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(71) Applicant: **The Procter & Gamble Company
Cincinnati, OH 45202 (US)**

(72) Inventors:

- **Saveyn, Pieter Jan Maria
9070 Heusden (Destelbergen) (BE)**
- **Demeyere, Hugo Jean Marie
1785 Merchtem (BE)**

(74) Representative: **Goodier, Claire-Louise**

**N.V.Procter & Gamble Services Company S.A.
Temselaan 100
1853 Strombeek-Bever (BE)**

(54) **Packaged fabric care composition**

(57) The present invention relates to packaged products comprising fabric care compositions, wherein the packaging is in the form of a water-insoluble plastic container, and also methods of use of the packaged products.

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Description

FIELD OF THE INVENTION

5 **[0001]** The present invention relates to packaged products comprising fabric care compositions, wherein the packaging is in the form of a water-insoluble plastic container, and also methods of use of the packaged products.

INTRODUCTION

10 **[0002]** Many consumers, especially ones in hot environments, value freshness of fabrics following washing and/or rinsing. Freshness is provided to fabrics during fabric treatment by using perfumes. However, many perfumes do not tend to deposit well onto fabrics and so are either lost in the wash or rinse liquor or do not provide long lasting freshness benefits to the fabrics post wash/rinse.

15 **[0003]** Such issues are overcome by using deposition aids. An exemplary class of deposition aids are polycationic polymers. The polycationic polymers form hydrophobic complexes with residual anionic detergent carried over from the wash cycle. Perfumes are hydrophobic and hence associate with the cationic/anionic hydrophobic complexes. In other words, the polycationic polymers act as carriers to deposit the perfume to the fabric surface.

20 **[0004]** However, an issue with liquid compositions comprising such deposition aids and perfumes, is that there is a tendency for the composition to phase separate especially under elevated temperatures, such as found in developing countries. Due to phase separation, the perfume and deposition aid will differ in concentration between the top and bottom phase, and accurately dosing the composition will be difficult. Phase separation may also lead to a loss in deposition efficiency as the separated polycationic polymer becomes less efficient as deposition aid.

[0005] Therefore, there is a need in the art for a fabric care product that effectively delivers perfumes to fabrics, and which can be accurately dosed to enable consistent perfume delivery between uses.

25 **[0006]** It was surprisingly found that providing a packaged fabric care composition according to the present invention in a single unit water insoluble plastic container solved this problem. Even when phase separated, the fabric care composition according to the present invention delivers excellent perfume deposition, provided the product is added from a water-insoluble plastic unit-dose container, thus ensuring the composition is effectively transferred to the wash or rinse liquor.

SUMMARY OF THE INVENTION

35 **[0007]** A first aspect of the invention is a packaged product comprising packaging and a fabric care composition, the packaging containing a single unit dose amount of a fabric care composition and the fabric care composition comprising a polycationic polymer and a dispersed perfume oil, and wherein the packaging is in the form of a water-insoluble plastic container.

[0008] A second aspect of the present invention is a method of treating fabrics using the packaged product of the present invention comprising the steps of:

- 40 i) Adding fabrics to the wash/rinse solution.
 ii) Opening the water-insoluble plastic pouch;
 iii) Dispensing substantially all the fabric care composition contained in the water-insoluble plastic pouch into wash/rinse water.
 iv) Washing/rinsing the fabrics in the solution containing the fabric care composition.

45 **[0009]** Or more preferably comprising the steps of:

- i) Opening the water-insoluble plastic pouch;
 ii) Dispensing substantially all the fabric care composition contained in the water-insoluble plastic pouch into water to create a rinse solution;
 50 iii) Treating fabrics in the rinse solution.

DETAILED DESCRIPTION

55 Polycationic polymer

[0010] The composition of the present invention comprises a polycationic polymer.

[0011] The polymer may be added to a fabric care composition in a solid or liquid form. In one preferred embodiment,

the polymer is added as an emulsion. The emulsion preferably has an average particle size of less than 5 μm (alternatively less than 4 μm , or less than 3 μm , or less than 2 μm , or less than 1 μm). The size may be measured with a Sympatec HELOS laser diffraction apparatus (from Sympatec GmbH, Germany).

[0012] The polycationic polymer is preferably selected from the group comprising polycationic homopolymers, polycationic copolymers, and mixtures thereof.

[0013] In one embodiment, the polycationic polymer is a homopolymer and comprises cationic monomers. The homopolymer may be linear or branched. In one embodiment, the cationic monomer comprises a protonated amine or quaternary ammonium group. In one embodiment, the homopolymer has a number average Molecular Weight of 50,000 to 10,000,000 Daltons, preferably from 100,000 to 5,000,000 Daltons.

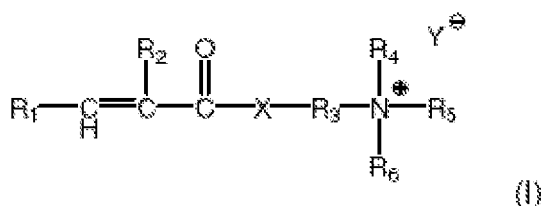
[0014] In another embodiment, the polycationic polymer is a copolymer, preferably comprising cationic monomers and non-ionic monomers. The polycationic copolymer may be linear or branched. In one embodiment of the invention, the polycationic copolymer comprises between 5 and 95% by weight of the total weight of the copolymer of at least one cationic monomer and between 5 and 95% by weight of the total weight of the copolymer of at least one non-ionic monomer. In yet still another embodiment of the invention, the polycationic copolymer comprises between 50 and 70%, preferably between 55 and 65%, by weight of the total weight of the copolymer of at least one cationic monomer and between 30 and 50%, preferably between 35 and 45% by weight of the total weight of the copolymer, of at least one non-ionic monomer.

[0015] In one embodiment the polycationic copolymer comprises a cationic monomer, where the cationic monomer comprises a protonated amine or quaternary ammonium group. In one embodiment, the polycationic copolymer has a number average Molecular Weight of 50,000 to 10,000,000 Daltons, preferably from 100,000 to 5,000,000 Daltons.

[0016] In another embodiment, the polycationic copolymer comprises a cross-linking agent, and a chain transfer agent.

