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(54) **LAUNDRY DETERGENT**

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EP 3 740 555 B1

DescriptionField of the Invention

5 **[0001]** The present invention relates to liquid laundry detergents which contain fragrance, and especially concerns liquid laundry detergents which contain a combination of encapsulated and free fragrance.

Background and Prior Art

10 **[0002]** In liquid laundry detergents, the fragrance experienced by consumers is one of the most important attributes. Efficient delivery of the right fragrances to the fabric during the laundry process and release of that fragrance at key consumer moments is critical to the delivery of clean and fresh laundry.

[0003] The delivery of fragrance at key moments is a difficult task since laundry washing liquids are usually designed to carry oily materials or particulate solids away from the laundered fabric. Fragrances, however, are also typically oily materials.

15 **[0004]** WO 2010/079467 A2, WO 95/16432 A2, WO 2010/060677 A1, EP 2 757 146 A1, WO 2017/004339 A1 and CA 2 977 566 A1 disclose detergent compositions comprising encapsulated fragrance and free fragrance dispersed in the composition.

[0005] Encapsulation of fragrance allows for improved deposition of fragrance to fabric, as well as delaying the release of fragrance when the consumer garment is being worn. However, another important moment to the consumer is when the laundry is in the "damp" phase, which extends from when the garments are being removed from the washing machine, to when they are almost dry. There is a need for a composition that delivers a good fragrance experience during this phase without significant compromise of fragrance performance at other stages such as in the packaged composition before use and when the laundered garments are dry. However, there is equally a desire to reduce manufacturing costs and raw material wastage, particularly in the case of high value ingredients such as fragrances.

25 **[0006]** The present invention addresses this problem.

Summary of the Invention

30 **[0007]** The present invention provides a liquid laundry detergent composition comprising:

a) from 3 to 60% by weight based on the total weight of the composition of one or more detergents selected from non-soap anionic surfactants, nonionic surfactants and mixtures thereof;

35 b) from 0.01 to 1% by weight based on the total weight of the composition of a fragrance formulation (f1) which is in the form of free droplets dispersed in the composition;

c) from 0.01 to 1% by weight based on the total weight of the composition of a fragrance formulation (f2) which is entrapped within discrete polymeric microparticles dispersed in the composition, in which the polymeric microparticles are polymeric core-shell microcapsules in which at least one generally spherical continuous shell of polymeric material surrounds a core containing the fragrance formulation (f2);

40 in which the total amount of fragrance formulation (f1) and fragrance formulation (f2) ranges from 0.6 to 0.9% by weight based on the total weight of the composition;

45 and in which the weight ratio of fragrance formulation (f1) to fragrance formulation (f2) in the composition ranges from 40:60 to 60:40; and in which the polymeric core-shell microcapsule is an aminoplast microcapsule with an aminoplast shell surrounding a core containing the fragrance formulation (f2); in which a deposition aid is attached to the outside of the shell by means of covalent bonding.

50 Detailed Description and Preferred EmbodimentsFragrance formulation (f1)

[0008] The fragrance formulation (f1) will typically contain a blend of selected fragrant components, optionally mixed with one or more excipients. The combined odours of the various fragrant components produce a pleasant or desired fragrance.

[0009] The term "fragrant component" in the context of this invention denotes a material which is used essentially for its ability to impart a pleasant odour to a composition (into which it is incorporated), and/or a surface (to which it is

applied), either on its own or in admixture with other such materials. Materials having these characteristics are generally small, lipophilic molecules of sufficient volatility to be transported to the olfactory system in the upper part of the nose.

[0010] Fragrant components for use in the invention will typically have molecular weights of less than 325 atomic mass units, preferably less than 300 atomic mass units and more preferably less than 275 atomic mass units. The molecular weight is preferably greater than 100 atomic mass units and more preferably greater than 125 atomic mass units, since lower masses may be too volatile and/or insufficiently lipophilic to be effective.

[0011] Fragrant components for use in the invention will preferably have a molecular structure which does not contain halogen atoms and/or strongly ionizing functional groups such as sulfonates, sulfates, or quaternary ammonium ions.

[0012] Fragrant components for use in the invention will more preferably have a molecular structure containing only atoms from among, but not necessarily all, of the following: hydrogen, carbon, oxygen, nitrogen and sulphur. Most preferably the fragrant components will have a molecular structure containing only atoms from among, but not necessarily all, of the following: hydrogen, carbon and oxygen.

[0013] Examples of fragrant components include aromatic, aliphatic and araliphatic hydrocarbons having molecular weights from about 90 to about 250; aromatic, aliphatic and araliphatic esters having molecular weights from about 130 to about 250; aromatic, aliphatic and araliphatic nitriles having molecular weights from about 90 to about 250; aromatic, aliphatic and araliphatic alcohols having molecular weights from about 90 to about 240; aromatic, aliphatic and araliphatic ketones having molecular weights from about 150 to about 270; aromatic, aliphatic and araliphatic lactones having molecular weights from about 130 to about 290; aromatic, aliphatic and araliphatic aldehydes having molecular weights from about 90 to about 230; aromatic, aliphatic and araliphatic ethers having molecular weights from about 150 to about 270; and condensation products of aldehydes and amines having molecular weights from about 180 to about 320.

[0014] Specific examples of fragrant components for use in the invention include:

i) hydrocarbons, such as, for example, D-limonene, 3-carene, α -pinene, β -pinene, α -terpinene, γ -terpinene, p-cymene, bisabolene, camphene, caryophyllene, cedrene, farnesene, longifolene, myrcene, ocimene, valencene, (E,Z)-1,3,5-undecatriene, styrene, and diphenylmethane;

ii) aliphatic and araliphatic alcohols, such as, for example, benzyl alcohol, 1-phenylethyl alcohol, 2-phenylethyl alcohol, 3-phenylpropanol, 2-phenylpropanol, 2-phenoxyethanol, 2,2-dimethyl-3-phenylpropanol, 2,2-dimethyl-3-(3-methylphenyl)propanol, 1,1-dimethyl-2-phenylethyl alcohol, 1,1-dimethyl-3-phenylpropanol, 1-ethyl-1-methyl-3-phenylpropanol, 2-methyl-5-phenylpentanol, 3-methyl-5-phenylpentanol, 3-phenyl-2-propen-1-ol, 4-methoxybenzyl alcohol, 1-(4-isopropylphenyl)ethanol, hexanol, octanol, 3-octanol, 2,6-dimethylheptanol, 2-methyl-2-heptanol, 2-methyl-2-octanol, (E)-2-hexenol, (E)- and (Z)-3-hexenol, 1-octen-3-ol, a mixture of 3,4,5,6,6-pentamethyl-3/4-hepten-2-ol and 3,5,6,6-tetramethyl-4-methyleneheptan-2-ol, (E,Z)-2,6-nonadienol, 3,7-dimethyl-7-methoxyoctan-2-ol, 9-decenol, 10-undecenol, and 4-methyl-3-decen-5-ol;

iii) cyclic and cycloaliphatic alcohols, such as, for example, 4-tert-butylcyclohexanol, 3,3,5-trimethylcyclohexanol, 3-isocamphylcyclohexanol, 2,6,9-trimethyl-2Z,5E9-cyclododecatrien-1-ol, 2-isobutyl-4-methyltetrahydro-2H-pyran-4-ol, α , 3,3-trimethylcyclohexylmethanol, 2-methyl-4-(2,2,3-trimethyl-3-cyclopent-1-yl)butanol, 2-methyl-4-(2,2,3-trimethyl-3-cyclopent-1-yl)-2-buten-1-ol, 2-ethyl-4-(2,2,3-trimethyl-3-cyclopent-1-yl)-2-buten-1-ol, 3-methyl-5-(2,2,3-trimethyl-3-cyclopent-1-yl)-pentan-2-ol, 3-methyl-5-(2,2,3-trimethyl-3-cyclopent-1-yl)-4-penten-2-ol, 3,3-dimethyl-5-(2,2,3-trimethyl-3-cyclopent-1-yl)-4-penten-2-ol, 1-(2,2,6-trimethylcyclohexyl)pentan-3-ol, and 1-(2,2,6-trimethylcyclohexyl)hexan-3-ol;

iv) aliphatic aldehydes and their acetals, such as, for example, hexanal, heptanal, octanal, nonanal, decanal, undecanal, dodecanal, tridecanal, 2-methyloctanal, 2-methylnonanal, 2-methylundecanal, (E)-2-hexenal, (Z)-4-heptenal, 2,6-dimethyl-5-heptenal, 10-undecenal, (E)-4-decenal, 2-dodecenal, 2,6,10-trimethyl-5,9-undecadienal, heptanal-diethylacetal, 1,1-dimethoxy-2,2,5-trimethyl-4-hexene, and citronellyl oxyacetaldehyde;

v) aliphatic ketones and oximes thereof, such as, for example, 2-heptanone, 2-octanone, 3-octanone, 2-nonanone, 5-methyl-3-heptanone, 5-methyl-3-heptanone oxime, and 2,4,4,7-tetramethyl-6-octen-3-one;

vi) aliphatic sulfur-containing compounds, such as, for example, 3-methylthiohexanol, 3-methylthiohexyl acetate, 3-mercaptohexanol, 3-mercaptohexyl acetate, 3-mercaptohexyl butyrate, 3-acetylthiohexyl acetate, and 1-menthene-8-thiol;

