[0045]** The composition optionally comprises a silicone.

### Builders or Complexing Agents

**[0046]** Builder materials may be selected from 1) calcium sequestrant materials, 2) precipitating materials, 3) calcium ion-exchange materials and 4) mixtures thereof.

**[0047]** Examples of calcium sequestrant builder materials include alkali metal polyphosphates, such as sodium tripolyphosphate and organic sequestrants, such as ethylene diamine tetra-acetic acid.

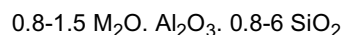
**[0048]** Examples of precipitating builder materials include sodium orthophosphate and sodium carbonate.

**[0049]** Examples of calcium ion-exchange builder materials include the various types of waterinsoluble crystalline or amorphous aluminosilicates, of which zeolites are 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.

**[0050]** 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.

**[0051]** Zeolite and carbonate (carbonate (including bicarbonate and sesquicarbonate)) are preferred builders with carbonates being particularly preferred.

**[0052]** 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:



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 SiO<sub>2</sub> 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 aluminosilicate (where present) is preferably greater than 5:2, more preferably greater than 3:1.

**[0053]** Alternatively, or additionally to the aluminosilicate builders, phosphate builders may be used. In this art the term 'phosphate' embraces diphosphate, triphosphate, and phosphonate species. Other forms of builder include silicates, such as soluble silicates, metasilicates, layered silicates (e.g. SKS-6 from Hoechst).

**[0054]** Preferably the laundry detergent formulation is a non-phosphate built laundry detergent formulation, i.e., contains less than 1 wt% of phosphate. Preferably powder laundry detergent formulations are predominantly carbonate built. Powders, should preferably give an in use pH of 9.5-11.

**[0055]** Most preferably the laundry detergent is an aqueous liquid laundry detergent, preferably with a pH of from 7 to 9.

**[0056]** 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

**[0057]** The composition preferably comprises a fluorescent agent (optical brightener). Fluorescent agents are well known and many such fluorescent agents are available commercially. Usually, these fluorescent agents are supplied and used in the form of their alkali metal salts, for example, the sodium salts.

**[0058]** 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 and Blankophor (Trade Mark) HRH, and Pyrazoline compounds, e.g. Blankophor SN.

**[0059]** 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.

## **Perfume**

**[0060]** The composition comprises a perfume. The perfume is in the range from 0.001 to 3 wt %, preferably 0.05 to 0.5 wt%, 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.

**[0061]** 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; ver-dyl 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; alpha-santalol; cedrol; cedryl acetate; cedryl formate; cyclohexyl salicylate; gamma-dodecalactone; and, beta phenylethyl phenyl acetate.

**[0062]** 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 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, preferably five or more, more preferably six or more or even seven or more different perfume components.

**[0063]** 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 are selected from citrus oils, linalool, linalyl acetate, lavender, dihydromyrcenol, rose oxide and cis-3-hexanol.

**[0064]** The International Fragrance Association has published a list of fragrance ingredients (perfums) in 2011. (<http://www.ifraorg.org/en-us/ingredients#.U7Z4hPldWzk>)

**[0065]** The Research Institute for Fragrance Materials provides a database of perfumes (fragrances) with safety information.

**[0066]** Perfume top note may be used to cue the whiteness and brightness benefit of the invention.

**[0067]** 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 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 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, hydratropic alcohol, hydroxycitronellal, indone, isoamyl alcohol, iso menthone, isopulegyl acetate, isoquinolone, ligustral, linalool, linalool oxide, linalyl formate, menthone, menthyl acetophenone, 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 carbonyl 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 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.

**[0068]** 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.

**[0069]** It is preferred that the laundry treatment composition does not contain a peroxygen bleach, e.g., sodium percarbonate, sodium perborate, and peracid.

### Polymers

**[0070]** The composition may comprise one or more further polymers. Examples are carboxymethylcellulose, poly(ethylene glycol), poly(vinyl alcohol), polycarboxylates such as polyacrylates, maleic/acrylic acid copolymers and lauryl methacrylate/acrylic acid copolymers.