[0017] In one embodiment, the cross linked polycationic copolymer is formed from the polymerization of:

a) a water soluble ethylenically unsaturated monomer or blend of monomers comprising at least one cationic monomer and at least one non-ionic monomer;
wherein the cationic monomer is a compound according to formula (I):



wherein:

R₁ is chosen from hydrogen or methyl, preferably hydrogen;

R₂ is chosen hydrogen, or C₁ - C₄ alkyl, preferably hydrogen;

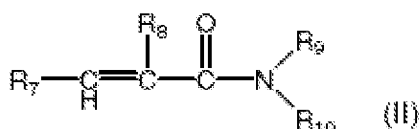
R₃ is chosen C₁ - C₄ alkylene, preferably ethylene;

R₄, R₅, and R₆ are each independently chosen from hydrogen, or C₁ - C₄ alkyl, preferably methyl;

X is chosen from -O-, or -NH-, preferably -O-; and

Y is chosen from a compatible anion, preferably Cl, Br, I, hydrogensulfate, or methosulfate, more preferably Cl.

wherein the non-ionic monomer is a compound of formula (II):



wherein:

R₇ is chosen from hydrogen or methyl, preferably hydrogen;

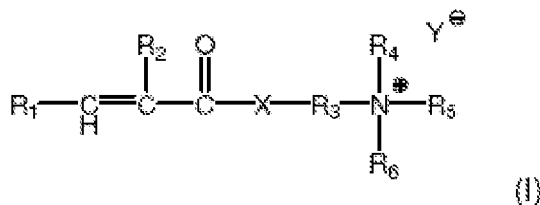
R₈ is chosen from hydrogen or C₁ - C₄ alkyl, preferably hydrogen; and

R₉ and R₁₀ are each independently chosen from hydrogen or C₁ - C₄ alkyl, preferably methyl;

b) at least one cross-linking agent in an amount from 0.5 ppm to 500 ppm by the weight of component a), and

c) at least one chain transfer agent in the amount of greater than 1000 ppm relative to component a), preferably from 1200 ppm to 10,000 ppm, more preferably from 1,500 ppm to 3,000 ppm.

[0018] Preferred cationic monomers are diallyl dialkyl ammonium halides or compounds according to formula (I):



wherein:

R₁ is hydrogen or methyl, preferably hydrogen;

R₂ is hydrogen;

R₃ is chosen C₁ - C₄ alkylene, preferably ethylene;

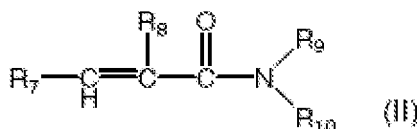
R₄, R₅, and R₆ are each independently C₁ - C₄ alkyl, preferably methyl;

X is -O-; and

[0019] Y is chosen from Cl, Br, I, hydrogensulfate, or methosulfate, preferably Cl.

[0020] In one embodiment, the cationic monomer of formula (I) is dimethyl aminoethyl acrylate methyl chloride.

[0021] Preferred non-ionic monomers are compounds of formula (II) wherein



wherein:

R₇ is chosen from hydrogen or methyl, preferably hydrogen;

R₈ is hydrogen; and

R₉ and R₁₀ are each independently C₁ - C₄ alkyl, preferably methyl;

[0022] In one embodiment, the non-ionic monomer is acrylamide.

[0023] The cross-linking agent contains at least two ethylenically unsaturated moieties. In one embodiment, the cross-linking agent contains at least three or more ethylenically unsaturated moieties, preferably at least four or more ethylenically unsaturated moieties. Suitable cross-linking agents may include divinyl benzene; 5 tetra allyl ammonium chloride; allyl acrylates and methacrylates; diacrylates and dimethacrylates of glycols and polyglycols; butadiene; 1,7-octadiene; allyl-acrylamides and allylmethacrylamides; bisacrylamidoacetic acid; N,N-methylene-bisacrylamide and polyol polyalylethers, such as polyallylsaccharose and pentaerythrol triallylether, and mixtures thereof In one embodiment, the 10 cross-linking agents are chosen from: tetra allyl ammonium chloride; allyl-acrylamides and allylmethacrylamides; bisacrylamidoacetic acid and N,N-methylene-bisacrylamide, and mixtures thereof A preferred cross-linking agent is tetra allyl ammonium chloride. It is also suitable to use mixtures of cross-linking agents.

[0024] The crosslinker(s) is (are) included in the range of from 0.5 ppm to 500 ppm, alternatively 15 from 10 ppm to 400 ppm, more preferred 20 ppm to 200 ppm even more preferred 40 ppm to 100 ppm, even more preferred from 50 ppm to 80 ppm (based on component a). In one embodiment, the cross linker is greater than 5ppm (based on component a).

[0025] The chain transfer agent is chosen from mercaptanes, malic acid, lactic acid, formic acid, isopropanol and hypophosphites, and mixtures thereof. In one embodiment, the CTA is formic acid. The CTA is present in a range greater than 100 ppm (based on component a). In one embodiment, the CTA is from 100 ppm to 10,000 ppm, alternatively from 500 ppm to 4,000 ppm, alternatively from 1,000 ppm to 3,500 ppm, alternatively from 1,500 ppm to 3,000 ppm, alternatively from 1,500 ppm to 2,500 ppm, alternatively combinations thereof (based on component a). In yet another embodiment the CTA is greater than 1000 (based on component a). It is also suitable to use mixtures of chain transfer agents.

[0026] In one embodiment, the polymer comprises a Number Average Molecular Weight (Mn) from 1,000,000 Daltons to 3,000,000 Daltons, alternatively from 1,500,000 Daltons to 2,500,000 Daltons. In another embodiment, the polymer comprises a Weight Average 5 Molecular Weight (Mw) from 4,000,000 Daltons to 11,000,000 Daltons, alternatively from

4,000,000 Daltons to 6,000,000 Daltons.

[0027] One aspect of the invention is directed to providing a polymer having a chain transfer agent (CTA) value in a range greater than 1000 ppm by weight of the polycationic polymer. Another aspect of the invention is directed to providing a polymer having a cross linker greater than 5 ppm, alternatively greater than 45 ppm, by weight of the polycationic polymer. Without wishing to be bound by theory, having such a level of CTA and/or level of cross linker surprisingly provides a polymer that in a fabric care composition provides desirable perfume deposition while minimizing undesirable stringiness in the fabric care product.