vii) aliphatic nitriles, such as, for example, 2-nonenenitrile, 2-tridecenenitrile, 2,12-tridecenenitrile, 3,7-dimethyl-2,6-octadienenitrile, and 3,7-dimethyl-6-octenenitrile;

viii) aliphatic carboxylic acids and esters thereof, such as, for example, (E)- and (Z)-3-hexenylformate, ethyl acetoacetate, isoamyl acetate, hexyl acetate, 3,5,5-trimethylhexyl acetate, 3-methyl-2-butenyl acetate, (E)-2-hexenyl acetate, (E)- and (Z)-3-hexenyl acetate, octyl acetate, 3-octyl acetate, 1-octen-3-yl acetate, ethyl butyrate, butyl butyrate, isoamyl butyrate, hexylbutyrate, (E)- and (Z)-3-hexenyl isobutyrate, hexyl crotonate, ethylisovalerate, ethyl-2-methyl pentanoate, ethyl hexanoate, allyl hexanoate, ethyl heptanoate, allyl heptanoate, ethyl octanoate, ethyl-(E,Z)-2,4-decadienoate, methyl-2-octinate, methyl-2-noninate, allyl-2-isoamyl oxyacetate, and methyl-3,7-dimethyl-2,6-octadienoate;

ix) acyclic terpene alcohols, such as, for example, citronellol; geraniol; nerol; linalool; lavandulol; nerolidol; farnesol; tetrahydrolinalool; tetrahydrogeraniol; 2,6-dimethyl-7-octen-2-ol; 2,6-dimethyloctan-2-ol; 2-methyl-6-methylene-7-octen-2-ol; 2,6-dimethyl-5,7-octadien-2-ol; 2,6-dimethyl-3,5-octadien-2-ol; 3,7-dimethyl-4,6-octadien-3-ol; 3,7-dimethyl-1,5,7-octatrien-3-ol 2,6-dimethyl-2,5,7-octatrien-1-ol; as well as formates, acetates, propionates, isobutyrate, butyrate, isovalerate, pentanoates, hexanoates, crotonates, tiglinates and 3-methyl-2-butenates thereof;

x) acyclic terpene aldehydes and ketones, such as, for example, geranial, neral, citronellal, 7-hydroxy-3,7-dimethyloctanal, 7-methoxy-3,7-dimethyloctanal, 2,6,10-trimethyl-9-undecenal, α -sinensal, β -sinensal, geranylacetone, as well as the dimethyl- and diethylacetals of geranial, neral and 7-hydroxy-3,7-dimethyloctanal;

xi) cyclic terpene alcohols, such as, for example, menthol, isopulegol, α -terpineol, terpinen-4-ol, menthan-8-ol, menthan-1-ol, menthan-7-ol, borneol, isoborneol, linalool oxide, nopol, cedrol, ambrinol, vetiverol, guaïol, and the formates, acetates, propionates, isobutyrate, butyrate, isovalerate, pentanoates, hexanoates, crotonates, tiglinates and 3-methyl-2-butenates of α -terpineol, terpinen-4-ol, menthan-8-ol, menthan-1-ol, menthan-7-ol, borneol, isoborneol, linalool oxide, nopol, cedrol, ambrinol, vetiverol, and guaïol;

xii) cyclic terpene aldehydes and ketones, such as, for example, menthone, isomenthone, 8-mercaptomenthan-3-one, carvone, camphor, fenchone, α -ionone, β -ionone, α -n-methylionone, β -n-methylionone, α -isomethylionone, β -isomethylionone, α -irone, α -damascone, β -damascone, β -damascenone, δ -damascone, γ -damascone, 1-(2,4,4-trimethyl-2-cyclohexen-1-yl)-2-buten-1-one, 1,3,4,6,7,8a-hexahydro-1,1,5,5-tetramethyl-2H-2,4a-methanonaphthalen-8(5H)-one, nootkatone, dihydronootkatone and cedryl methyl ketone;

xiii) cyclic and cycloaliphatic ethers, such as, for example, cineole, cedryl methyl ether, cyclododecyl methyl ether, (ethoxymethoxy)cyclododecane; α -cedrene epoxide, 3a,6,6,9a-tetramethyldodecahydronaphtho[2,1-b]furan, 3a-ethyl-6,6,9a-trimethyldodecahydronaphtho[2,1-b]furan, 1,5,9-trimethyl-13-oxabicyclo[10.1.0]trideca-4,8-diene, rose oxide and 2-(2,4-dimethyl-3-cyclohexen-1-yl)-5-methyl-5-(1-methylpropyl)-1,3-dioxane;

xiv) cyclic ketones, such as, for example, 4-tert-butylcyclohexanone, 2,2,5-trimethyl-5-pentylcyclopentanone, 2-heptylcyclopentanone, 2-pentylcyclopentanone, 2-hydroxy-3-methyl-2-cyclopenten-1-one, 3-methyl-cis-2-penten-1-yl-2-cyclopenten-1-one, 3-methyl-2-pentyl-2-cyclopenten-1-one, 3-methyl-4-cyclopentadecenone, 3-methyl-5-cyclopentadecenone, 3-methylcyclopentadecanone, 4-(1-ethoxyvinyl)-3,3,5,5-tetramethylcyclohexanone, 4-tert-pentylcyclohexanone, 5-cyclohexadecen-1-one, 6,7-dihydro-1,1,2,3,3-pentamethyl-4(5H)-indanone, 5-cyclohexadecen-1-one, 8-cyclohexadecen-1-one, 9-cycloheptadecen-1-one and cyclopentadecanone;

xv) cycloaliphatic aldehydes and ketones, such as, for example, 2,4-dimethyl-3-cyclohexene carbaldehyde, 2-methyl-4-(2,2,6-trimethyl-cyclohexen-1-yl)-2-butenal, 4-(4-hydroxy-4-methylpentyl)-3-cyclohexene carbaldehyde, 4-(4-methyl-3-penten-1-yl)-3-cyclohexene carbaldehyde, 1-(3,3-dimethylcyclohexyl)-4-penten-1-one, 1-(5,5-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one, 2,3,8,8-tetramethyl-1,2,3,4,5,6,7,8-octahydro-2-naphthalenyl methylketone, methyl-2,6,10-trimethyl-2,5,9-cyclododecatrienyl ketone and tert-butyl-(2,4-dimethyl-3-cyclohexen-1-yl) ketone;

xvi) esters of cyclic alcohols, such as, for example, 2-tert-butylcyclohexyl acetate, 4-tert-butylcyclohexyl acetate, 2-tert-pentylcyclohexyl acetate, 4-tert-pentylcyclohexyl acetate, decahydro-2-naphthyl acetate, 3-pentyltetrahydro-2H-pyran-4-yl acetate, decahydro-2,5,5,8a-tetramethyl-2-naphthyl acetate, 4,7-methano-3a,4,5,6,7,7a-hexahydro-5 or 6-indenyl acetate, 4,7-methano-3a,4,5,6,7,7a-hexahydro-5 or 6-indenyl propionate, 4,7-methano-3a,4,5,6,7,7a-hexahydro-5 or 6-indenyl-isobutyrate and 4,7-methano-octahydro-5 or 6-indenyl acetate;

xvii) esters of cycloaliphatic carboxylic acids, such as, for example, allyl 3-cyclohexyl-propionate, allyl cyclohexyl oxyacetate, methyl dihydrojasmonate, methyl jasmonate, methyl 2-hexyl-3-oxocyclopentanecarboxylate, ethyl 2-ethyl-6,6-dimethyl-2-cyclohexenecarboxylate, ethyl 2,3,6,6-tetramethyl-2-cyclohexenecarboxylate and ethyl 2-me-

thyl-1,3-dioxolane-2-acetate;

xviii) esters of araliphatic alcohols and aliphatic carboxylic acids, such as, for example, benzyl acetate, benzyl propionate, benzyl isobutyrate, benzyl isovalerate, 2-phenylethyl acetate, 2-phenylethyl propionate, 2-phenylethyl isobutyrate, 2-phenylethyl isovalerate, 1-phenylethyl acetate, α -trichloromethylbenzyl acetate, α,α -dimethylphenylethyl acetate, α,α -dimethylphenylethyl butyrate, cinnamyl acetate, 2-phenoxyethyl isobutyrate and 4-methoxybenzyl acetate;

xix) araliphatic ethers and their acetals, such as, for example, 2-phenylethyl methyl ether, 2-phenylethyl isoamyl ether, 2-phenylethyl cyclohexyl ether, 2-phenylethyl-1-ethoxyethyl ether, phenylacetaldehyde dimethyl acetal, phenylacetaldehyde diethyl acetal, 2-phenylpropionaldehyde dimethyl acetal, phenylacetaldehyde glycerol acetal, 2,4,6-trimethyl-4-phenyl-1,3-dioxane, 4,4a,5,9b-tetrahydroindeno[1,2-d]-m-dioxin and 4,4a,5,9b-tetrahydro-2,4-dimethylindeno[1,2-d]-m-dioxin;

