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(54) **Solid detergent composition comprising glycerol carbonate**

(57) The present invention relates to a solid detergent composition comprising: (a) detergents; (b) glycerol carbonate; (c) from 0wt% to less than 5wt% zeolite builder; (d) from 0wt% to less than 5wt% phosphate

builder; (e) optionally, from 0wt% to less than 10wt% silicate; and (f) optionally perfume; and (g) optionally, additional detergent ingredients.

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Description

FIELD OF THE INVENTION

5 **[0001]** The present invention relates to solid detergent compositions comprising glycerol carbonate. The compositions exhibit an excellent hand-feel profile.

BACKGROUND OF THE INVENTION

10 **[0002]** Consumers of laundry powder detergent products desire not only clean clothes from their laundry products, but also good hand-feel performance when hand-washing clothes. One can improve hand-feel performance through particular formulation choices of alkoxyated alkyl sulphate surfactants, improving the solubility of the laundry powders, reducing the pH of the wash liquor, or by combinations of these approaches.

15 **[0003]** The Inventors have found that the hand-feel performance can be improved by the use of glycerol, which is a humectant. However, incorporating glycerol into a solid, especially free-flowing particulate, laundry detergent, and still maintaining good flowability, frangibility and storage stability is extremely difficult. The Inventors have found that carbonating the glycerol, affords it processability and it hydrolyses in the wash liquor to form glycerol and provide excellent hand-feel performance.

20 SUMMARY OF THE INVENTION

[0004] The present invention provides a composition as defined by claim 1.

DETAILED DESCRIPTION OF THE INVENTION

25 **[0005]** Solid laundry detergent composition. The solid laundry detergent composition typically comprises: (a) detergent surfactant; (b) glycerol carbonate; (c) from 0wt% to less than 5wt% zeolite builder; (d) from 0wt% to less than 5wt% phosphate builder; (e) optionally, from 0wt% to less than 10wt% silicate salt; and (f) optionally, additional detergent ingredients..

30 **[0006]** The composition can be any suitable form, including free-flowing particulate form, or a unit dose form including tablet form, detergent sheet form. The composition may in the form of a pouch, for example the particles or tablet may be at least partially, preferably completely, enclosed by a film, preferably a water-soluble and/or water-dispersible film. A preferred film is a polyvinyl alcohol film.

[0007] Highly preferably, the composition is a laundry detergent composition.

35 **[0008]** Typically, the solid laundry detergent composition is a fully formulated laundry detergent composition, not a portion thereof such as a spray-drying or agglomerate particle that only forms part of the laundry detergent composition. Typically, the solid laundry detergent composition comprises a plurality of chemically different particles, such as spray-dried base detergent particles and/or agglomerate base detergent particles and/or extrudate base detergent particles, in combination with one or more, typically two or more, or three or more, or four or more, or five or more, or six or more,
40 or even ten or more particles selected from: surfactant particles, including surfactant agglomerates, surfactant extrudates, surfactant needles, surfactant noodles, surfactant flakes; builder particles, such as sodium carbonate and sodium silicate particles, phosphate particles, zeolite particles, silicate salt particles, carbonate salt particles; polymer particles such as cellulosic polymer particles, polyester particles, polyamine particles, terephthalate polymer particles, polyethylene glycol based polymer particles; aesthetic particles such as coloured noodles or needles or lamellae particles; enzyme particles
45 such as protease prills, lipase prills, cellulase prills, amylase prills, mannanase prills, pectate lyase prills, xyloglucanase prills, and co-prills of any of these enzymes; bleach particles, such as percarbonate particles, especially coated percarbonate particles, such as percarbonate coated with carbonate salt, sulphate salt, silicate salt, borosilicate salt, or combinations thereof, perborate particles, bleach catalyst particles such as transition metal catalyst particles, or isoquinolinium bleach catalyst particles, pre-formed peracid particles, especially coated pre-formed peracid particles; filler particles
50 such as sulphate salt particles; clay particles such as montmorillonite particles or particles of clay and silicone; flocculant particles such as polyethylene oxide particles, wax particles such as wax agglomerates, brightener particles, dye transfer inhibition particles; dye fixative particles, perfume particles such as perfume microcapsules and starch encapsulated perfume accord particles, or pro-perfume particles such as Schiff base reaction product particles, bleach activator particles such as oxybenzene sulphonate bleach activator particles and tetra acetyl ethylene diamine bleach activator particles;
55 hueing dye particles; chelant particles such as chelant agglomerates; and any combination thereof.