[0028] In a preferred embodiment, the polycationic polymer is copolymer of dimethyl aminoethyl acrylate methochloride and acrylamide in a 40:60 wt ratio that contains tetraallyl ammonium chloride as a cross linker, and formic acid as a chain transfer agent. In another embodiment, the polycationic polymer is selected from the commercially available group of Zetag® compounds supplied by BASF.

[0029] In another embodiment, the polycationic polymer is the polymerization product of:

- (i) 5 to 80% by weight of the polycationic polymer of an alkyl ester of acrylic acid or an alkyl ester of methacrylic acid, wherein the alkyl group is linear or branched containing 1 to 22 carbons and optionally interrupted by oxygen.
- (ii) 5 to 80% by weight of the polycationic polymer of a monomer selected from the group consisting of a vinyl-substituted heterocyclic compound containing at least one nitrogen, oxygen, or sulfur atom, (meth)acrylamide, a mono- or di-alkylamino alkyl(meth)acrylate, and a mono or di-alkylamino alkyl(meth)acrylamide, wherein the alkyl group has 1 to 4 carbon atoms;
- (iii) 0.01 to 30% by weight of the polycationic polymer of an associative monomer selected from the group consisting of (a) urethane reaction products of a monoethylenically unsaturated isocyanate and non-ionic surfactants comprising C₁-C₄ alkoxy-terminated block copolymers of ethylene oxide, propylene oxide, or 1,2-butylene oxide; (b) an ethylenically unsaturated copolymerizable surfactant monomer obtained by condensing a nonionic surfactant with an ethylenically unsaturated carboxylic acid or the anhydride thereof; (c) a surfactant monomer selected from the group consisting of urea reaction product of a monoethylenically unsaturated monoisocyanate with a nonionic surfactant having amine functionality; (d) an allyl ether of the formula CH₂=CR'CH₂ OA_m B_n A_p R wherein R' is hydrogen or methyl, A is propyleneoxy or butyleneoxy, B is ethyleneoxy, n is zero or an integer, m and p are zero or an integer less than n, and R is a hydrophobic group of at least 8 carbon atoms; and (e) a nonionic urethane monomer which is the urethane reaction product of a monohydric nonionic surfactant with a monoethylenically unsaturated isocyanate; and
- (iv) 0 to 1% by weight of the polycationic polymer of a cross-linking monomer having at least two ethylenically unsaturated moieties wherein the weight percent of monomers is based on 100 weight percent. Examples of cross-linking monomers used in the present invention include and are not limited to ethylene glycol diacrylate, divinylbenzene, pentaerythritol triacrylate glycerol triglycidyl ether, and ethylene glycol diglycidyl ether.

[0030] The fabric care composition, in one embodiment, comprises from 0.001% to 10% by weight of the polycationic polymer. In alternative embodiments, the fabric care composition comprises from 0.01% to 1%, alternatively from 0.05% to 0.50%, alternatively from 0.10% to 0.25%, alternatively combinations thereof, of the polycationic polymer by weight of the fabric care composition.

Dispersed perfume oil

[0031] The fabric care composition of the present invention comprises a dispersed perfume composition. By dispersed perfume we herein mean a perfume composition that is freely dispersed in the fabric care composition and is not encapsulated and is independent of a perfume delivery system. A perfume composition comprises one or more perfume ingredients. Perfume ingredients are the individual chemical compounds that are used to make a perfume composition. A perfume composition comprises one or more perfume ingredients, the choice of type and number of ingredients being dependent upon the final desired scent. In the context of the present invention, any suitable perfume composition may be used. Those skilled in the art will recognize suitable compatible perfume ingredients for use in the perfume composition, and will know how to select combinations of ingredients to achieve desired scents.

[0032] The fabric care composition may comprise from 0.1 to 10% per weight of a dispersed perfume oil, preferably from 0.5 to 10%, preferably from 1 to 3%.

[0033] The ratio of polycationic polymer to perfume is preferably between 1:50 and 1:1, preferably between 1:30 to 1:5, for example between 1:20 and 1:10.

[0034] According to a preferred embodiments, at least 10%, for example at least 20% or 30%, by weight of the perfume components of the fabric care composition have a ClogP value above 2 or 3.

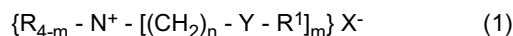
[0035] The logP values are most conveniently calculated by the "CLOGP" program, also available from Daylight CIS. This program also lists experimental logP values when they are available in the Pomona92 database. The "calculated

logP" (ClogP) is determined by the fragment approach of Hansch and Leo (cf., A. Leo, in Comprehensive Medicinal Chemistry, Vol. 4, C. Hansch, P. G. Sammens, J. B. Taylor and C. A. Ramsden, Eds., p. 295, Pergamon Press, 1990, incorporated herein by reference). The fragment approach is based on the chemical structure of each perfume ingredient, and takes into account the numbers and types of atoms, the atom connectivity, and chemical bonding. The ClogP values, which are the most reliable and widely used estimates for this physicochemical property, are preferably used instead of the experimental logP values in the selection of perfume ingredients which are useful in the present invention.

Fabric softening active

[0036] In one embodiment, the fabric care composition comprises a fabric softening active.

[0037] A first preferred type of fabric softening active comprises, as the principal active, compounds of the formula:



wherein each R substituent is either hydrogen, a short chain C₁-C₆, preferably C₁-C₃ alkyl or hydroxyalkyl group, e.g., methyl, ethyl, propyl, hydroxyethyl, and the like, poly (C₂₋₃ alkoxy), preferably polyethoxy, benzyl, or mixtures thereof; each m is 2 or 3; each n is from 1 to about 4, preferably 2; each Y is -O-(O)C-, -C(O)-O-, -NR-C(O)-, or -C(O)-NR-; the sum of carbons in each R¹, plus one when Y is -O-(O)C- or -NR-C(O)-, is C₁₂-C₂₂, preferably C₁₄-C₂₀, with each R¹ being a hydrocarbyl, or substituted hydrocarbyl group, and X⁻ can be any softener-compatible anion, preferably, chloride, bromide, methylsulfate, ethylsulfate, sulfate, and nitrate, more preferably chloride or methyl sulfate.