**[0071]** Polymers present to prevent dye deposition may be present, for example poly(vinylpyrrolidone), poly(vinylpyridine-N-oxide), and poly(vinylimidazole).

### Enzymes

**[0072]** One or more enzymes are preferred present in a laundry composition of the invention and when practicing a method of the invention.

**[0073]** Preferably the level of each enzyme in the laundry composition of the invention is from 0.0001 wt% to 0.1 wt% protein.

**[0074]** Preferably the enzyme is selected from: proteases; lipases; and, cellulases, preferably a protease.

**[0075]** Especially contemplated enzymes include proteases, alpha-amylases, cellulases, lipases, peroxidases/oxidases, pectate lyases, and mannanases, or mixtures thereof.

**[0076]** Suitable lipases include those of bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Examples of useful lipases include lipases from *Humicola* (synonym *Thermomyces*), e.g. from *H. lanuginosa* (*T. lanuginosus*) as described in EP 258 068 and EP 305 216 or from *H. insolens* as described in WO 96/13580, a *Pseudomonas* lipase, e.g. from *P. alcaligenes* or *P. pseudoalcaligenes* (EP 218 272), *P. cepacia* (EP 331 376), *P. stutzeri* (GB 1,372,034), *P. fluorescens*, *Pseudomonas* sp. strain SD 705 (WO 95/06720 and WO 96/27002), *P. wisconsinensis* (WO 96/12012), a *Bacillus* lipase, e.g. from *B. subtilis* (Dartois et al. (1993), Biochemica et Biophysica Acta, 1131, 253-360), *B. stearothermophilus* (JP 64/744992) or *B. pumilus* (WO 91/16422). 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.

**[0077]** Preferred commercially available lipase enzymes include Lipolase™ and Lipolase Ultra™, Lipex™ and Lipoclean™ (Novozymes A/S).

**[0078]** 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.

**[0079]** 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 A<sub>1</sub> and A<sub>2</sub> 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.

**[0080]** 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™, Dyrzym™, Esperase™, Everlase™, Polarzyme™, and Kan-nase™, (Novozymes A/S), Maxatase™, Maxacal™, Maxapem™, Properase™, Purafect™, Purafect OxP™, FN2™, and FN3™ (Genencor International Inc.).

**[0081]** 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.

**[0082]** Suitable amylases (alpha and/or beta) include those of bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Amylases include, for example, alpha-amylases obtained from *Bacillus*, e.g. a special strain of *B. licheniformis*, described in more detail in GB 1,296,839, or the *Bacillus* sp. strains disclosed in WO 95/026397 or WO 00/060060. Commercially available amylases are Duramyl™, Termamyl™, Termamyl Ultra™, Natalase™, Stainzyme™, Fungamyl™ and BAN™ (Novozymes A/S), Rapidase™ and Purastar™ (from Genencor International Inc.).

**[0083]** Suitable cellulases include those of bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Suitable cellulases include cellulases from the genera *Bacillus*, *Pseudomonas*, *Humicola*, *Fusarium*, *Thielavia*, *Acremonium*, e.g. the 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™, Endolase™, Renozyme™ (Novozymes A/S), Clazinase™ and Puradax HA™ (Genencor International Inc.), and KAC-500(B)™ (Kao Corporation). Celluclean™ is preferred.

[0084] 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).

[0085] Further enzymes suitable for use are discussed in WO2009/087524, WO2009/090576, WO2009/107091, WO2009/111258 and WO2009/148983.

### Enzyme Stabilizers

[0086] 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.

[0087] 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.

[0088] 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

#### Example 1

[0089] 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

[0090] The formulation was used to wash eight 5x5cm 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 2.3g/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.

[0091] Once the wash had been completed the cotton monitors were rinsed twice in 500ml clean water, removed dried and the colour measured on a reflectometer and expressed as the CIE L\*a\*b\* values.