[0009] Glycerol carbonate. The composition comprises glycerol carbonate, preferably the composition comprises at least 5wt%, or at least 7wt%, or even at least 10wt% glycerol carbonate, and preferably to 20wt%, or to 15wt% glycerol carbonate.

[0010] The glycerol carbonate comprises at least 1 carbonate moiety, preferably at least 2 or even 3 carbonate moieties per glycerol moiety.

[0011] Deterative surfactant. Suitable deterative surfactants include anionic deterative surfactants, non-ionic deterative surfactant, cationic deterative surfactants, zwitterionic deterative surfactants and amphoteric deterative surfactants.

[0012] Preferred anionic deterative surfactants include sulphate and sulphonate deterative surfactants.

[0013] Preferred sulphonate deterative surfactants include alkyl benzene sulphonate, preferably C₁₀₋₁₃ alkyl benzene sulphonate. Suitable alkyl benzene sulphonate (LAS) is obtainable, preferably obtained, by sulphonating commercially available linear alkyl benzene (LAB); suitable LAB includes low 2-phenyl LAB, such as those supplied by Sasol under the tradename Isochem® or those supplied by Petresa under the tradename Petrelab®, other suitable LAB include high 2-phenyl LAB, such as those supplied by Sasol under the tradename Hyblene®. A suitable anionic deterative surfactant is alkyl benzene sulphonate that is obtained by DETAL catalyzed process, although other synthesis routes, such as HF, may also be suitable.

[0014] Preferred sulphate deterative surfactants include alkyl sulphate, preferably C₈₋₁₈ alkyl sulphate, or predominantly C₁₂ alkyl sulphate.

[0015] Another preferred sulphate deterative surfactant is alkyl alkoxyated sulphate, preferably alkyl ethoxyated sulphate, preferably a C₈₋₁₈ alkyl alkoxyated sulphate, preferably a C₈₋₁₈ alkyl ethoxyated sulphate, preferably the alkyl alkoxyated sulphate has an average degree of alkoxylation of from 1 to 20, preferably from 1 to 10, preferably the alkyl alkoxyated sulphate is a C₈₋₁₈ alkyl ethoxyated sulphate having an average degree of ethoxylation of from 1 to 10, preferably from 1 to 7, more preferably from 1 to 5 and most preferably from 1 to 3.

[0016] The alkyl sulphate, alkyl alkoxyated sulphate and alkyl benzene sulphonates may be linear or branched, substituted or un-substituted.

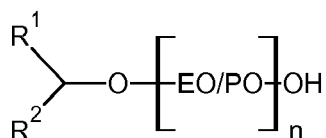
[0017] The deterative surfactant may be a mid-chain branched deterative surfactant, preferably a mid-chain branched anionic deterative surfactant, more preferably a mid-chain branched alkyl sulphate and/or a mid-chain branched alkyl benzene sulphonate, most preferably a mid-chain branched alkyl sulphate. Preferably, the mid-chain branches are C₁₋₄ alkyl groups, preferably methyl and/or ethyl groups.

[0018] Suitable non-ionic deterative surfactants are selected from the group consisting of: C₈-C₁₈ alkyl ethoxylates, such as, NEODOL® non-ionic surfactants from Shell; C₆-C₁₂ alkyl phenol alkoxyates wherein preferably the alkoxyate units are ethyleneoxy units, propyleneoxy units or a mixture thereof; C₁₂-C₁₈ alcohol and C₆-C₁₂ alkyl phenol condensates with ethylene oxide/propylene oxide block polymers such as Pluronic® from BASF; C₁₄-C₂₂ mid-chain branched alcohols; C₁₄-C₂₂ mid-chain branched alkyl alkoxyates, preferably having an average degree of alkoxylation of from 1 to 30; alkylpolysaccharides, preferably alkylpolyglycosides; polyhydroxy fatty acid amides; ether capped poly(oxyalkylated) alcohol surfactants; and mixtures thereof.