[0038] Non-limiting examples of compound (1) are N,N-bis(stearoyl-oxy-ethyl) N,N-dimethyl ammonium chloride, N,N-bis(tallowyl-oxy-ethyl) N,N-dimethyl ammonium chloride, N,N-bis(stearoyl-oxyethyl) N-(2 hydroxyethyl) N-methyl ammonium methylsulfate.

[0039] A second type of preferred fabric softening active has the general formula:



wherein each Y, R, R¹, and X⁻ have the same meanings as before. Such compounds include those having the formula:

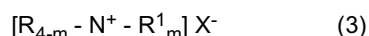


wherein each R is a methyl or ethyl group and preferably each R¹ is in the range of C₁₅ to C₁₉. As used herein, when the diester is specified, it can include the monoester that is present.

[0040] These types of agents and general methods of making them are disclosed in U.S. Pat. No. 4,137,180, Naik et al., issued Jan. 30, 1979, which is incorporated herein by reference. An example of a preferred DEQA (2) is the "propyl" ester quaternary ammonium fabric softener active having the formula 1,2-di(acyloxy)-3-trimethylammonio propane chloride.

[0041] Non-limiting examples of compound (2) is 1,2 di (stearoyl-oxy) 3 trimethyl ammonium propane chloride.

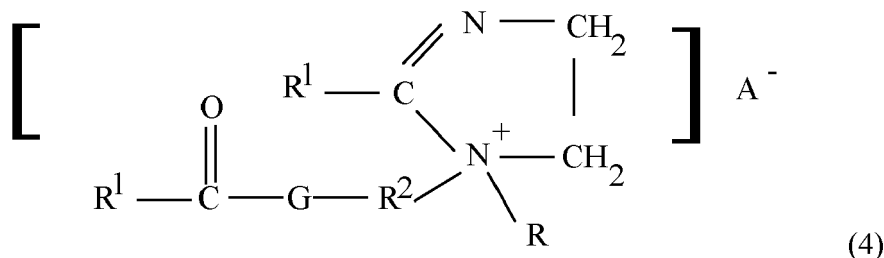
[0042] A third type of preferred fabric softening active has the formula:



wherein each R, R¹, and X⁻ have the same meanings as before.

[0043] Non-limiting examples of Compound (3) are dialkylenedimethylammonium salts such as dicanoladimethylammonium chloride, di(hard)tallowdimethylammonium chloride dicanoladimethylammonium methylsulfate,. An example of commercially available dialkylenedimethylammonium salts usable in the present invention is dioleyldimethylammonium chloride available from Witco Corporation under the trade name Adogen® 472 and dihardtallow dimethylammonium chloride available from Akzo Nobel Arquad 2HT75.

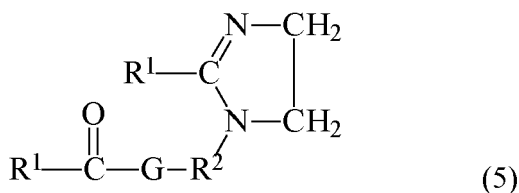
[0044] A fourth type of preferred fabric softening active has the formula:



wherein each R, R¹, and A⁻ have the definitions given above; each R² is a C₁₋₆ alkylene group, preferably an ethylene group; and G is an oxygen atom or an -NR- group.

[0045] A non-limiting example of Compound (4) is 1-methyl-1-stearoylamidoethyl-2-stearoylimidazolium methylsulfate wherein R¹ is an acyclic aliphatic C₁₅-C₁₇ hydrocarbon group, R² is an ethylene group, G is a NH group, R⁵ is a methyl group and A⁻ is a methyl sulfate anion, available commercially from the Witco Corporation under the trade name Varisoft®.

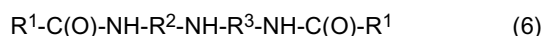
[0046] A fifth type of preferred fabric softening active has the formula:



wherein R¹, R² and G are defined as above.

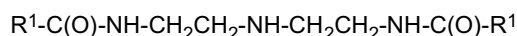
[0047] A non-limiting example of Compound (5) is 1-tallowylamidoethyl-2-tallowylimidazoline wherein R¹ is an acyclic aliphatic C₁₅-C₁₇ hydrocarbon group, R² is an ethylene group, and G is a NH group.

[0048] A sixth type of preferred fabric softening active are condensation reaction products of fatty acids with dialkylene-triamines in, e.g., a molecular ratio of about 2:1, said reaction products containing compounds of the formula:



wherein R¹, R² are defined as above, and each R³ is a C₁₋₆ alkylene group, preferably an ethylene group and wherein the reaction products may optionally be quaternized by the additional of an alkylating agent such as dimethyl sulfate. Such quaternized reaction products are described in additional detail in U.S. Patent No. 5,296,622, issued Mar. 22, 1994 to Uphues et al., which is incorporated herein by reference.

[0049] A non-limiting example of Compound (6) is the reaction products of fatty acids with diethylenetriamine in a molecular ratio of about 2:1, said reaction product mixture containing N,N"-dialkyldiethylenetriamine with the formula:



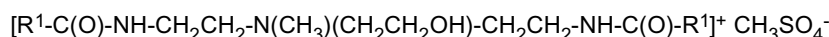
wherein R¹-C(O) is an alkyl group of a commercially available fatty acid derived from a vegetable or animal source, such as Emersol® 223LL or Emersol® 7021, available from Henkel Corporation, and R² and R³ are divalent ethylene groups.

[0050] A seventh type of preferred fabric softening active has the formula:



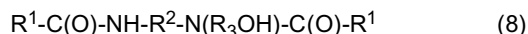
wherein R, R¹, R², R³ and A⁻ are defined as above.

[0051] A non-limiting example of Compound (7) is a difatty amidoamine based softener having the formula:



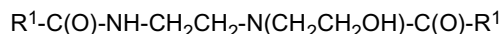
wherein R¹-C(O) is an alkyl group, available commercially from the Witco Corporation e.g. under the trade name Varisoft® 2221 T.