xx) aromatic and araliphatic aldehydes and ketones, such as, for example, benzaldehyde; phenylacetaldehyde, 3-phenylpropanal, 2-phenyl propanal, 4-methylbenzaldehyde, 4-methylphenylacetaldehyde, 3-(4-ethylphenyl)-2,2-dimethylpropanal, 2-methyl-3-(4-isopropylphenyl)propanal, 2-methyl-3-(4-tert-butylphenyl)propanal, 3-(4-tert-butylphenyl)propanal, cinnamaldehyde, alpha-butylcinnamaldehyde, alpha-amylicinnamaldehyde, alpha-hexylcinnamaldehyde, 3-methyl-5-phenylpentanal, 4-methoxybenzaldehyde, 4-hydroxy-3-methoxybenzaldehyde, 4-hydroxy-3-ethoxybenzaldehyde, 3,4-methylene-dioxybenzaldehyde, 3,4-dimethoxybenzaldehyde, 2-methyl-3-(4-methoxyphenyl)propanal, 2-methyl-3-(4-methylendioxyphenyl)propanal, acetophenone, 4-methylacetophenone, 4-methoxyacetophenone, 4-tert-butyl-2,6-dimethylacetophenone, 4-phenyl-2-butanone, 4-(4-hydroxyphenyl)-2-butanone, 1-(2-naphthalenyl)ethanone, benzophenone, 1,1,2,3,3,6-hexamethyl-5-indanyl methyl ketone, 6-tert-butyl-1,1-dimethyl-4-indanyl methyl ketone, 1-[2,3-dihydro-1,1,2,6-tetramethyl-3-(1-methyl-ethyl)-1H-5-indenyl]ethanone and 5',6',7',8'-tetrahydro-3',5',5',6',8',8'-hexamethyl-2-acetonaphthone;

xxi) aromatic and araliphatic carboxylic acids and esters thereof, such as, for example, benzoic acid, phenylacetic acid, methyl benzoate, ethyl benzoate, hexyl benzoate, benzyl benzoate, methyl phenylacetate, ethyl phenylacetate, geranyl phenylacetate, phenylethyl phenylacetate, methyl cinnamate, ethyl cinnamate, benzyl cinnamate, phenylethyl cinnamate, cinnamyl cinnamate, allyl phenoxyacetate, methyl salicylate, isoamyl salicylate, hexyl salicylate, cyclohexyl salicylate, cis-3-hexenyl salicylate, benzyl salicylate, phenylethyl salicylate, methyl 2,4-dihydroxy-3,6-dimethylbenzoate, ethyl 3-phenylglycidate and ethyl 3-methyl-3-phenylglycidate;

xxii) nitrogen-containing aromatic compounds, such as, for example, 2,4,6-trinitro-1,3-dimethyl-5-tert-butylbenzene, 3,5-dinitro-2,6-dimethyl-4-tert-butylacetophenone, cinnamionitrile, 5-phenyl-3-methyl-2-pentenitrile, 5-phenyl-3-methylpentanonitrile, methyl anthranilate, methyl-N-methylantranilate, Schiff's bases of methyl anthranilate with 7-hydroxy-3,7-dimethyloctanal, 2-methyl-3-(4-tert-butylphenyl)propanal or 2,4-dimethyl-3-cyclohexene carbaldehyde, 6-isopropylquinoline, 6-isobutylquinoline, 6-sec-butylquinoline, indole, skatole, 2-methoxy-3-isopropylpyrazine and 2-isobutyl-3-methoxypyrazine;

xxiii) phenols, phenyl ethers and phenyl esters, such as, for example, estragole, anethole, eugenol, eugenyl methyl ether, isoeugenol, isoeugenol methyl ether, thymol, carvacrol, diphenyl ether, beta-naphthyl methyl ether, beta-naphthyl ethyl ether, beta-naphthyl isobutyl ether, 1,4-dimethoxybenzene, eugenyl acetate, 2-methoxy-4-methylphenol, 2-ethoxy-5-(1-propenyl)phenol and p-cresyl phenylacetate;

xxiv) heterocyclic compounds, such as, for example, 2,5-dimethyl-4-hydroxy-2H-furan-3-one, 2-ethyl-4-hydroxy-5-methyl-2H-furan-3-one, 3-hydroxy-2-methyl-4H-pyran-4-one, 2-ethyl-3-hydroxy-4H-pyran-4-one;

xxv) lactones, such as, for example, 1,4-octanolide, 3-methyl-1,4-octanolide, 1,4-nonanolide, 1,4-decanolide, 8-decen-1,4-olide, 1,4-undecanolide, 1,4-dodecanolide, 1,5-decanolide, 1,5-dodecanolide, 1,15-pentadecanolide, cis- and trans-1'-pentadecen-1,15-olide, cis- and trans-12-pentadecen-1,15-olide, 1,16-hexadecanolide, 9-hexadecen-1,16-olide, 10-oxa-1,16-hexadecanolide, 11-oxa-1,16-hexadecanolide, 12-oxa-1,16-hexadecanolide, ethylene-1,12-dodecanedioate, ethylene-1,13-tridecanedioate, coumarin, 2,3-dihydrocoumarin, and octahydrocoumarin.

[0015] Naturally occurring exudates such as essential oils extracted from plants may also be used as fragrant components in the invention. Essential oils are usually extracted by processes of steam distillation, solid-phase extraction, cold pressing, solvent extraction, supercritical fluid extraction, hydrodistillation or simultaneous distillation-extraction. Essential oils may be derived from several different parts of the plant, including for example leaves, flowers, roots, buds,

twigs, rhizomes, heartwood, bark, resin, seeds and fruits. The major plant families from which essential oils are extracted include *Asteraceae*, *Myrtaceae*, *Lauraceae*, *Lamiaceae*, *Myrtaceae*, *Rutaceae* and *Zingiberaceae*. The oil is "essential" in the sense that it carries a distinctive scent, or essence, of the plant.

[0016] Essential oils are understood by those skilled in the art to be complex mixtures which generally consist of several tens or hundreds of constituents. Most of these constituents possess an isoprenoid skeleton with 10 atoms of carbon (monoterpenes), 15 atoms of carbon (sesquiterpenes) or 20 atoms of carbon (diterpenes). Lesser quantities of other constituents can also be found, such as alcohols, aldehydes, esters and phenols. However, an individual essential oil is usually considered as a single ingredient in the context of practical fragrance formulation. Therefore, an individual essential oil may be considered as a single fragrant component for the purposes of this invention.

[0017] Specific examples of essential oils for use as fragrant components in the invention include cedarwood oil, juniper oil, cumin oil, cinnamon bark oil, camphor oil, rosewood oil, ginger oil, basil oil, eucalyptus oil, lemongrass oil, peppermint oil, rosemary oil, spearmint oil, tea tree oil, frankincense oil, chamomile oil, clove oil, jasmine oil, lavender oil, rose oil, ylang-ylang oil, bergamot oil, grapefruit oil, lemon oil, lime oil, orange oil, fir needle oil, galbanum oil, geranium oil, grapefruit oil, pine needle oil, caraway oil, labdanum oil, lovage oil, marjoram oil, mandarin oil, clary sage oil, nutmeg oil, myrtle oil, clove oil, neroli oil, patchouli oil, sandalwood oil, thyme oil, verbena oil, vetiver oil and wintergreen oil.

[0018] The number of different fragrant components contained in the fragrance formulation (f1) will generally be at least 4, preferably at least 6, more preferably at least 8 and most preferably at least 10, such as from 10 to 200 and more preferably from 10 to 100.

[0019] Typically, no single fragrant component will comprise more than 70% by weight of the total weight of fragrance formulation (f1). Preferably no single fragrant component will comprise more than 60% by weight of the total weight of fragrance formulation (f1) and more preferably no single fragrant component will comprise more than 50% by weight of the total weight of fragrance formulation (f1).

[0020] The term "fragrance formulation" in the context of this invention denotes the fragrant components as defined above, plus any optional excipients. Excipients may be included within fragrance formulations for various purposes, for example as solvents for insoluble or poorly-soluble components, as diluents for the more potent components or to control the vapour pressure and evaporation characteristics of the fragrance formulation. Excipients may have many of the characteristics of fragrant components but they do not have strong odours in themselves. Accordingly, excipients may be distinguished from fragrant components because they can be added to fragrance formulations in high proportions such as 30% or even 50% by weight of the total weight of the fragrance formulation without significantly changing the odour quality of the fragrance formulation. Some examples of suitable excipients include ethanol, isopropanol, diethylene glycol monoethyl ether, dipropylene glycol, diethyl phthalate and triethyl citrate. Mixtures of any of the above described materials may also be suitable.

[0021] A suitable fragrance formulation (f1) for use in the invention comprises a blend of at least 10 fragrant components selected from hydrocarbons i); aliphatic and araliphatic alcohols ii); aliphatic aldehydes and their acetals iv); aliphatic carboxylic acids and esters thereof viii); acyclic terpene alcohols ix); cyclic terpene aldehydes and ketones xii); cyclic and cycloaliphatic ethers xiii); esters of cyclic alcohols xvi); esters of araliphatic alcohols and aliphatic carboxylic acids xviii); araliphatic ethers and their acetals xix); aromatic and araliphatic aldehydes and ketones xx) and aromatic and araliphatic carboxylic acids and esters thereof xxi); as are further described and exemplified above.

[0022] The content of fragrant components preferably ranges from 50 to 100%, more preferably from 60 to 100% and most preferably from 75 to 100% by weight based on the total weight of fragrance formulation (f1); with one or more excipients (as described above) making up the balance of the fragrance formulation (f1) as necessary.