[0092] Formulations were tested containing Sokalan HP20 (BASF), an ethoxylated polyethylene imine polymer PEI(600) 20EO, as a comparison polymer for anti-redeposition benefits. Formulation were tested containing of a negative charge Alkoxylated polyarylphenol, Dispersogen LFH ex Clariant, (tristyrylphenol polyoxy ethylene phosphoric acid ester (anionic)).

[0093] 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 L\* value is the mean of the measurements from the 8 monitors.

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sample	results	
	L*	95%
Control	90.14	0.26
Sokalan HP20 (reference)	91.37	0.14
negative charge alkoxyated polyarylphenol	92.47	0.36

**[0094]** The negative charge alkoxyated polyarylphenol increased the L\* of the monitors. High L\* values equate to a cleaner whiter fabrics. The negative charge alkoxyated polyarylphenol provides significantly better benefits than the ethoxyated polyethyleneimine.

**Example 2**

**[0095]** An aqueous liquid laundry detergent was prepared of the following formulation:

Ingredient	Weight%
Mono propylene glycol	2.2
triethylamine	1.5
C12-C15 alcohol ethoxylate with 7 moles of ethylene oxide	1.2
Linear alkyl benzene sulfonate	4.6
Sodium laureth ether sulphate with 1 moles of ethylene oxide	5.8
Citric acid	2.0
CaCl <sub>2</sub> dihydrate	0.2
NaCl	0.2
Tinopal CBS-X (fluorescer BASF)	0.3
Sodium Hydroxide	To pH=8.4
dispersant	See text
Water	balance

**[0096]** The formulation was used to wash eight 5x5cm knitted cotton cloth pieces in a tergotometer set at 200rpm. A one hour wash was conducted in 800ml of 26° French Hard water at 20°C, with 2.3g/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.

**[0097]** Once the wash had been completed the cotton monitors were rinsed twice in 500ml clean water, removed dried and the colour measured on a reflectometer and expressed as the CIE L\*a\*b\* values.

**[0098]** Formulations were tested containing TAMOL ® NN7718 (BASF), the polycondensate product of naphthalene sulfonic acid and formaldehyde, and lignin sulphonate as comparison sulphonated aromatic polymers for anti-redeposition benefits.

**[0099]** Formulation were tested containing a negative charge Alkoxyated polyarylphenol, Dispersogen LFH ex Clariant, (tristyrylphenol polyoxy ethylene phosphoric acid ester (anionic)).

**[0100]** 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 L\* value is the mean of the measurements from the 8 monitors.

sample	results	
	L*	95%
Control	82.7	0.3

(continued)

sample	results	
	L*	95%
naphthalene sulfonic acid and formaldehyde condensate (reference)	79.7	0.4
Lignin sulphonate	83.9	0.3
negative charge alkoxyated polyarylphenol	89.1	0.3

**[0101]** The negative charge alkoxyated polyarylphenol increased the L\* of the monitors. High L\* values equate to a cleaner whiter fabrics. The negative charge alkoxyated polyarylphenol provides significantly better benefits than the naphthalene sulfonic acid and formaldehyde condensate or ligninsulfonate.

## Claims

1. A laundry detergent composition comprising:

- (i) from 4 to 50 wt% of a charged surfactant;
- (ii) from 0.1 to 20 wt% of a negatively charged alkoxyated polyarylphenol; and,
- (iii) from 0.001 to 3 wt % of a perfume,

wherein the negatively charged alkoxyated polyarylphenol is not considered a surfactant and does not contribute numerically to the surfactant.

2. A laundry detergent composition according to claim 1, wherein the negatively charged alkoxyated polyarylphenol is negatively charged alkoxyated tristyrylphenol.

3. A laundry detergent composition according to claim 1, wherein the negatively charged alkoxyated polyarylphenol is negatively charged ethoxyated polyarylphenol.

4. A laundry detergent composition according to claim 2, wherein the negatively charged alkoxyated tristyrylphenol is negatively charged polyethylene glycol mono(2,4,6-tris(1-phenylethyl)phenyl) ether.