[0052] An eighth type of preferred fabric softening active are reaction products of fatty acid with hydroxyalkylalkylenediamines in a molecular ratio of about 2:1, said reaction products containing compounds of the formula:



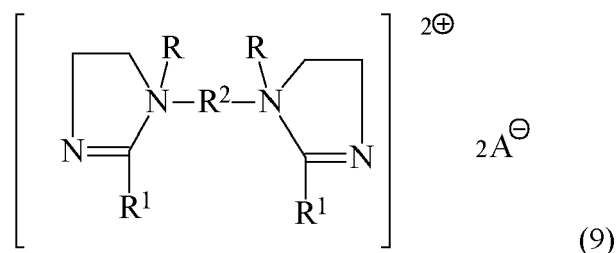
wherein R^1 , R^2 and R^3 are defined as above.

[0053] An example of Compound (8) is the reaction products of fatty acids with N-2-hydroxyethylethylenediamine in a molecular ratio of about 2: 1, said reaction product mixture containing a compound of the formula:



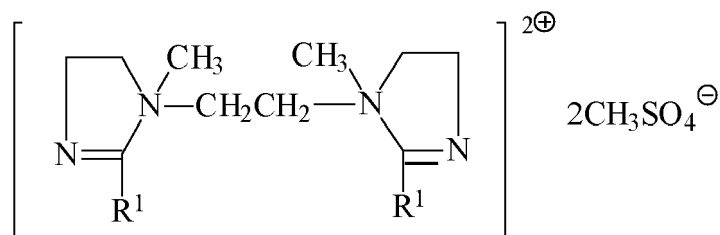
wherein $R^1-C(O)$ is an alkyl group of a commercially available fatty acid derived from a vegetable or animal source, such as Emersol® 223LL or Emersol® 7021, available from Henkel Corporation.

[0054] A ninth type of preferred fabric softening active has the formula:



wherein R , R^1 , R^2 , and A^- are defined as above.

[0055] An example of Compound (9) is the diquatery compound having the formula:



wherein R^1 is derived from fatty acid, and the compound is available from Witco Company.

[0056] It will be understood that combinations of softener actives disclosed above are suitable for use in this invention.

[0057] In the cationic nitrogenous salts herein, the anion A^- , which is any softener compatible anion, provides electrical neutrality. Most often, the anion used to provide electrical neutrality in these salts is from a strong acid, especially a halide, such as chloride, bromide, or iodide. However, other anions can be used, such as methylsulfate, ethylsulfate, acetate, formate, sulfate, carbonate, and the like. Chloride and methylsulfate are preferred herein as anion A. The anion can also, but less preferably, carry a double charge in which case A^- represents half a group.

[0058] Preferably, if present, the fabric softening active is present at a concentration of between 1% and 20%, more preferably between 2% and 15%, most preferably between 3% and 6% by weight of the fabric care composition.

Antimicrobial agent

[0059] In one embodiment, the fabric care composition comprises an antimicrobial agent. It is preferable that a broad-spectrum anti-microbial is used, i.e. one that is effective on both gram positive and gram negative bacteria and fungi. However, a mixture of broad spectrum anti-microbials may be used, or combinations of limited spectrum anti-microbials.

[0060] Antimicrobial preservatives useful in the present invention can be biocidal compounds, i.e., substances that kill microorganisms, or biosratio compounds, i.e., substances that inhibit and/or regulate the growth of microorganisms.

[0061] The anti-microbial agent is included in the present invention at an effective amount. The term "effective amount" as herein defined means a level sufficient to reduce bacterial growth at least tenfold, preferably 100-fold and most preferably 1000-fold as compared to fabrics rinsed with water only. The anti-microbial is used to control the growth of microorganisms on the surface onto which the composition is deposited in order to avoid odors produced by microorganisms. Preferably, the fabric care composition comprises at least 0.03%, more preferably at least 0.06%, most preferably 0.12% by weight of the fabric care composition of an antimicrobial agent.

[0062] The antimicrobial agent can be an organic material, which will not cause damage to fabric appearance, e.g., discoloration, coloration, bleaching. Preferably, the antimicrobial is selected from the group comprising short chain alkyl esters of p-hydroxybenzoic acid, organic sulfur compounds, halogenated compounds, cyclic organic nitrogen compounds, low molecular weight aldehydes, quaternary ammonium compounds, dehydroacetic acid, phenyl and phenoxy compounds, and mixtures thereof

[0063] A preferred class of anti-microbial agents are short chain alkyl esters of p-hydroxybenzoic acid, commonly known as parabens, preferably selected from the group comprising 4,4'-dichloro 2-hydroxy diphenylether, N-(4-chlorophenyl)-N'-(3,4-dichlorophenyl) urea, also known as 3,4,4'-trichlorocarbanilide or triclocarban; 2,4,4'-trichloro-2'-hydroxy diphenyl ether. Preferably, the antimicrobial is 4,4'-dichloro 2-hydroxy diphenylether, available commercially as Tinosan HP100 from BASF.

[0064] Another class of anti-microbial agents suitable for use in the present invention are organic sulfur compounds, preferably selected from the group comprising 5-chloro-2-methyl-4-isothiazolin-3-one; 2-n-butyl-3-isothiazolone; 2-benzyl-3-isothiazolone; 2-phenyl-3-isothiazolone, 2-methyl-4,5-dichloroisothiazolone; 5-chloro-2-methyl-3-isothiazolone; 2-methyl-4-isothiazolin-3-one; and mixtures thereof. A preferred anti-microbial is a water-soluble mixture of 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-4-isothiazolin-3-one, more preferably a mixture of about 77% 5-chloro-2-methyl-4-isothiazolin-3-one and about 23% 2-methyl-4-isothiazolin-3-one, which is a broad spectrum preservative available as a 1.5% aqueous solution under the trade name Kathon.RTM. CG by Rohm and Haas Company.

[0065] Another class of anti-microbial agents suitable for use in the present invention are halogenated compounds, preferably selected from the group comprising 5-bromo-5-nitro-1,3-dioxane, available under the trade name Bronidox L.RTM. from Henkel, 2-bromo-2-nitropropane-1,3-diol, available under the trade name Bronopol from Inolex, 1,1'-hexamethylene bis(5-(p-chlorophenyl)biguanide), commonly known as chlorhexidine, and its salts, e.g., with acetic and gluconic acids, 1,1,1-Trichloro-2-methylpropan-2-ol, commonly known as chlorobutanol, 4,4'-(Trimethylenedioxy)bis-(3-bromobenzamidine)diisethionate, or dibromopropamidine, and mixtures thereof.