[0023] Fragrance formulation (f1) is in the form of free droplets dispersed in the composition. The term "free droplets" in the context of this invention denotes droplets which are not entrapped within discrete polymeric microparticles.

[0024] In a typical liquid laundry detergent composition according to the invention the level of fragrance formulation (f1) will generally range from 0.1 to 0.75%, and preferably ranges from 0.3 to 0.6% (by weight based on the total weight of the composition).

Fragrance formulation (f2)

[0025] A fragrance formulation (f2) for use in the invention will typically contain a blend of selected fragrant components, optionally mixed with one or more excipients, as described above for fragrance formulation (f1).

[0026] Fragrance formulation (f2) and fragrance formulation (f1) may be the same or different. Fragrance formulation (f2) is entrapped within discrete polymeric microparticles dispersed within the composition.

[0027] The microparticle for use in the invention is a microcapsule. Microencapsulation may be defined as the process of surrounding or enveloping one substance within another substance on a very small scale, yielding capsules ranging from less than one micron to several hundred microns in size. The material that is encapsulated may be called the core, the active ingredient or agent, fill, payload, nucleus, or internal phase. The material encapsulating the core may be referred to as the coating, membrane, shell, or wall material.

[0028] The microcapsules have at least one generally spherical continuous shell surrounding the core. The shell may contain pores, vacancies or interstitial openings depending on the materials and encapsulation techniques employed. Multiple shells may be made of the same or different encapsulating materials, and may be arranged in strata of varying thicknesses around the core.

[0029] The shell may have a barrier function protecting the core material from the environment external to the microcapsule, but it may also act as a means of modulating the release of core materials such as fragrance. Thus, a shell may be water soluble or water swellable and fragrance release may be actuated in response to exposure of the microcapsules to a moist environment. Similarly, if a shell is temperature sensitive, a microcapsule might release fragrance in response to elevated temperatures. Microcapsules may also release fragrance in response to shear forces applied to the surface of the microcapsules.

[0030] The polymeric microparticle for use in the invention is a polymeric core-shell microcapsule in which at least one generally spherical continuous shell of polymeric material surrounds a core containing the fragrance formulation (f2). The shell will typically comprise at most 20% by weight based on the total weight of the microcapsule. The fragrance formulation (f2) will typically comprise from about 10 to about 60% and preferably from about 20 to about 40% by weight based on the total weight of the microcapsule. The amount of fragrance (f2) may be measured by taking a slurry of the microcapsules, extracting into ethanol and measuring by liquid chromatography.

[0031] Polymeric core-shell microcapsules may be prepared using methods known to those skilled in the art such as coacervation, interfacial polymerization, and polycondensation.

[0032] The process of coacervation typically involves encapsulation of a generally water-insoluble core material by the precipitation of colloidal material(s) onto the surface of droplets of the material. Coacervation may be simple e.g. using one colloid such as gelatin, or complex where two or possibly more colloids of opposite charge, such as gelatin and gum arabic or gelatin and carboxymethyl cellulose, are used under carefully controlled conditions of pH, temperature and concentration.

[0033] Interfacial polymerisation typically proceeds with the formation of a fine dispersion of oil droplets (the oil droplets containing the core material) in an aqueous continuous phase. The dispersed droplets form the core of the future microcapsule and the dimensions of the dispersed droplets directly determine the size of the subsequent microcapsules. Microcapsule shell-forming materials (monomers or oligomers) are contained in both the dispersed phase (oil droplets) and the aqueous continuous phase and they react together at the phase interface to build a polymeric wall around the oil droplets thereby to encapsulate the droplets and form core-shell microcapsules. An example of a core-shell microcapsule produced by this method is a polyurea microcapsule with a shell formed by reaction of diisocyanates or polyisocyanates with diamines or polyamines. Polycondensation involves forming a dispersion or emulsion of the core material in an aqueous solution of precondensate of polymeric materials under appropriate conditions of agitation to produce capsules of a desired size, and adjusting the reaction conditions to cause condensation of the precondensate by acid catalysis, resulting in the condensate separating from solution and surrounding the dispersed core material to produce a coherent film and the desired microcapsules. An example of a core-shell microcapsule produced by this method is an aminoplast microcapsule with a shell formed from the polycondensation product of melamine (2,4,6-triamino-1,3,5-triazine) or urea with formaldehyde. Suitable cross-linking agents (e.g. toluene diisocyanate, divinyl benzene, butanediol diacrylate) may also be used and secondary wall polymers may also be used as appropriate, e.g. anhydrides and their derivatives, particularly polymers and copolymers of maleic anhydride.

[0034] The polymeric core-shell microcapsule for use in the invention is an aminoplast microcapsule with an aminoplast shell surrounding a core containing the fragrance formulation (f2). More preferably such an aminoplast shell is formed from the polycondensation product of melamine with formaldehyde.

[0035] Polymeric microparticles suitable for use in the invention will generally have an average particle size between 100 nanometers and 50 microns. Particles larger than this are entering the visible range. Examples of particles in the sub-micron range include latexes and mini-emulsions with a typical size range of 100 to 600 nanometers. The preferred particle size range is in the micron range. Examples of particles in the micron range include polymeric core-shell microcapsules (such as those further described above) with a typical size range of 1 to 50 microns, preferably 5 to 30 microns. The average particle size can be determined by light scattering using a Malvern Mastersizer with the average particle size being taken as the median particle size D (0.5) value. The particle size distribution can be narrow, broad or multimodal. If necessary, the microcapsules as initially produced may be filtered or screened to produce a product of greater size uniformity.

[0036] Polymeric microparticles for use in the invention are provided with a deposition aid at the outer surface of the microparticle. Deposition aids serve to modify the properties of the exterior of the microparticle, for example to make the microparticle more substantive to a desired substrate. Desired substrates include cellulose (including cotton) and polyesters (including those employed in the manufacture of polyester fabrics).

[0037] In the polymeric core-shell microcapsules a deposition aid is attached to the outside of the shell by means of covalent bonding. While it is preferred that the deposition aid is attached directly to the outside of the shell, it may also be attached via a linking species.

[0038] Deposition aids for use in the invention may suitably be selected from polysaccharides having an affinity for cellulose. Such polysaccharides may be naturally occurring or synthetic and may have an intrinsic affinity for cellulose or may have been derivatised or otherwise modified to have an affinity for cellulose. Suitable polysaccharides have a 1-4 linked β glycan (generalised sugar) backbone structure with at least 4, and preferably at least 10 backbone residues which are β 1-4 linked, such as a glucan backbone (consisting of β 1-4 linked glucose residues), a mannan backbone (consisting of β 1-4 linked mannose residues) or a xylan backbone (consisting of β 1-4 linked xylose residues). Examples of such β 1-4 linked polysaccharides include xyloglucans, glucomannans, mannans, galactomannans, β (1-3),(1-4) glucan and the xylan family incorporating glucurono-, arabino- and glucuronoarabinoxylans. Preferred β 1-4 linked polysaccharides for use in the invention may be selected from xyloglucans of plant origin, such as pea xyloglucan and tamarind seed xyloglucan (TXG) (which has a β 1-4 linked glucan backbone with side chains of α -D xylopyranose and β -D-galactopyranosyl-(1-2)- α -D-xylo-pyranose, both 1-6 linked to the backbone); and galactomannans of plant origin such as locust bean gum (LBG) (which has a mannan backbone of β 1-4 linked mannose residues, with single unit galactose side chains linked α 1-6 to the backbone).

[0039] Also suitable are polysaccharides which may gain an affinity for cellulose upon hydrolysis, such as cellulose mono-acetate; or modified polysaccharides with an affinity for cellulose such as hydroxypropyl cellulose, hydroxypropyl methylcellulose, hydroxyethyl methylcellulose, hydroxypropyl guar, hydroxyethyl ethylcellulose and methylcellulose.

[0040] Deposition aids for use in the invention may also be selected from phthalate containing polymers having an affinity for polyester. Such phthalate containing polymers may have one or more nonionic hydrophilic segments comprising oxyalkylene groups (such as oxyethylene, polyoxyethylene, oxypropylene or polyoxypropylene groups), and one or more hydrophobic segments comprising terephthalate groups. Typically, the oxyalkylene groups will have a degree of polymerization of from 1 to about 400, preferably from 100 to about 350, more preferably from 200 to about 300. A suitable example of a phthalate containing polymer of this type is a copolymer having random blocks of ethylene terephthalate and polyethylene oxide terephthalate.

[0041] Mixtures of any of the above described materials may also be suitable.

[0042] Deposition aids for use in the invention will generally have a weight average molecular weight (M_w) in the range of from about 5 kDa to about 500 kDa, preferably from about 10 kDa to about 500 kDa and more preferably from about 20 kDa to about 300 kDa.

[0043] One example of a particularly preferred polymeric core-shell microcapsule for use in the invention is an aminoplast microcapsule with a shell formed by the polycondensation of melamine with formaldehyde; surrounding a core containing the fragrance formulation (f2); in which a deposition aid is attached to the outside of the shell by means of covalent bonding. The preferred deposition aid is selected from β 1-4 linked polysaccharides, and in particular the xyloglucans of plant origin, as are further described above.

[0044] The present inventors have surprisingly observed that it is possible to reduce the total level of fragrance included in the composition of the invention without sacrificing the overall fragrance experience delivered to the consumer at key stages in the laundry process. A reduction in the total level of fragrance is advantageous for cost and environmental reasons.