[0019] Preferred non-ionic deterative surfactants are alkyl polyglucoside and/or an alkyl alkoxyated alcohol.

[0020] Preferred non-ionic deterative surfactants include alkyl alkoxyated alcohols, preferably C₈₋₁₈ alkyl alkoxyated alcohol, preferably a C₈₋₁₈ alkyl ethoxyated alcohol, preferably the alkyl alkoxyated alcohol has an average degree of alkoxylation of from 1 to 50, preferably from 1 to 30, or from 1 to 20, or from 1 to 10, preferably the alkyl alkoxyated alcohol is a C₈₋₁₈ alkyl ethoxyated alcohol having an average degree of ethoxylation of from 1 to 10, preferably from 1 to 7, more preferably from 1 to 5 and most preferably from 3 to 7. The alkyl alkoxyated alcohol can be linear or branched, and substituted or un-substituted.

[0021] Suitable nonionic deterative surfactants include secondary alcohol-based deterative surfactant having the formula:

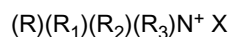


wherein R¹ = linear or branched, substituted or unsubstituted, saturated or unsaturated C₂₋₈ alkyl; wherein R² = linear or branched, substituted or unsubstituted, saturated or unsaturated C₂₋₈ alkyl, wherein the total number of carbon atoms present in R¹ + R² moieties is in the range of from 7 to 13;

wherein EO/PO are alkoxy moieties selected from ethoxy, propoxy, or mixtures thereof, preferably the EO/PO alkoxyl moieties are in random or block configuration; wherein n is the average degree of alkoxylation and is in the range of from 4 to 10.

[0022] Suitable cationic deterative surfactants include alkyl pyridinium compounds, alkyl quaternary ammonium compounds, alkyl quaternary phosphonium compounds, alkyl ternary sulphonium compounds, and mixtures thereof.

[0023] Preferred cationic deterative surfactants are quaternary ammonium compounds having the general formula:



5 wherein, R is a linear or branched, substituted or unsubstituted C₆₋₁₈ alkyl or alkenyl moiety, R₁ and R₂ are independently selected from methyl or ethyl moieties, R₃ is a hydroxyl, hydroxymethyl or a hydroxyethyl moiety, X is an anion which provides charge neutrality, preferred anions include: halides, preferably chloride; sulphate; and sulphonate. Preferred cationic deterative surfactants are mono-C₆₋₁₈ alkyl mono-hydroxyethyl di-methyl quaternary ammonium chlorides. Highly preferred cationic deterative surfactants are mono-C₈₋₁₀ alkyl mono-hydroxyethyl di-methyl quaternary ammonium chloride, mono-C₁₀₋₁₂ alkyl mono-hydroxyethyl di-methyl quaternary ammonium chloride and mono-C₁₀ alkyl mono-hydroxyethyl di-methyl quaternary ammonium chloride.

[0024] **Zeolite builder.** The composition comprises from 0wt% to 5wt% zeolite builder, preferably to 4wt%, or to 3wt%, or to 2wt%, or even to 1wt% zeolite builder. The composition may even be substantially free of zeolite builder; substantially free means "no deliberately added". Typical zeolite builders include zeolite A, zeolite P and zeolite MAP.

15 [0025] **Phosphate builder.** The composition comprises from 0wt% to 5wt% phosphate builder, preferably to 4wt%, or to 3wt%, or to 2wt%, or even to 1wt% phosphate builder. The composition may even be substantially free of phosphate builder; substantially free means "no deliberately added". A typical phosphate builder is sodium tri-polyphosphate.