[0066] Another class of anti-microbial agents suitable for use in the present invention are cyclic organic nitrogen compounds, preferably selected from the group comprising imidazolidinedione compounds, polymethoxy bicyclic oxazolidine, and mixtures thereof

[0067] Preferred imidazolidione compounds are selected from the group comprising 1,3-bis(hydroxymethyl)-5,5-dimethyl-2,4-imidazolidinedione, N-[1,3-bis(hydroxymethyl)2,5-dioxo-4-imidazolidinyl]-N,N'-bis(hydroxymethyl) urea, N,N"-methylenebis[N'-(1-(hydroxymethyl)-2,5-dioxo-4-imidazolidinyl)urea], and mixtures thereof.

[0068] Another class of anti-microbial agents are low molecular weight aldehydes, preferably selected from the group comprising formaldehyde, glutaraldehyde and mixtures thereof.

[0069] Another class of anti-microbial agents suitable for use in the present invention are quaternary ammonium compounds, preferably selected from the group comprising polyaminopropyl biguanide, 1-(3-Chlorallyl)-3,5,7-triaza-1-azoniaadamantane chloride, dialkyl quaternary ammonium compounds, ethoxylated alkyl quaternary ammonium compounds and mixtures thereof. Preferred commercially available anti-microbial quaternary ammonium compounds are the Bardac series (especially 2250 and 2280) of anti-microbial agents supplied by Lonza Group Ltd, Switzerland, which are dialkyl quaternary ammonium compounds. Also preferred are the commercially available Berol series of anti-microbial compounds supplied by AkzoNobel, Netherlands, which are ethoxylated alkyl quaternary ammonium compounds. In one embodiment the anti-microbial agent is didecyl dimethyl ammonium chloride. In another embodiment, the anti-microbial agent is cocoalkylmethyl[polyoxyethylene(15)] ammonium chloride.

[0070] A final class of anti-microbial agents suitable for use in the present invention are phenyl and phenoxy compounds, preferably selected from the group comprising 4,4'-diamidino-.alpha.,.omega.-diphenoxypropane diisethionate, benzyl alcohol, 2-phenylethanol, 2-phenoxyethanol, and mixtures thereof

[0071] Another preferred antimicrobial agent is a sodium alkyl naphthalene sulfonate. Sodium alkyl naphthalene sulfonate is commercially available as the Berol series of anti-microbial agents supplied by AkzoNobel.

[0072] In one embodiment, the anti-microbial agent is selected from the group comprising 4,4'-dichloro 2-hydroxy diphenylether, didecyl dimethyl ammonium chloride, cocoalkylmethyl[polyoxyethylene(15)] ammonium chloride and mixtures thereof.

[0073] It was surprisingly found that fabric care compositions comprising the combination of 4,4'-dichloro 2-hydroxy diphenylether and a copolymer of dimethyl aminoethyl acrylate methochloride and acrylamide in a 40:60 wt ratio that contains tetraalkyl ammonium chloride as a cross linker, and formic acid as a chain transfer agent (polycationic polymer) were especially beneficial.

Adjunct ingredients

[0074] According to another aspect of the present invention, the fabric softening compositions may comprise one or more of the following optional ingredients: perfumes, encapsulated perfumes, dispersing agents, stabilizers, pH control agents, colorants, brighteners, dyes, odor control agent, pro-perfumes, cyclodextrin, solvents, soil release polymers,

preservatives, antimicrobial agents, chlorine scavengers, anti-shrinkage agents, fabric crisping agents, spotting agents, anti-oxidants, anti-corrosion agents, bodying agents, drape and form control agents, smoothness agents, static control agents, wrinkle control agents, sanitization agents, disinfecting agents, germ control agents, mold control agents, mildew control agents, antiviral agents, anti-microbials, drying agents, stain resistance agents, soil release agents, malodor control agents, fabric refreshing agents, chlorine bleach odor control agents, dye fixatives, dye transfer inhibitors, color maintenance agents, color restoration/rejuvenation agents, anti-fading agents, whiteness enhancers, anti-abrasion agents, wear resistance agents, fabric integrity agents, anti-wear agents, defoamers and anti-foaming agents, rinse aids, UV protection agents, sun fade inhibitors, insect repellents, anti-allergenic agents, enzymes, flame retardants, water proofing agents, fabric comfort agents, water conditioning agents, shrinkage resistance agents, stretch resistance agents, thickeners, chelants, electrolytes and mixtures thereof. In a preferred embodiment, the packaged product of the present invention comprises an encapsulated perfume.

Packaging

[0075] The present invention comprises a packaging, wherein the packaging is in the form of a water-insoluble plastic container. By water-insoluble plastic container, we herein mean a water-insoluble container made of a plastic material capable of retaining the fabric care composition of the present invention. By water-insoluble, we herein mean the ability to prevent external moisture from entering the container and also preventing internal moisture leaving the container.

[0076] In one embodiment, the water-insoluble plastic container is made of a rigid plastic material. The water-insoluble plastic container made of a rigid plastic material can be of any size, colour, shape or orientation providing it is able to retain the fabric care composition until use by the consumer. The rigid plastic container material can be any suitable thickness, providing it is water-insoluble.

[0077] Preferably, the water-insoluble plastic container is a pouch made from a flexible plastic material. The pouch can be of any size, colour, shape or orientation providing it is able to retain the fabric care composition until use by the consumer. In one embodiment the pouch comprises two sheets of flexible plastic material which are sealed together along all four edges. In another embodiment, the pouch comprises a single sheet of flexible plastic material which is folded round to form a pouch and sealed along the three edges. In one embodiment, the pouch may comprise three or four flexible plastic sheets sealed together to form a triangular or pyramidal shaped pouch. Those skilled in the art will recognize all suitable combinations and permutations. The flexible plastic pouch material can be any suitable thickness, providing it is water-insoluble.

[0078] The use of a flexible plastic pouch is advantageous as it is beneficial for shipping and storage. Due to the flexibility of the plastic pouch, there is less wasted space between individual pouches as they are packed together.

[0079] In one embodiment, the container comprising the fabric care composition is completely sealed comprising no opening. In order to remove the fabric care composition contained within the container, the consumer would need to pierce or cut the container. In another embodiment, the container comprises a sealed opening comprising an opening means. The opening means could be any opening means. In one embodiment, the opening means is a removable strip. In one embodiment, the opening means is re-sealable. In another embodiment, the opening means is a cap.