[0045] The weight ratio of fragrance formulation (f1) to fragrance formulation (f2) in the composition of the invention preferably ranges from 60:40 to 45:55. Particularly good results have been obtained at a weight ratio of fragrance formulation (f1) to fragrance formulation (f2) of around 50:50.

[0046] The fragrance (f1) and fragrance (f2) are typically incorporated at different stages of formation of the composition of the invention. Typically, the discrete polymeric microparticles (e.g. microcapsules) entrapping fragrance formulation (f2) are added in the form of a slurry to a warmed base formulation comprising other components of the composition (such as surfactants and solvents). Fragrance (f1) is typically post-dosed later after the base formulation has cooled.

Liquid laundry detergents

[0047] The term "laundry detergent" in the context of this invention denotes formulated compositions intended for and capable of wetting and cleaning domestic laundry such as clothing, linens and other household textiles. The term "linen" is often used to describe certain types of laundry items including bed sheets, pillow cases, towels, tablecloths, table napkins and uniforms. Textiles can include woven fabrics, non-woven fabrics, and knitted fabrics; and can include natural or synthetic fibres such as silk fibres, linen fibres, cotton fibres, polyester fibres, polyamide fibres such as nylon, acrylic fibres, acetate fibres, and blends thereof including cotton and polyester blends.

[0048] Examples of liquid laundry detergents include heavy-duty liquid laundry detergents for use in the wash cycle of automatic washing machines, as well as liquid fine wash and liquid colour care detergents such as those suitable for washing delicate garments (e.g. those made of silk or wool) either by hand or in the wash cycle of automatic washing machines.

[0049] The term "liquid" in the context of this invention denotes that a continuous phase or predominant part of the composition is liquid and that the composition is flowable at 15°C and above. Accordingly, the term "liquid" may encompass

emulsions, suspensions, and compositions having flowable yet stiffer consistency, known as gels or pastes. The viscosity of the composition may suitably range from about 200 to about 10,000 mPa.s at 25°C at a shear rate of 21 sec⁻¹. This shear rate is the shear rate that is usually exerted on the liquid when poured from a bottle. Pourable liquid detergent compositions generally have a viscosity of from 200 to 1,500 mPa.s, preferably from 200 to 500 mPa.s. Liquid detergent compositions which are pourable gels generally have a viscosity of from 1,500 mPa.s to 6,000 mPa.s, preferably from 1,500 mPa.s to 2,000 mPa.s.

[0050] A composition according to the invention may suitably have an aqueous continuous phase. By "aqueous continuous phase" is meant a continuous phase which has water as its basis. Compositions with an aqueous continuous phase will generally comprise from 15 to 95%, preferably from 20 to 90%, more preferably from 25 to 85% water (by weight based on the total weight of the composition).

[0051] A composition according to the invention may also have a low water content, for example when the composition is intended for packaging in polymeric film soluble in the wash water. Low water content compositions will generally comprise no more than 20%, and preferably no more than 10%, such as from 5 to 10% water (by weight based on the total weight of the composition).

[0052] A composition of the invention with an aqueous continuous phase preferably has a pH in the range of 5 to 9, more preferably 6 to 8, when measured on dilution of the composition to 1% using demineralised water.

[0053] The composition of the invention comprises from 3 to 60%, preferably from 5 to 40%, and more preferably from 6 to 30% by weight based on the total weight of the composition of one or more deterative surfactants selected from non-soap anionic surfactants, nonionic surfactants and mixtures thereof.

[0054] The term "deterative surfactant" in the context of this invention denotes a surfactant which provides a deterative (i.e. cleaning) effect to laundry treated as part of a domestic laundering process.

[0055] Non-soap anionic surfactants for use in the invention are typically salts of organic sulfates and sulfonates having alkyl radicals containing from about 8 to about 22 carbon atoms, the term "alkyl" being used to include the alkyl portion of higher acyl radicals. Examples of such materials include alkyl sulfates, alkyl ether sulfates, alkaryl sulfonates, alphaolefin sulfonates and mixtures thereof. The alkyl radicals preferably contain from 10 to 18 carbon atoms and may be unsaturated. The alkyl ether sulfates may contain from one to ten ethylene oxide or propylene oxide units per molecule, and preferably contain one to three ethylene oxide units per molecule. The counterion for anionic surfactants is generally an alkali metal such as sodium or potassium; or an ammoniacal counterion such as monoethanolamine, (MEA) diethanolamine (DEA) or triethanolamine (TEA). Mixtures of such counterions may also be employed.

[0056] A preferred class of non-soap anionic surfactant for use in the invention includes alkylbenzene sulfonates, particularly linear alkylbenzene sulfonates (LAS) with an alkyl chain length of from 10 to 18 carbon atoms. Commercial LAS is a mixture of closely related isomers and homologues alkyl chain homologues, each containing an aromatic ring sulfonated at the "para" position and attached to a linear alkyl chain at any position except the terminal carbons. The linear alkyl chain typically has a chain length of from 11 to 15 carbon atoms, with the predominant materials having a chain length of about C₁₂. Each alkyl chain homologue consists of a mixture of all the possible sulfophenyl isomers except for the 1-phenyl isomer. LAS is normally formulated into compositions in acid (i.e. HLAS) form and then at least partially neutralized in-situ.

[0057] Also suitable are alkyl ether sulfates having a straight or branched chain alkyl group having 10 to 18, more preferably 12 to 14 carbon atoms and containing an average of 1 to 3EO units per molecule. A preferred example is sodium lauryl ether sulfate (SLES) in which the predominantly C₁₂ lauryl alkyl group has been ethoxylated with an average of 3EO units per molecule.

[0058] Some alkyl sulfate surfactant (PAS) may be used, such as non-ethoxylated primary and secondary alkyl sulfates with an alkyl chain length of from 10 to 18.

[0059] Mixtures of any of the above described materials may also be used. A preferred mixture of non-soap anionic surfactants for use in the invention comprises linear alkylbenzene sulfonate (preferably C₁₁ to C₁₅ linear alkyl benzene sulfonate) and sodium lauryl ether sulfate. (preferably C₁₀ to C₁₈ alkyl sulfate ethoxylated with an average of 1 to 3 EO)

[0060] In a composition of the invention the total level of non-soap anionic surfactant may suitably range from 5 to 15% (by weight based on the total weight of the composition).

[0061] Nonionic surfactants for use in the invention are typically polyoxyalkylene compounds, i.e. the reaction product of alkylene oxides (such as ethylene oxide or propylene oxide or mixtures thereof) with starter molecules having a hydrophobic group and a reactive hydrogen atom which is reactive with the alkylene oxide. Such starter molecules include alcohols, acids, amides or alkyl phenols. Where the starter molecule is an alcohol, the reaction product is known as an alcohol alkoxylate. The polyoxyalkylene compounds can have a variety of block and heteric (random) structures. For example, they can comprise a single block of alkylene oxide, or they can be diblock alkoxylates or triblock alkoxylates. Within the block structures, the blocks can be all ethylene oxide or all propylene oxide, or the blocks can contain a heteric mixture of alkylene oxides. Examples of such materials include C₈ to C₂₂ alkyl phenol ethoxylates with an average of from 5 to 25 moles of ethylene oxide per mole of alkyl phenol; and aliphatic alcohol ethoxylates such as C₈ to C₁₈ primary or secondary linear or branched alcohol ethoxylates with an average of from 2 to 40 moles of ethylene oxide per mole

of alcohol.

[0062] A preferred class of nonionic surfactant for use in the invention includes aliphatic C₈ to C₁₈, more preferably C₁₂ to C₁₅ primary linear alcohol ethoxylates with an average of from 3 to 20, more preferably from 5 to 10 moles of ethylene oxide per mole of alcohol.

[0063] Mixtures of any of the above described materials may also be used.

[0064] In a composition of the invention the total level of nonionic surfactant will suitably range from 1 to 10% (by weight based on the total weight of the composition).

[0065] A mixture of non-soap anionic and nonionic surfactants for use in the invention comprises linear alkylbenzene sulfonate (preferably C₁₁ to C₁₅ linear alkyl benzene sulfonate), sodium lauryl ether sulfate (preferably C₁₀ to C₁₈ alkyl sulfate ethoxylated with an average of 1 to 3 EO) and ethoxylated aliphatic alcohol (preferably C₁₂ to C₁₅ primary linear alcohol ethoxylate with an average of from 5 to 10 moles of ethylene oxide per mole of alcohol).

[0066] The weight ratio of total non-soap anionic surfactant to total nonionic surfactant in a composition of the invention suitably ranges from about 3:1 to about 1:1.

Optional ingredients

[0067] A composition of the invention may contain further optional ingredients to enhance performance and/or consumer acceptability, as follows:

Non-aqueous carriers

[0068] A composition of the invention may incorporate non-aqueous carriers such as hydrotropes, co-solvents and phase stabilizers. Such materials are typically low molecular weight, water-soluble or water-miscible organic liquids such as C₁ to C₅ monohydric alcohols (such as ethanol and n- or i-propanol); C₂ to C₆ diols (such as monopropylene glycol and dipropylene glycol); C₃ to C₉ triols (such as glycerol); polyethylene glycols having a weight average molecular weight (M_w) ranging from about 200 to 600; C₁ to C₃ alkanolamines such as mono-, di- and triethanolamines; and alkyl aryl sulfonates having up to 3 carbon atoms in the lower alkyl group (such as the sodium and potassium xylene, toluene, ethylbenzene and isopropyl benzene (cumene) sulfonates).