[0026] **Silicate salt.** The composition may preferably comprise from 0wt% to less than 10wt% silicate salt, preferably to 9wt%, or to 8wt%, or to 7wt%, or to 6wt%, or to 5wt%, or to 4wt%, or to 3wt%, or even to 2wt%, and preferably from above 0wt%, or from 0.5wt%, or even from 1wt% silicate salt. A preferred silicate salt is sodium silicate.

20 [0027] **Bleach.** The composition preferably comprises bleach, preferably from 0wt% to 10wt% bleach. wherein the composition comprises from 0wt% to 10wt% bleach, preferably to 9wt%, or to 8wt%, or to 7wt%, or to 6wt%, or to 5wt%, or to 4wt%, or to 3wt%, or even to 2wt%, and preferably from above 0wt%, or from 0.5wt%, or even from 1wt% bleach. Suitable bleach includes a source of hydrogen peroxide, typically in combination with a bleach activator and/or a bleach catalyst.

25 [0028] Preferred source of hydrogen peroxide includes percarbonate and/or perborate salts, more preferably sodium percarbonate, sodium perborate monohydrate, and/or sodium perborate tetrahydrate. Preferably, the source of hydrogen peroxide, especially percarbonate salt, is coated. Preferred coating materials are carbonate salts, sulphate salts, silicate salts including borosilicate salts, and mixtures thereof. Another suitable source of hydrogen peroxide is pre-formed peracid. Preferably the pre-formed peracid is coated or encapsulated.

30 [0029] Preferred bleach activators include: tetraacetylthylene diamine (TAED); oxybenzene sulphonate (OBS) preferably nonanoyl oxybenzene sulphonate; nitrile quats, and mixtures thereof.

[0030] Preferred bleach catalysts include: imine bleach boosters, preferably oxaziridinium bleach boosters; transition metal catalysts, bleaching enzymes; and mixtures thereof.

35 [0031] **Hueing agent.** Hueing dyes are formulated to deposit onto fabrics from the wash liquor so as to improve fabric whiteness perception. Preferably the hueing agent dye is blue or violet. It is preferred that the shading dye(s) have a peak absorption wavelength of from 550nm to 650nm, preferably from 570nm to 630nm. A combination of dyes which together have the visual effect on the human eye as a single dye having a peak absorption wavelength on polyester of from 550nm to 650nm, preferably from 570nm to 630nm. This may be provided for example by mixing a red and green-blue dye to yield a blue or violet shade.

40 [0032] Dyes are coloured organic molecules which are soluble in aqueous media that contain surfactants. Dyes are described in 'Industrial Dyes', Wiley VCH 2002, K. Hunger (editor). Dyes are listed in the Color Index International published by Society of Dyers and Colourists and the American Association of Textile Chemists and Colorists. Dyes are preferably selected from the classes of basic, acid, hydrophobic, direct and polymeric dyes, and dye-conjugates. Those skilled in the art of detergent formulation are able to select suitable hueing dyes from these publications. Polymeric hueing dyes are commercially available, for example from Milliken, Spartanburg, South Carolina, USA.

45 [0033] Examples of suitable dyes are direct violet 7, direct violet 9, direct violet 11, direct violet 26, direct violet 31, direct violet 35, direct violet 40, direct violet 41, direct violet 51, direct violet 66, direct violet 99, acid violet 50, acid blue 9, acid violet 17, acid black 1, acid red 17, acid blue 29, solvent violet 13, disperse violet 27 disperse violet 26, disperse violet 28, disperse violet 63 and disperse violet 77, basic blue 16, basic blue 65, basic blue 66, basic blue 67, basic blue 71, basic blue 159, basic violet 19, basic violet 35, basic violet 38, basic violet 48; basic blue 3, basic blue 75, basic blue 95, basic blue 122, basic blue 124, basic blue 141, thiazolium dyes, reactive blue 19, reactive blue 163, reactive blue 182, reactive blue 96, Liquitint® Violet CT (Milliken, Spartanburg, USA) and Azo-CM-Cellulose (Megazyme, Bray, Republic of Ireland).

55 [0034] **Perfume microcapsule.** Preferably, the composition comprises a perfume microcapsule. Preferred perfume microcapsules comprise melamine formaldehyde, urea formaldehyde, urea, or mixtures thereof.