[0080] Those skilled in the art will recognize suitable plastic materials for use in the present invention. Preferably, the plastic material is selected from the group comprising, polyethylene, polypropylene, polyethylene terephthalate and mixtures thereof. In one embodiment, the container plastic material comprises a biodegradable plastic material. In another embodiment, the plastic material is laminated, where the laminate may contain a mixture of different plastic materials. Preferred laminate materials include an outer paper layer for aesthetic reasons or a metal layer further limiting the moisture permeability of the package, or a mixture thereof. Preferably, the container plastic material comprises polyethylene.

[0081] The water insoluble plastic container comprises a single unit-dose amount of the fabric care composition. A unit-dose amount is intended to be a sufficient amount to be used in a single fabric care operation. In one embodiment a preferred unit-dose volume is less than 40 g, preferably less than 30 g, preferably less than 25 g, for example less than 20 g or less than 15 g. Without being bound by theory, fabric care compositions comprising polycationic polymers and dispersed perfume compositions have a tendency to phase separate when stored. This is especially true at elevated temperatures such as experienced in warmer climates such as the Middle East, Asia, India, and North Africa. This poses a significant problem, as when the consumer adds a dose of the fabric care composition to water to make a liquor, the dose will comprise incorrect levels of the ingredients. By packaging unit dose amounts of the fabric care composition into water-insoluble flexible plastic pouches, the problem of incorrect dosing is overcome. It no longer matters if the composition phase splits, as the ingredients will be effectively dosed to the wash/rinse water and products according to the present invention will deliver excellent perfume deposition even when phase split.

[0082] A further advantage of the packaging being made of flexible plastic material, is that consumer can squeeze out all of the fabric care composition contained within. This is especially advantageous where the fabric care composition is a viscous composition. Rigid packaging suffers from the disadvantage that it is difficult to remove all the fabric care

composition, since it tends to build up on the sides and in the corners. To remove it all can be a messy operation.

[0083] A yet further advantage of the pouch material being flexible plastic is that the packaged fabric care composition will be easier to store and transport. The flexible pouch material will make the pouches less bulky than rigid pouch material.

[0084] In one embodiment, a number of packaged products can be placed together within a larger packaging for storage and distribution. For instance, a large package may comprise ten packaged products, each packaged product comprising a single unit dose amount of a fabric care composition. In one embodiment, the packaging comprises instructions to direct the consumer as to use the fabric care composition. Such information could include, amount of water in which to dose the contents of the package. In another embodiment the packaging may comprise instructions on how to open the package.

Method of treating fabrics

[0085] One aspect of the present invention is a method of treating fabrics comprising the steps of;

i) Adding fabrics to the wash/rinse solution.

ii) Opening the water-insoluble plastic pouch;

iii) Dispensing substantially all the fabric care composition contained in the water-insoluble plastic pouch into wash/rinse water.

iv) Washing/rinsing the fabrics in the solution containing the fabric care composition.

[0086] A preferred aspect of the present invention is a method of treating fabrics comprising the steps of:

i) Opening the water-insoluble plastic pouch;

ii) Dispensing substantially all the fabric care composition contained in the water-insoluble plastic pouch into water to create a rinse solution;

iii) Treating fabrics in the rinse solution.

EXAMPLES

[0087] The following composition was prepared;

Table 1

copolymer of dimethyl aminoethyl acrylate methochloride and acrylamide in a 40:60 wt ratio that contains tetraallyl ammonium chloride as a cross linker	0.16%
Dispersed perfume oil (Totocare 2 T20, commercially available from Givaudan SA. Chemin De La Parfumerie, Vernier)	2.31%
Proxel (antimicrobial agent commercially available from Arch Uk Biocides Ltd Manchester GB)	0.0075
Liquitint blue 275 (commercially available from Milliken, Gent, Belgium)	0.0018%
HCl	0.0075%
Deionised water	97.51%

[0088] Percentages are in weight percent of the overall composition.

[0089] Two 20g aliquots of this composition were prepared in separate sealed water insoluble plastic unit dose containers. Also, a 250g aliquot was prepared in a multidose plastic bottle. The samples were then stored at 43°C for a period of 5 days. At the end of the 5 days, all samples were visibly phase split.

[0090] Following storage, the multidose plastic bottle composition was aliquoted into 20g samples. A control 20g sample was also prepared that was homogeneous and not phase split and which had not been stored at 43°C for 5 days.

[0091] Test knitted cotton fabrics were purchased from supplier Vanackere Yves. These test fabrics were washed together with a ballast load consisting of polycotton (purchased from Dewerchin) and muslin cotton (purchased from

Habeco). One load comprised 4 test fabrics (knitted cotton of each 30g) and ballast load of 120g muslin cotton and 220g polycotton. The different test loads (i.e. one load per test product) were washed together in a 5 minute single wash operation using 3L tapwater per load at 27°C in a semi- automatic washing machine with 12.6g Tide detergent (commercially available in India). After the wash cycle, each load was wrung dry to a weight of +/- 80g per test fabric, resulting in a total weight of 320g for the full test fabric set and +/-920g for the ballast load.

[0092] The different aliquots of samples detailed above were each separately dispersed in 10 L of deionised water at 27°C to make different rinse solutions. The washed fabric loads were split per load and then rinsed in the separate rinse solutions for 5 minutes by hand ensuring continuous agitation. Fabrics were also rinsed with the homogenous control sample as reference fabrics. After rinsing, only the test fabrics were removed from the rinse water and wrung dry to a weight of +/- 80g per fabric.

[0093] The rinse fabrics were then graded for odour intensity versus the control reference fabrics. This grading was done by an expert panel of 3 testers and the results averaged. The testers graded the wet sample fabrics versus the control on an increasing scale for fabrics that had higher odour intensity than the control and a decreasing scale for fabrics having lower odour intensity than the control. A grading score difference of 3 corresponds to a consumer noticeable difference in odour intensity.

[0094] The results for the wet fabric testing are presented in Table 2. The control fabric was given an odour grade of 0. The results correspond to the difference in odour intensity versus this control sample.