[0069] Mixtures of any of the above described materials may also be used.

[0070] Non-aqueous carriers, when included, may be present in an amount ranging from 0.1 to 20%, preferably from 1 to 15%, and more preferably from 3 to 12% (by weight based on the total weight of the composition).

Cosurfactants

[0071] A composition of the invention may contain one or more cosurfactants (such as amphoteric (zwitterionic) and/or cationic surfactants) in addition to the non-soap anionic and/or nonionic deterative surfactants described above.

[0072] Specific cationic surfactants include C₈ to C₁₈ alkyl dimethyl ammonium halides and derivatives thereof in which one or two hydroxyethyl groups replace one or two of the methyl groups, and mixtures thereof. Cationic surfactant, when included, may be present in an amount ranging from 0.1 to 5% (by weight based on the total weight of the composition).

[0073] Specific amphoteric (zwitterionic) surfactants include alkyl amine oxides, alkyl betaines, alkyl amidopropyl betaines, alkyl sulfobetaines (sultaines), alkyl glycines, alkyl carboxyglycines, alkyl amphotacetates, alkyl amphotpropionates, alkylamphotglycines, alkyl amidopropyl hydroxysultaines, acyl taurates and acyl glutamates, having alkyl radicals containing from about 8 to about 22 carbon atoms, the term "alkyl" being used to include the alkyl portion of higher acyl radicals. Amphoteric (zwitterionic) surfactant, when included, may be present in an amount ranging from 0.1 to 5% (by weight based on the total weight of the composition).

[0074] Mixtures of any of the above described materials may also be used.

Builders

[0075] A composition of the invention may contain one or more builders. Builders enhance or maintain the cleaning efficiency of the surfactant, primarily by reducing water hardness. This is done either by sequestration or chelation (holding hardness minerals in solution), by precipitation (forming an insoluble substance), or by ion exchange (trading electrically charged particles).

[0076] Builders for use in the invention can be of the organic or inorganic type, or a mixture thereof.

[0077] Suitable inorganic builders include hydroxides, carbonates, sesquicarbonates, bicarbonates, silicates, zeolites, and mixtures thereof. Specific examples of such materials include sodium and potassium hydroxide, sodium and potassium carbonate, sodium and potassium bicarbonate, sodium sesquicarbonate, sodium silicate and mixtures thereof.

[0078] Suitable organic builders include polycarboxylates, in acid and/or salt form. When utilized in salt form, alkali metal (e.g. sodium and potassium) or alkanolammonium salts are preferred. Specific examples of such materials include sodium and potassium citrates, sodium and potassium tartrates, the sodium and potassium salts of tartaric acid mono-succinate, the sodium and potassium salts of tartaric acid disuccinate, sodium and potassium ethylenediaminetetraacetates, sodium and potassium N(2-hydroxyethyl)-ethylenediamine triacetates, sodium and potassium nitrilotriacetates and sodium and potassium N-(2-hydroxyethyl)-nitrilotriacetates. Polymeric polycarboxylates may also be used, such as polymers of unsaturated monocarboxylic acids (e.g. acrylic, methacrylic, vinylacetic, and crotonic acids) and/or unsaturated dicarboxylic acids (e.g. maleic, fumaric, itaconic, mesaconic and citraconic acids and their anhydrides). Specific examples of such materials include polyacrylic acid, polymaleic acid, and copolymers of acrylic and maleic acid. The polymers may be in acid, salt or partially neutralised form and may suitably have a molecular weight (Mw) ranging from about 1,000 to 100,000, preferably from about 2,000 to about 85,000, and more preferably from about 2,500 to about 75,000.

[0079] Mixtures of any of the above described materials may also be used. Preferred builders for use in the invention may be selected from polycarboxylates (e.g. citrates) in acid and/or salt form and mixtures thereof.

[0080] Builder, when included, may be present in an amount ranging from about 0.1 to about 20%, preferably from about 0.5 to about 15%, more preferably from about 1 to about 10% (by weight based on the total weight of the composition).

Transition metal ion chelating agents

[0081] A composition of the invention may contain one or more chelating agents for transition metal ions such as iron, copper and manganese. Such chelating agents may help to improve the stability of the composition and protect for example against transition metal catalyzed decomposition of certain ingredients.

[0082] Suitable transition metal ion chelating agents include phosphonates, in acid and/or salt form. When utilized in salt form, alkali metal (e.g. sodium and potassium) or alkanolammonium salts are preferred. Specific examples of such materials include aminotris(methylene phosphonic acid) (ATMP), 1-hydroxyethylidene diphosphonic acid (HEDP) and

diethylenetriamine penta(methylene phosphonic acid) (DTPMP) and their respective sodium or potassium salts. [PA1] HEDP is preferred. Mixtures of any of the above described materials may also be used.

[0083] Transition metal ion chelating agents, when included, may be present in an amount ranging from about 0.1 to about 10%, preferably from about 0.1 to about 3% (by weight based on the total weight of the composition).

Fatty Acid

[0084] A composition of the invention will preferably contain one or more fatty acids and/ or salts thereof.

[0085] Suitable fatty acids in the context of this invention include aliphatic carboxylic acids of formula RCOOH, where R is a linear or branched alkyl or alkenyl chain containing from 6 to 24, more preferably 10 to 22, most preferably from 12 to 18 carbon atoms and 0 or 1 double bond. Preferred examples of such materials include saturated C12-18 fatty acids such as lauric acid, myristic acid, palmitic acid or stearic acid; and fatty acid mixtures in which 50 to 100% (by weight based on the total weight of the mixture) consists of saturated C12-18 fatty acids. Such mixtures may typically be derived from natural fats and/or optionally hydrogenated natural oils (such as coconut oil, palm kernel oil or tallow).

[0086] The fatty acids may be present in the form of their sodium, potassium or ammonium salts and/or in the form of soluble salts of organic bases, such as mono-, di- or triethanolamine.

[0087] Mixtures of any of the above described materials may also be used.

[0088] Fatty acids and/or their salts, when included, may be present in an amount ranging from about 0.25 to 5%, more preferably from 0.5 to 5%, most preferably from 0.75 to 4% (by weight based on the total weight of the composition).

[0089] For formula accounting purposes, in the formulation, fatty acids and/or their salts (as defined above) are not included in the level of surfactant or in the level of builder.

Polymeric cleaning boosters

[0090] To further improve the environmental profile of liquid laundry detergents it may be preferred in some cases to reduce the volume of laundry detergent dosed per wash-load and to add various highly weight efficient ingredients to the composition to boost cleaning performance. In addition to the soil release polymers of the invention described above, a composition of the invention will preferably contain one or more additional polymeric cleaning boosters such as antire-deposition polymers.

[0091] Anti-redeposition polymers stabilise the soil in the wash solution thus preventing redeposition of the soil. Suitable soil release polymers for use in the invention include alkoxylated polyethyleneimines. Polyethyleneimines are materials

composed of ethylene imine units $-\text{CH}_2\text{CH}_2\text{NH}-$ and, where branched, the hydrogen on the nitrogen is replaced by another chain of ethylene imine units. Preferred alkoxyated polyethyleneimines for use in the invention have a polyethyleneimine backbone of about 300 to about 10000 weight average molecular weight (M_w). The polyethyleneimine backbone may be linear or branched. It may be branched to the extent that it is a dendrimer. The alkoxylation may typically be ethoxylation or propoxylation, or a mixture of both. Where a nitrogen atom is alkoxyated, a preferred average degree of alkoxylation is from 10 to 30, preferably from 15 to 25 alkoxy groups per modification. A preferred material is ethoxylated polyethyleneimine, with an average degree of ethoxylation being from 10 to 30, preferably from 15 to 25 ethoxy groups per ethoxylated nitrogen atom in the polyethyleneimine backbone.

[0092] Mixtures of any of the above described materials may also be used.

[0093] When included, a composition of the invention will preferably comprise from 0.25 to 8%, more preferably from 0.5 to 6% (by weight based on the total weight of the composition) of one or more anti-redeposition polymers such as, for example, the alkoxyated polyethyleneimines which are described above.

Polymeric thickeners

[0094] A composition of the invention may comprise one or more polymeric thickeners. Suitable polymeric thickeners for use in the invention include hydrophobically modified alkali swellable emulsion (HASE) copolymers. Exemplary HASE copolymers for use in the invention include linear or crosslinked copolymers that are prepared by the addition polymerization of a monomer mixture including at least one acidic vinyl monomer, such as (meth)acrylic acid (i.e. methacrylic acid and/or acrylic acid); and at least one associative monomer. The term "associative monomer" in the context of this invention denotes a monomer having an ethylenically unsaturated section (for addition polymerization with the other monomers in the mixture) and a hydrophobic section. A preferred type of associative monomer includes a polyoxyalkylene section between the ethylenically unsaturated section and the hydrophobic section. Preferred HASE copolymers for use in the invention include linear or crosslinked copolymers that are prepared by the addition polymerization of (meth)acrylic acid with (i) at least one associative monomer selected from linear or branched C_8 - C_{40} alkyl (preferably linear C_{12} - C_{22} alkyl) polyethoxylated (meth)acrylates; and (ii) at least one further monomer selected from C_1 - C_4 alkyl (meth) acrylates, polyacidic vinyl monomers (such as maleic acid, maleic anhydride and/or salts thereof) and mixtures thereof. The polyethoxylated portion of the associative monomer (i) generally comprises about 5 to about 100, preferably about 10 to about 80, and more preferably about 15 to about 60 oxyethylene repeating units.