5. A laundry detergent composition according to any one of claim 1 to 4, wherein the negatively charged alkoxyated polyarylphenol contains an average of 2 to 70 alkoxy groups.

6. A laundry detergent composition according to claim 5, wherein the negatively charged alkoxyated polyarylphenol contains an average of 10 to 54 alkoxy groups.

7. A laundry detergent composition according to any one of the preceding claims, wherein the negatively charged alkoxyated polyarylphenol is present at a level of from 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 anionic surfactant.

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.

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 claims 8 to 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 ethoxyated non-ionic surfactant.

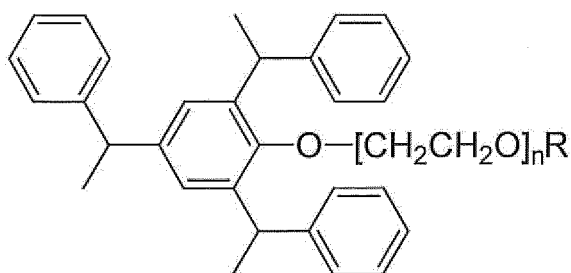
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13. A laundry detergent composition according to any one of the preceding claims, wherein the perfume comprises one or more note from: alpha-isomethyl ionone, benzyl salicylate; citronellol; coumarin; hexyl cinnamal; linalool; pentanoic acid, 2-methyl-, 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; verdy acetate; dodecanal; hexyl cinnamic aldehyde; cyclopentadecanolid; benzenoacetic acid, 2-phenylethyl ester; amyl salicylate; beta-caryophyllene; ethyl undecylenate; geranyl anthranilate; alpha-irone; beta-phenyl ethyl benzoate; alpha-santalol; cedrol; cedryl acetate; cedryl formate; cyclohexyl salicylate; gamma-dodecalactone; and, beta phenylethyl phenyl acetate.

14. A laundry detergent composition according to claim 1 comprising:

(i) from 4 to 50 wt% of anionic surfactant selected from: linear alkyl benzene sulphonate; alkyl sulphate; alkyl ether sulphate and mixtures thereof.

(ii) from 0.5 to 10 wt% of negatively charged alkoxyated polyarylphenol of the following structure:



wherein R is selected from: SO<sub>3</sub><sup>-</sup>; COO<sup>-</sup>; and, PO<sub>3</sub><sup>2-</sup>, preferably selected from SO<sub>3</sub><sup>-</sup>; and, COO<sup>-</sup>; wherein n is selected from: 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; 50; 51; 52; 53; and, 54; and,

(iii) from 0.001 to 3 wt % of a perfume.

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.

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.

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, the aqueous solution comprising from 10 ppm to 5000 ppm of said negatively charged alkoxyated polyarylphenol; and, up to 6 g/L of surfactant; and,

(ii) optionally rinsing and drying said textile.

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.

### Patentansprüche

1. Waschmittelzusammensetzung, umfassend:

(i) von 4 bis 50 Gew.-% eines geladenen Tensids,

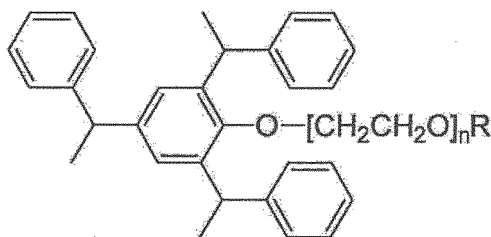
(ii) von 0,1 bis 20 Gew.-% eines negativ geladenen alkoxylierten Polyarylphenols und

(iii) von 0,001 bis 3 Gew.-% eines Parfüms,

wobei das negativ geladene alkoxylierte Polyarylphenol nicht als Tensid angesehen wird und zu dem Tensid keinen zahlenmäßigen Beitrag leistet.