Table 2

Sample	Tester 1	Tester 2	Tester 3	Average
Unit dose sample 1	0	-1	-1	-0.67
Unit dose sample 2	0	0	2	0.67
Multidose sample 1 (from top of bottle)	2	4	4	3.33
Multidose sample 2 (from middle of bottle)	-1	-1	-2	-1.33

[0095] As can be seen from Table 2, the unit dose samples both provided a consistent odour intensity to the wet fabrics that was of comparable intensity to that of the control sample. The difference in intensity between unit dose sample 1 and unit dose sample 2 was 1.34. Thus, between these two samples there is not a consumer noticeable difference in odour intensity, nor is there a consumer noticeable difference in odour intensity between unit dose samples 1 and 2 versus the control sample.

[0096] However, samples from the multidose container were not consistent and ranged in intensity versus the control. The difference in odour intensity between multidose sample 1 and multidose sample 2 is 4.66 which is consumer noticeable difference in odour intensity. Also multidose sample 1 gives a consumer noticeable difference in odour intensity versus the control sample.

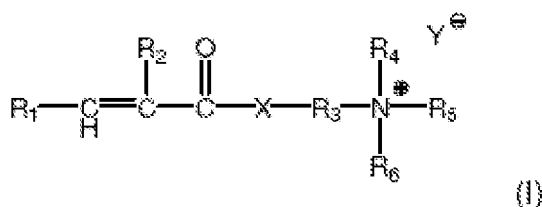
[0097] Therefore, multidose sample 1 from the top of the multidose container was far more intense than the control, and multidose sample 2 from the bottom of the multidose container was not as intense as the control. This means that as the consumer is using the composition from the multidose container, rinse operations with composition from the top of the container will provide a very intense odour to the fabrics, whilst those from the bottom of the bottle will not provide an intense enough odour to the fabrics. This means the consumer will get inconsistent odour intensity benefits between different rinse operations. However, this is not the case with regard to the unitdose samples.

[0098] The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

Claims

1. A packaged product comprising packaging and a fabric care composition, the packaging containing a single unit dose amount of a fabric care composition and the fabric care composition comprising a polycationic polymer and a dispersed perfume oil, and;
wherein the packaging is in the form of a water-insoluble plastic container.
2. The packaged product of claim 1, wherein the water insoluble plastic material of the container is laminated.

3. The packaged product of any proceeding claims, wherein the container comprises polyethylene material.
4. The packaged product of any preceding claim, wherein the container comprises a sealable opening.
5. The packaged product of any proceeding claims, wherein the polycationic polymer is a linear or branched homopolymer comprising cationic monomers, the cationic monomers preferably comprise a protonated amine, more preferably a quaternary ammonium compound.
6. The packaged product of claims 1 to 4, wherein the polycationic polymer is a linear or branched copolymer, comprising cationic monomers, the cationic monomers preferably comprise a protonated amine, more preferably a quaternary ammonium compound.
7. The packaged product of claim 6, wherein the polycationic copolymer is formed from the polymerization of:
 - a) a water soluble ethylenically unsaturated monomer or blend of monomers comprising at least one cationic monomer and at least one non-ionic monomer;
wherein the cationic monomer is a compound according to formula (I):



wherein:

R₁ is chosen from hydrogen or methyl, preferably hydrogen;

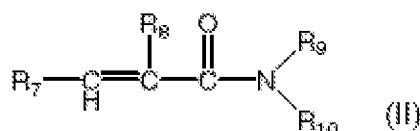
R₂ is chosen hydrogen, or C₁ - C₄ alkyl, preferably hydrogen;

R₃ is chosen C₁ - C₄ alkylene, preferably ethylene;

R₄, R₅, and R₆ are each independently chosen from hydrogen, or C₁ - C₄ alkyl, preferably methyl;

X is chosen from -O-, or -NH-, preferably -O-; and

Y is chosen from Cl, Br, I, hydrogensulfate, or methosulfate, preferably Cl. wherein the non-ionic monomer is a compound of formula (II):



wherein:

R₇ is chosen from hydrogen or methyl, preferably hydrogen;

R₈ is chosen from hydrogen or C₁ - C₄ alkyl, preferably hydrogen; and

R₉ and R₁₀ are each independently chosen from hydrogen or C₁ - C₄ alkyl, preferably methyl;

b) at least one cross-linking agent in an amount from 0.5 ppm to 500 ppm by the weight of component a), and
c) at least one chain transfer agent in the amount of greater than 1000 ppm relative to component a), preferably from 1200 ppm to 10,000 ppm, more preferably from 1,500 ppm to 3,000 ppm.

8. The packaged product of claim 7, wherein the polycationic polymer is a copolymer of dimethyl aminoethyl acrylate methochloride and acrylamide in a 40:60 wt ratio that contains tetraallyl ammonium chloride as a cross linker, and formic acid as a chain transfer agent.
9. The packaged product of any preceding claims, wherein the fabric care composition comprises an antimicrobial agent.
10. The packaged product of claim 9, wherein the antimicrobial agent is selected from the group comprising 4,4'-dichloro 2-hydroxy diphenylether, didecyl dimethyl ammonium chloride, cocoalkylmethyl[polyoxyethylene(15)] ammonium

chloride and mixtures thereof.

11. The packaged product of claim 10, wherein the antimicrobial agent is 4,4'-dichloro 2-hydroxy diphenylether.

12. The packaged product of claim 8, wherein the fabric care composition comprises the combination of 4,4'-dichloro 2-hydroxy diphenylether and a copolymer of dimethyl aminoethyl acrylate methochloride and acrylamide in a 40:60 wt ratio that contains tetraallyl ammonium chloride as a cross linker, and formic acid as a chain transfer agent.

13. The packaged product of any preceding claim, wherein the ratio of polycationic polymer to perfume is greater than 1:50, preferably greater then 1:30, more preferably greater then 1:20.

14. A method of treating fabrics using the packaged product of any preceding claims comprising the steps of;

i) Adding fabrics to the wash/rinse solution.

ii) Opening the water-insoluble plastic pouch;

iii) Dispensing substantially all the fabric care composition contained in the water-insoluble plastic pouch into wash/rinse water.

iv) Washing/rinsing the fabrics in the solution containing the fabric care composition.

15. The use of a packaged product according to any preceding claims for the treatment of fabrics.



EUROPEAN SEARCH REPORT

Application Number
EP 11 17 7410

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 31 January 2012	Examiner Péntek, Eric
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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