[0095] Mixtures of any of the above described materials may also be used.

[0096] When included, a composition of the invention will preferably comprise from 0.1 to 5% (by weight based on the total weight of the composition) of one or more polymeric thickeners such as, for example, the HASE copolymers which are described above.

External Structurants

[0097] Compositions of the invention may have their rheology further modified by use of one or more external structurants which form a structuring network within the composition. Examples of such materials include hydrogenated castor oil, microfibrinous cellulose and citrus pulp fibre. The presence of an external structurant may provide shear thinning rheology and may also enable materials such as encapsulates and visual cues to be suspended stably in the liquid.

Enzymes

[0098] A composition of the invention may comprise an effective amount of one or more enzyme selected from the group comprising, pectate lyase, protease, amylase, cellulase, lipase, mannanase and mixtures thereof. The enzymes are preferably present with corresponding enzyme stabilizers.

Further Optional Ingredients

[0099] A composition of the invention may contain further optional ingredients to enhance performance and/or consumer acceptability. Examples of such ingredients include foam boosting agents, preservatives (e.g. bactericides), polyelectrolytes, anti-shrinking agents, anti-wrinkle agents, anti-oxidants, sunscreens, anti-corrosion agents, drape imparting agents, anti-static agents, ironing aids, colorants, pearlisers and/or opacifiers, and shading dye. Each of these ingredients will be present in an amount effective to accomplish its purpose. Generally, these optional ingredients are included individually at an amount of up to 5% (by weight based on the total weight of the composition).

Packaging and dosing

[0100] A composition of the invention may be packaged as unit doses in polymeric film soluble in the wash water. Alternatively, a composition of the invention may be supplied in multidose plastics packs with a top or bottom closure.

A dosing measure may be supplied with the pack either as a part of the cap or as an integrated system.

[0101] A method of laundering fabric using a composition of the invention will usually involve diluting the dose of detergent composition with water to obtain a wash liquor, and washing fabrics with the wash liquor so formed.

[0102] The dilution step preferably provides a wash liquor which comprises *inter alia* from about 3 to about 20 g/wash of deterative surfactants (as are further defined above).

[0103] In automatic washing machines the dose of detergent composition is typically put into a dispenser and from there it is flushed into the machine by the water flowing into the machine, thereby forming the wash liquor. From 5 up to about 65 litres of water may be used to form the wash liquor depending on the machine configuration. The dose of detergent composition may be adjusted accordingly to give appropriate wash liquor concentrations. For example, dosages for a typical front-loading washing machine (using 10 to 15 litres of water to form the wash liquor) may range from about 10 ml to about 60 ml, preferably about 15 to 40 ml. Dosages for a typical top-loading washing machine (using from 40 to 60 litres of water to form the wash liquor) may be higher, e.g. up to about 100 ml.

[0104] A subsequent aqueous rinse step and drying the laundry is preferred.

[0105] The invention will now be further described with reference to the following non-limiting Examples.

EXAMPLES

[0106] Detergent compositions having various ratios of encapsulated fragrance to free fragrance were prepared having ingredients as shown in Table 1. All weight percentages are by weight based on total weight of the formulation, unless otherwise specified.

Table 1

Ingredient	wt% (active ingredient)								
	A	1	B	C	D	E	F	2	3
Water, minors	q.s. to 100								
Structurant ⁽¹⁾	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Glycerol	2	2	2	2	2	2	2	2	2
Nonionic surfactant ⁽²⁾	4.37	4.37	4.37	4.37	4.37	4.37	4.37	4.37	4.37
Thickener ⁽³⁾	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Fluorescer ⁽⁴⁾	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Triethanolamine	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82	8.82
LAS acid ⁽⁵⁾	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82
Fatty acid ⁽⁶⁾	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Sequestrant ⁽⁷⁾	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Citric acid	1	1	1	1	1	1	1	1	1
SLES 3EO	4.37	4.37	4.37	4.37	4.37	4.37	4.37	4.37	4.37
EPEI ⁽⁸⁾	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
SRP ⁽⁹⁾	1	1	1	1	1	1	1	1	1
Opacifier ⁽¹⁰⁾	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Encapsulated fragrance	0	0.46	0.48	0.45	0.41	0.54	0.56	0.34	0.29

(continued)

Ingredient	wt% (active ingredient)								
	A	1	B	C	D	E	F	2	3
Free fragrance	1.4	0.44	0.23	0.08	0.26	0.07	0.27	0.49	0.36
(1) Citrus pulp fibre (2) C12-15 alcohol ethoxylate (7EO) (3) HASE copolymer (4) Bis-(triazinylamino)-stilbene disulfonic acid derivative (5) C ₁₂₋₁₄ linear alkylbenzene sulfonic acid (6) Hydrogenated topped coconut fatty acid (7) 1-hydroxyethane-1,1-diphosphonic acid (HEDP) (8) Ethoxylated polyethyleneimine (9) Polyester soil release polymer (10) Styrene/acrylates copolymer									

[0107] The absolute and relative levels of free fragrance (f1) and encapsulated fragrance (f2) respectively in each of the formulations of Table 1 is shown below in Table 2. Examples 1 to 3 represent formulations according to the invention. Examples A to F represent comparative examples (not according to the invention).

Table 2

Example	Level of f1	Level of f2	Total level of (f1 +f2)	Weight ratio f1:f2
	(wt%)			
A	1.4	0	1.4	n/a
1	0.44	0.46	0.9	49:51
B	0.23	0.48	0.71	32:68
C	0.08	0.45	0.53	15:85
D	0.26	0.41	0.67	39:61
E	0.07	0.54	0.61	11:89
F	0.27	0.56	0.83	33:67
2	0.49	0.34	0.83	59:41
3	0.36	0.29	0.65	55:45

Evaluation

[0108] Each of the formulations in Table 1 above were evaluated for fragrance performance by trained expert sensory panellists.

[0109] Firstly, the fragrance intensity was assessed for each test formulation *per se* (i.e. prior to use). Each test formulation was then used to machine wash 2kg loads of test fabric (50:50 cotton / polyester split) using a 30°C cotton short wash programme. Fragrance intensity of the washed test fabric was assessed at the damp stage (1 hour after removal from the washing machine) and at the dry stage (24 hours after removal from the washing machine).

Results

[0110] The results are shown below in Table 3.

Table 3

Example	Fragrance intensity (formulation <i>per se</i>)	Fragrance intensity (damp test fabric)	Fragrance intensity (dry test fabric)
A	80.82	65.83	12.05

(continued)

Example	Fragrance intensity (formulation <i>per se</i>)	Fragrance intensity (damp test fabric)	Fragrance intensity (dry test fabric)
1	78.53	61.30	44.64
B	46.65	30.98	26.05
C	25.06	28.42	21.44 24.13
D	64.83	34.26	
E	22.87	29.32	25.19
F	55.94	35.56	27.21
2	77.52	54.22	23.58
3	63.88	52.68	37.23

[0111] These results show that Example A, containing only free fragrance, has little effect on the fragrance intensity of the dry test fabric. However the Example 1 formulation (according to the invention) provides a comparable fragrance intensity to Example A for the formulation *per se* and on the damp test fabric, and a significantly better result on the dry test fabric, despite containing a lower level of total fragrance than Example A.

[0112] Example F contains essentially the same amount of total fragrance as Example 2 (according to the invention), but the Example 2 formulation performs significantly better in the tests on the formulation *per se* and the damp test fabric.

[0113] Example D contains a similar amount of total fragrance as Example 3 (according to the invention). The two formulations gave similar results in the test on the formulation *per se* but the Example 3 formulation performs significantly better in the tests on both the damp and the dry test fabric.

[0114] All Examples 1 to 3 according to the invention show a surprising boost in the fragrance intensity observed for damp fabric as compared to Examples B to F.

[0115] These results show the improved overall sensory effect from the inventive formulations when assessed for the three stages of: (i) formulation prior to use; (ii) damp laundry after a wash process and (iii) dry laundry.

Claims

1. A liquid laundry detergent composition comprising:

- a) from 3 to 60% by weight based on the total weight of the composition of one or more deterative surfactants selected from non-soap anionic surfactants, nonionic surfactants and mixtures thereof;
- b) from 0.01 to 1% by weight based on the total weight of the composition of a fragrance formulation (f1) which is in the form of free droplets dispersed in the composition;
- c) from 0.01 to 1% by weight based on the total weight of the composition of a fragrance formulation (f2) which is entrapped within discrete polymeric microparticles dispersed in the composition, in which the polymeric microparticles are polymeric core-shell microcapsules in which at least one generally spherical continuous shell of polymeric material surrounds a core containing the fragrance formulation (f2);
- in which the total amount of fragrance formulation (f1) and fragrance formulation (f2) ranges from 0.6 to 0.9% by weight based on the total weight of the composition;
- and in which the weight ratio of fragrance formulation (f1) to fragrance formulation (f2) in the composition ranges from 40:60 to 60:40; and in which the polymeric core-shell microcapsule is an aminoplast microcapsule with an aminoplast shell surrounding a core containing the fragrance formulation (f2); in which a deposition aid is attached to the outside of the shell by means of covalent bonding.