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2. Waschmittelzusammensetzung nach Anspruch 1, wobei das negativ geladene alkoxylierte Polyarylphenol negativ geladenes alkoxyliertes Tristyrylphenol ist.
- 5 3. Waschmittelzusammensetzung nach Anspruch 1, wobei das negativ geladene alkoxylierte Polyarylphenol negativ geladenes ethoxyliertes Polyarylphenol ist.
4. Waschmittelzusammensetzung nach Anspruch 2, wobei das negativ geladene alkoxylierte Tristyrylphenol negativ geladener Polyethylenglycolmono(2,4,6-tris(1-phenylethyl)phenyl)ether ist.
- 10 5. Waschmittelzusammensetzung nach irgendeinem der Ansprüche 1 bis 4, wobei das negativ geladene alkoxylierte Polyarylphenol durchschnittlich 2 bis 70 Alkoxy-Gruppen enthält.
6. Waschmittelzusammensetzung nach Anspruch 5, wobei das negativ geladene alkoxylierte Polyarylphenol durchschnittlich 10 bis 54 Alkoxy-Gruppen enthält.
- 15 7. Waschmittelzusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei das negativ geladene alkoxylierte Polyarylphenol mit einem Gehalt von 0,5 bis 10 Gew.-%, höchst bevorzugt von 2 bis 9 Gew.-%, vorliegt.
8. Waschmittelzusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei das geladene Tensid ein anionisches Tensid ist.
- 20 9. Waschmittelzusammensetzung nach Anspruch 8, wobei das anionische Tensid aus linearem Alkylbenzolsulfonat, Alkylsulfaten, Alkylethersulfaten, Seifen, Methylestersulfonaten und Mischungen davon ausgewählt ist.
- 25 10. Waschmittelzusammensetzung nach Anspruch 9, wobei das anionische Tensid aus linearem Alkylbenzolsulfonat, Alkylsulfaten, Alkylethersulfaten und Mischungen davon ausgewählt ist.
- 30 11. Waschmittelzusammensetzung nach irgendeinem der Ansprüche 8 bis 10, wobei der Gehalt des anionischen Tensids von 4 bis 50 Gew.-% beträgt.
- 35 12. Waschmittelzusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei die Zusammensetzung von 2 bis 8 Gew.-% nichtionisches alkylethoxyliertes Tensid umfasst.
13. Waschmittelzusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei das Parfüm eine oder mehrere Verbindungen umfasst aus:  
Alpha-Isomethylionon, Benzylsalicylat, Citronellol, Cumarin, Hexylcinnamal, Linalool, Pentansäure, 2-Methyl-, Ethylester, Oktanal, Benzylacetat, 1,6-Octadien-3-ol, 3,7-Dimethyl-, 3-Acetate, Cyclohexanol, 2-(1,1-Dimethylethyl)-, 1-Acetate, Delta-Damascon, Beta-Ionon, Verdylacetat, Dodekanal, Hexylzimaldehyd, Cyclopentadecanolid, Benzol-essigsäure, 2-Phenylethylester, Amylsalicylat, Beta-Caryophyllen, Ethylundecylenat, Geranylthranilat, Alpha-Iron, Beta-Phenylethylbenzoat, Santalol, Cedrol, Cedrylacetat, Cedrylformiat, Cyclohexylsalicylat, Gamma-Dodecalacton und Beta-Phenylethylphenylacetat.
- 40 14. Waschmittelzusammensetzung nach Anspruch 1, umfassend:
- 45 (i) von 4 bis 50 Gew.-% anionisches Tensid, ausgewählt aus linearem Alkylbenzolsulfonat, Alkylsulfat, Alkylethersulfat und Mischungen davon,  
(ii) von 0,5 bis 10 Gew.-% negativ geladenes alkoxyliertes Polyarylphenol der folgenden Struktur:



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worin R aus  $\text{SO}_3^-$ ,  $\text{COO}^-$  und  $\text{PO}_3^{2-}$  ausgewählt ist, vorzugsweise aus  $\text{SO}_3^-$  und  $\text{COO}^-$  ausgewählt ist, wobei n ausgewählt ist aus: 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; 50; 51; 52; 53 und 54, und  
(iii) von 0,001 bis 3 Gew.-% eines Parfüms.