[0035] **Starch encapsulated perfume accord.** Preferably, the composition comprises a starch encapsulated perfume accord.

[0036] Fabric softening agent. The composition may comprise a fabric-softening agent. Preferably, the fabric softening agent is selected from: clay, preferred clays are montmorillonite clay; silicone, a preferred silicone is polydimethyl siloxane (PDMS); quaternary ammonium fabric softening compounds; and mixtures thereof. A highly preferred fabric softening agent is a combination of clay, especially montmorillonite clay, with silicone, especially PDMS.

[0037] The composition may also comprise a flocculating agent in combination with the fabric-softening agent. A preferred flocculating agent is polyethylene oxide (PEO). PEO is especially preferred when used in combination with clay, especially montmorillonite clay.

[0038] Cationic polymer. The composition may comprise a cationic polymer. Preferred cationic polymers include: cationic silicones; cationic cellulose, especially cationic hydroxyethyl cellulose; cationic polyamines; and mixtures thereof.

[0039] Alkoxylated polyamine. The composition may comprise an alkoxylated polyamine.

[0040] Fabric-deposition aid. The composition may comprise fabric deposition aid. Suitable fabric-deposition aids are polysaccharides, preferably cellulosic polymers. Other suitable fabric-deposition aids include poly diallyl dimethyl ammonium halides (DADMAC), and co-polymers of DADMAC with vinyl pyrrolidone, acrylamides, imidazoles, imidazolium halides, and mixtures thereof, in random or block configuration. Other suitable fabric-deposition aids include cationic guar gum, cationic cellulose such as cationic hydroxyethyl cellulose, cationic starch, cationic polyacrylamides, and mixtures thereof.

[0041] Additional detergent ingredients. The composition typically comprises other detergent ingredients. Suitable detergent ingredients include: transition metal catalysts; imine bleach boosters; enzymes such as amylases, carbohydrases, cellulases, laccases, lipases, bleaching enzymes such as oxidases and peroxidases, proteases, pectate lyases and mannanases; source of peroxygen such as percarbonate salts and/or perborate salts, preferred is sodium percarbonate, the source of peroxygen is preferably at least partially coated, preferably completely coated, by a coating ingredient such as a carbonate salt, a sulphate salt, a silicate salt, borosilicate, or mixtures, including mixed salts, thereof; bleach activator such as tetraacetyl ethylene diamine, oxybenzene sulphonate bleach activators such as nonanoyl oxybenzene sulphonate, caprolactam bleach activators, imide bleach activators such as N-nonanoyl-N-methyl acetamide, preformed peracids such as N,N-phthaloylamino peroxyacaproic acid, nonylamido peroxyadipic acid or dibenzoyl peroxide; suds suppressing systems such as silicone based suds suppressors; brighteners; hueing agents; photobleach; fabric-softening agents such as clay, silicone and/or quaternary ammonium compounds; flocculants such as polyethylene oxide; dye transfer inhibitors such as polyvinylpyrrolidone, poly 4-vinylpyridine N-oxide and/or co-polymer of vinylpyrrolidone and vinylimidazole; fabric integrity components such as oligomers produced by the condensation of imidazole and epichlorhydrin; soil dispersants and soil anti-redeposition aids such as alkoxylated polyamines and ethoxylated ethyleneimine polymers; anti-redeposition components such as polyesters and/or terephthalate polymers, polyethylene glycol including polyethylene glycol substituted with vinyl alcohol and/or vinyl acetate pendant groups; perfumes such as perfume microcapsules, polymer assisted perfume delivery systems including Schiff base perfume/polymer complexes, starch encapsulated perfume accords; soap rings; aesthetic particles including coloured noodles and/or needles; dyes; fillers such as sodium sulphate, although it may be preferred for the composition to be substantially free of fillers; carbonate salt including sodium carbonate and/or sodium bicarbonate; silicate salt such as sodium silicate, including 1.6R and 2.0R sodium silicate, or sodium metasilicate; co-polyesters of di-carboxylic acids and diols; cellulosic polymers such as methyl cellulose, carboxymethyl cellulose, hydroxyethoxycellulose, or other alkyl or alkylalkoxy cellulose, and hydrophobically modified cellulose; carboxylic acid and/or salts thereof, including citric acid and/or sodium citrate; and any combination thereof.