2. A composition according to claim 1, in which the fragrance formulation (f1) and the fragrance formulation (f2) each comprise a blend of at least 10 fragrant

components selected from hydrocarbons; aliphatic and araliphatic alcohols; aliphatic aldehydes and their acetals; aliphatic carboxylic acids and esters thereof; acyclic terpene alcohols; cyclic terpene aldehydes and ketones; cyclic and cycloaliphatic ethers; esters of cyclic alcohols; esters of araliphatic alcohols and

aliphatic carboxylic acids; araliphatic ethers and their acetals; aromatic and araliphatic aldehydes and ketones; and aromatic and araliphatic carboxylic acids and esters thereof.

3. A composition according to claim 1 or claim 2, in which the level of fragrance formulation (f1) ranges from 0.1 to 0.75% by weight based on the total weight of the composition.
4. A composition according to any one of claims 1 to 3, in which the level of fragrance formulation (f2) ranges from 0.05 to 0.7% by weight based on the total weight of the composition.
5. A composition according to any one of claims 1 to 4, in which the weight ratio of fragrance formulation (f1) to fragrance formulation (f2) ranges from 60:40 to 45:55.
6. A composition according to any one of claims 1 to 5, in which the amount of deterative surfactant is from 6 to 30% by weight based on the total weight of the composition.
7. A method of laundering fabric using a composition according to any one of claims 1 to 6, the method comprising diluting a dose of the composition to obtain a wash liquor, and washing fabrics with the wash liquor so formed.

Patentansprüche

1. Flüssige Waschmittelzusammensetzung, umfassend:

a) 3 bis 60 Gewichts-%, bezogen auf das Gesamtgewicht der Zusammensetzung, eines oder mehrerer Reinigungstenside, ausgewählt aus anionischen Nicht-Seife-Tensiden, nichtionischen Tensiden und Mischungen davon;

b) 0,01 bis 1 Gewichts-%, bezogen auf das Gesamtgewicht der Zusammensetzung, von einer Duftstoffformulierung (f1), die in Form von freien Tröpfchen vorliegt, die in der Zusammensetzung dispergiert sind;

c) 0,01 bis 1 Gewichts-%, bezogen auf das Gesamtgewicht der Zusammensetzung, von einer Duftstoffformulierung (f2), die in diskreten polymeren Mikroteilchen eingeschlossen ist, die in der Zusammensetzung dispergiert sind; wobei die polymeren Mikroteilchen polymere Kern-Schale-Mikrokapseln sind, in denen mindestens eine im Allgemeinen kugelförmige kontinuierliche Schale aus Polymermaterial einen Kern umgibt, der die Duftstoffformulierung (f2) enthält;

wobei die Gesamtmenge an Duftstoffformulierung (f1) und Duftstoffformulierung (f2) im Bereich von 0,6 bis 0,9 Gewichts-%, bezogen auf das Gesamtgewicht der Zusammensetzung, liegt;

und wobei das Gewichtsverhältnis von Duftstoffformulierung (f1) zu Duftstoffformulierung (f2) in der Zusammensetzung im Bereich von 40:60 bis 60:40 liegt; und bei der die polymere Kern-Schale-Mikrokapsel eine Aminoplast-Mikrokapsel mit einer Aminoplastschale, die einen Kern umgibt, der die Duftstoffformulierung (f2) enthält, ist; in der mittels kovalenter Bindung ein Abscheidungshilfsmittel an der Außenseite der Schale angebracht ist.

2. Zusammensetzung nach Anspruch 1, in der die Duftstoffformulierung (f1) und die Duftstoffformulierung (f2) jeweils eine Mischung von mindestens 10 Duftstoffkomponenten umfassen, die ausgewählt sind aus Kohlenwasserstoffen; aliphatischen und araliphatischen Alkoholen;

aliphatischen Aldehyden und deren Acetalen; aliphatischen Carbonsäuren und deren Estern; acyclischen Terpenalkoholen; cyclischen Terpenaldehyden und Ketonen; cyclischen und cycloaliphatischen Ethern; Estern von cyclischen Alkoholen; Estern von araliphatischen Alkoholen und aliphatischen Carbonsäuren; araliphatischen Ethern und deren Acetalen; aromatischen und araliphatischen Aldehyden und Ketonen; und aromatischen und araliphatischen Carbonsäuren und deren Estern.

3. Zusammensetzung nach Anspruch 1 oder Anspruch 2, wobei der Gehalt an Duftstoffformulierung (f1) im Bereich von 0,1 bis 0,75 Gewichts-%, bezogen auf das Gesamtgewicht der Zusammensetzung, liegt.

4. Zusammensetzung nach irgendeinem der Ansprüche 1 bis 3, wobei der Gehalt an Duftstoffformulierung (f2) im Bereich von 0,05 bis 0,7 Gewichts-%, bezogen auf das Gesamtgewicht der Zusammensetzung, liegt.

5. Zusammensetzung nach irgendeinem der Ansprüche 1 bis 4, wobei das Gewichtsverhältnis der Duftstoffformulierung (f1) zur Duftstoffformulierung (f2) im Bereich von 60:40 bis 45:55 liegt.

6. Zusammensetzung nach irgendeinem der Ansprüche 1 bis 5, in der die Menge an Reinigungstensid 6 bis 30 Gewichts-%, bezogen auf das Gesamtgewicht der Zusammensetzung, beträgt.
7. Verfahren zum Waschen von Textilien unter Verwendung einer Zusammensetzung nach irgendeinem der Ansprüche 1 bis 6, wobei das Verfahren das Verdünnen einer Dosis der Zusammensetzung zum Erhalten einer Waschflüssigkeit und das Waschen von Textilien mit der so gebildeten Waschflüssigkeit umfasst.

Revendications

1. Composition de détergent de lessive liquide comprenant :

a) de 3 à 60 % en masse sur la base de la masse totale de la composition d'un ou plusieurs tensioactifs détersifs choisis parmi des tensioactifs anioniques, tensioactifs non ioniques non savonneux et mélanges de ceux-ci ;
b) de 0,01 à 1 % en masse sur la base de la masse totale de la composition d'une formulation de parfum (f1) qui est dans la forme de gouttelettes libres dispersées dans la composition ;
c) de 0,01 à 1 % en masse sur la base de la masse totale de la composition d'une formulation de parfum (f2) qui est piégée à l'intérieur de microparticules polymères discrètes dispersées dans la composition, dans laquelle les microparticules polymères sont des microparticules noyau-enveloppe polymères dans lesquelles au moins une enveloppe continue généralement sphérique de matériau polymère entoure un noyau contenant la formulation de parfum (f2) ;
dans laquelle la quantité totale de formulation de parfum (f1) et formulation de parfum (f2) est de 0,6 à 0,9 % en masse sur la base de la masse totale de la composition ;
et dans laquelle le rapport massique de formulation de parfum (f1) à formulation de parfum (f2) dans la composition est de 40:60 à 60:40 ; et dans laquelle la microcapsule noyau-enveloppe polymère est une microcapsule d'aminoplaste avec une enveloppe d'aminoplaste entourant un noyau contenant la formulation de parfum (f2) ;
dans laquelle un agent d'aide au dépôt est fixé à l'extérieur de l'enveloppe au moyen d'une liaison covalente.

2. Composition selon la revendication 1, dans laquelle la formulation de parfum (f1) et la formulation de parfum (f2) comprennent chacune une combinaison d'au moins 10 constituants de parfum choisis parmi des hydrocarbures ; alcools aliphatiques et araliphatiques ; aldéhydes aliphatiques et leurs acétals ; acides carboxyliques aliphatiques et leurs esters ; alcools de terpènes acycliques ; aldéhydes et cétones de terpènes cycliques ; éthers cycliques et cycloaliphatiques ; esters d'alcools cycliques ; esters d'alcools araliphatiques et acides carboxyliques aliphatiques ; éthers araliphatiques et leurs acétals ; aldéhydes et cétones aromatiques et araliphatiques ; et acides carboxyliques aromatiques et araliphatiques et leurs esters.
3. Composition selon la revendication 1 ou revendication 2, dans laquelle la teneur en formulation de parfum (f1) est de 0,1 à 0,75 % en masse sur la base de la masse totale de la composition.
4. Composition selon l'une quelconque des revendications 1 à 3, dans laquelle la teneur en formulation de parfum (f2) est de 0,05 à 0,7 % en masse sur la base de la masse totale de la composition.
5. Composition selon l'une quelconque des revendications 1 à 4, dans laquelle le rapport massique de formulation de parfum (f1) la formulation de parfum (f2) est de 60:40 à 45:55.
6. Composition selon l'une quelconque des revendications 1 à 5, dans laquelle la quantité de tensioactif détersif est de 6 à 30 % en masse sur la base de la masse totale de la composition.
7. Procédé de lavage de textile utilisant une composition selon l'une quelconque des revendications 1 à 6, le procédé comprenant la dilution d'une dose de la composition pour obtenir une liqueur de lavage, et le lavage de textiles avec la liqueur de lavage ainsi formée.

REFERENCES CITED IN THE DESCRIPTION

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