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15. Waschmittelzusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei die Zusammensetzung von 0,0001 Gew.-% bis 0,1 Gew.-% Protein eines Enzyms umfasst, das aus Proteasen, Lipasen, Cellulasen und Mischungen davon ausgewählt ist, vorzugsweise eine Protease umfasst.

10 16. Waschmittelzusammensetzung nach irgendeinem der vorhergehenden Ansprüche, wobei die Waschmittelzusammensetzung eine flüssige wässrige Waschmittelzusammensetzung ist.

17. Häusliches Verfahren zum Behandeln eines Textils, wobei das Verfahren die Schritte umfasst:

15 (i) Behandeln des Textils mit einer wässrigen Lösung einer Waschmittelzusammensetzung, wie in irgendeinem der Ansprüche 1 bis 16 definiert, wobei die wässrige Lösung von 10 ppm bis 5000 ppm des negativ geladenen alkoxylierten Polyarylphenols und bis zu 6 g/l Tensid enthält, und  
(ii) gegebenenfalls Spülen und Trocknen des Textils.

20 18. Häusliches Verfahren zum Behandeln eines Textils nach Anspruch 17, wobei die wässrige Lösung von 0,2 bis 4 g/l eines Tensids enthält.

### Revendications

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1. Composition de détergent de lessive comprenant :

- (i) de 4 à 50 % en masse d'un tensioactif chargé ;  
(ii) de 0,1 à 20 % en masse d'un polyarylphénol alcoxylé négativement chargé ; et,  
30 (iii) de 0,001 à 3 % en masse d'un parfum,

dans laquelle le polyarylphénol alcoxylé négativement chargé n'est pas considéré comme un tensioactif et ne contribue pas numériquement au tensioactif.

35 2. Composition de détergent de lessive selon la revendication 1, dans laquelle le polyarylphénol alcoxylé négativement chargé est du tristyrylphénol alcoxylé négativement chargé.

3. Composition de détergent de lessive selon la revendication 1, dans laquelle le polyarylphénol alcoxylé négativement chargé est du polyarylphénol éthoxylé négativement chargé.

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4. Composition de détergent de lessive selon la revendication 2, dans laquelle le tristyrylphénol alcoxylé négativement chargé est du mono(2,4,6-tris(1-phényléthyl)phényl)éther de polyéthylène glycol négativement chargé.

45 5. Composition de détergent de lessive selon l'une quelconque des revendications 1 à 4, dans laquelle le polyarylphénol alcoxylé négativement chargé contient une moyenne de 2 à 70 groupes alcoxy.

6. Composition de détergent de lessive selon la revendication 5, dans laquelle le polyarylphénol alcoxylé négativement chargé contient une moyenne de 10 à 54 groupes alcoxy.

50 7. Composition de détergent de lessive selon l'une quelconque des revendications précédentes, dans laquelle le polyarylphénol alcoxylé négativement chargé est présent à une teneur de 0,5 à 10 % en masse, encore mieux de 2 à 9 % en masse.

55 8. Composition de détergent de lessive selon l'une quelconque des revendications précédentes, dans laquelle le tensioactif chargé est un tensioactif anionique.

9. Composition de détergent de lessive selon la revendication 8, dans laquelle le tensioactif anionique est choisi parmi : un benzènesulfonate d'alkyle linéaire ; des sulfates d'alkyle ; des sulfates d'alkyléther ; des savons ; des sulfonates

d'esters méthyliques et des mélanges de ceux-ci.

10. Composition de détergent de lessive selon la revendication 9, dans laquelle le tensioactif anionique est choisi parmi : un benzènesulfonate d'alkyle linéaire ; des sulfates d'alkyle ; des sulfates d'alkyléther et des mélanges de ceux-ci.