EXAMPLES

[0042]

Ingredient	Composition A	Composition B	Composition C	Composition D
Linear alkyl benzene sulphonate	9wt%	9wt%	12wt%	8wt%
Alkyl ethoxylated sulphate having an average degree of ethoxylation of from 0.5 to 3	3wt%	2wt%	1wt%	2wt%
Cationic deterative surfactant	0.5wt%	0.5wt%	0.5wt%	0.5wt%
Sodium sulphate	55wt%	55wt%	55wt%	55wt%
Sodium carbonate	8wt%	10wt%	5wt%	8wt%
Glycerol carbonate	9wt%	12wt%	8wt%	10wt%

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(continued)

Ingredient	Composition A	Composition B	Composition C	Composition D
Oxaziridinium-based bleach catalyst	0.005wt%	0.005wt%	0.005wt%	0.005wt%
Sodium silicate	3wt%	0wt%	3wt%	0wt%
Carboxylate polymer	2wt%	2wt%	2wt%	2wt%
Brightener	0.02wt%	0.02wt%	0.02wt%	0.02wt%
Enzymes	0.8wt%	0.8wt%	0.8wt%	0.8wt%
Cellulosic polymer	0.3wt%	0.3wt%	0.3wt%	0.3wt%
Misc & Moisture	to 100wt%	to 100wt%	to 100wt%	to 100wt%

[0043] 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. Solid laundry detergent composition comprising:

- a. deterative surfactant;
- b. glycerol carbonate;
- c. from 0wt% to less than 5wt% zeolite builder;
- d. from 0wt% to less than 5wt% phosphate builder;
- e. optionally, from 0wt% to less than 10wt% silicate salt;
- f. optionally, perfume; and
- g. optionally, additional detergent ingredients.

2. Solid detergent composition according to any preceding claim, wherein the composition comprises perfume microcapsule.

3. Solid detergent composition according to any preceding claim, wherein the composition comprises cationic polymer.

4. Solid detergent composition according to any preceding claim, wherein the composition comprises clay and silicone.

5. Solid detergent composition according to any preceding claim, wherein the composition comprises a fabric-deposition aid.

6. Solid detergent composition according to any preceding claim, wherein the composition comprises alkoxyated polyamine.

7. Solid detergent composition according to any preceding claim, wherein the composition comprises bleach catalyst.

8. Solid detergent composition according to any preceding claim, wherein the composition comprises hueing agent.

9. Solid detergent composition according to any preceding claim, wherein the composition comprises mid-chain branched deterative surfactant.

10. Solid detergent composition according to any preceding claim, wherein the composition is a free flowing particulate form.



EUROPEAN SEARCH REPORT

Application Number
EP 10 16 0362

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	WO 02/087327 A1 (HUNTSMAN SPEC CHEM CORP [US]) 7 November 2002 (2002-11-07) * claims; examples 8-10 * -----	1	
X	DE 198 26 327 A1 (HENKEL KGAA [DE]) 16 December 1999 (1999-12-16) * pages 3-4; claims * -----	1-10	
X	DE 101 43 973 A1 (COGNIS DEUTSCHLAND GMBH [DE]) 27 March 2003 (2003-03-27) * paragraph [0012] * -----	1-10	
Y	DE 198 42 069 A1 (COGNIS DEUTSCHLAND GMBH [DE]) 23 March 2000 (2000-03-23) * page 2; claims * -----	1-10	
Y	EP 0 313 146 A2 (PROCTER & GAMBLE [US]) 26 April 1989 (1989-04-26) * page 3, lines 26-56; claims; examples * -----	1-10	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			C11D
1	Place of search Munich	Date of completion of the search 25 August 2010	Examiner Pfannenstein, Heide
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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REFERENCES CITED IN THE DESCRIPTION

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Non-patent literature cited in the description

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