11. Composition de détergent de lessive selon l'une quelconque des revendications 8 à 10, dans laquelle la teneur en tensioactif anionique est de 4 à 50 % en masse.

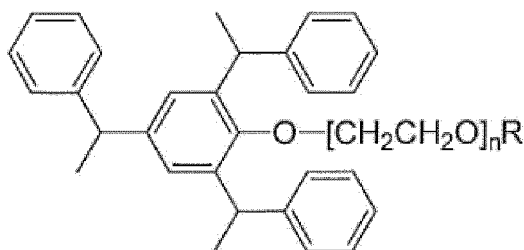
12. Composition de détergent de lessive selon l'une quelconque des revendications précédentes, dans laquelle la composition comprend de 2 à 8 % en masse de tensioactif non-ionique éthoxylé d'alkyle.

13. Composition de détergent de lessive selon l'une quelconque des revendications précédentes, dans laquelle le parfum comprend une ou plusieurs notes parmi : alpha-isométhylionone, salicylate de benzyle ; citronellol ; coumarine ; hexylcinnamal ; linalool ; acide pentanoïque, 2-méthylrique, éthylique ester ; octanal ; acétate de benzyle ; 1,6-octadien-3-ol, 3,7-diméthyl-, 3-acétate ; cyclohexanol, 2-(1,1-diméthyléthyl)-, 1-acétate ; delta-damascone ; bêta-ionone ; acétate de verdyle ; dodécanal ; aldéhyde hexylcinnamique ; cyclopentadécanolide ; acide benzène-acétique, ester 2-phényl-éthylique ; salicylate d'amyle ; bêta-caryophyllène ; undécylénate d'éthyle ; anthranilate de géranyle ; alpha-irone ; benzoate de bêta-phényléthyle, alpha-santalol ; cédrol ; acétate de cédryle ; formate de cédryle ; salicylate de cyclohexyle ; gamma-dodécalactone ; et acétate de bêta-phényléthylphényle.

14. Composition de détergent de lessive selon la revendication 1 comprenant :

(i) de 4 à 50 % en masse de tensioactif anionique choisi parmi : un benzènesulfonate d'alkyle linéaire ; un sulfate d'alkyle ; un sulfate d'alkyléther et des mélanges de ceux-ci.

(ii) de 0,5 à 10 % en masse de polyarylphénol alcoxylé négativement chargé de la structure suivante :



dans laquelle R est choisi parmi :  $\text{SO}_3^-$  ;  $\text{COO}^-$  ; et,  $\text{PO}_3^{2-}$ , de préférence choisi parmi  $\text{SO}_3^-$  ; et,  $\text{COO}^-$  ; dans laquelle n est choisi parmi : 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 ; 50 ; 51 ; 52 ; 53 ; et, 54 ; et,

(iii) de 0,001 à 3 % en masse d'un parfum.

15. Composition de détergent de lessive selon l'une quelconque des revendications précédentes, dans laquelle la composition comprend de 0,0001 % en masse à 0,1 % en masse de protéine d'une enzyme choisie parmi : des protéases ; lipases ; cellulases ; et, mélanges de celles-ci, comprenant de préférence une protéase.

16. Composition de détergent de lessive selon l'une quelconque des revendications précédentes, dans laquelle la composition de détergent de lessive est une composition de détergent liquide aqueuse de lessive.

17. Procédé domestique de traitement d'un textile, le procédé comprenant les étapes de :

(i) traitement dudit textile avec une solution aqueuse d'une composition de détergent de lessive comme définie dans l'une quelconque des revendications 1 à 16, la solution aqueuse comprenant de 10 ppm à 5 000 ppm dudit polyarylphénol alcoxylé négativement chargé ; et, jusqu'à 6 g/L de tensioactif ; et,

(ii) éventuellement rinçage et séchage dudit textile.

18. Procédé domestique de traitement d'un textile selon la revendication 17, dans lequel la solution aqueuse comprend de 0,2 à 4 g/L d'un tensioactif.

## REFERENCES CITED IN THE DESCRIPTION

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