

A DETERGENT PRODUCT IN THE FORM OF A SINGLE SOLID BLOCK COMPRISING MULTIPLE PORTIONS,
METHODS
AND USES

The present invention relates to detergent compositions. In particular the invention relates to detergent compositions having improved properties for use in toilet care, automatic dishwashing, manual dishwashing, laundry, fabric care, kitchen care, carpet cleaning, air fresheners, vehicle care, polishing products, machine cleaning and maintenance, pesticides, insecticides, fungicides, herbicides, oilfield chemical applications, marine applications and institutional / industrial cleaning. The detergent compositions may be especially useful in household cleaning applications, for example in laundry detergent compositions.

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Detergent compositions are commonly known for household use, particularly for laundry and automatic dishwashing applications. Compositions may be provided in loose powder or liquid form where a user measures out a dose each time before use. However this is time consuming and can be messy.

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Many consumers prefer to buy detergent compositions in unit dose form in which the dose is pre-measured and a single tablet or pouch is added to the washing machine or dishwasher. Unit dose detergent compositions are often provided in the form of compressed powder tablets or pouches comprising liquids encapsulated in a water-soluble polymer, for example polyvinyl alcohol.

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Although unit dose detergents are sometimes favoured by consumers in particular for their ease of handling, a difficulty with such compositions is that only a single dosage level is available. However it is often desirable to vary the dose of a detergent, for a number of reasons: for example due to different levels of soiling, different loads of laundry/dishes, and varying levels of water hardness. Such factors and others mean that the same amount of laundry or dishwashing detergent is not appropriate for every wash cycle. It would therefore be desirable to provide detergent composition that is both easy to handle and for which the dose can be easily varied.

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The nature of the ingredients in many compositions means that unit doses must be individually wrapped in a disposable packaging or encased in a polymer. In some embodiments pouches or tablets include multiple compartments. This is typically to separate incompatible ingredients so that they do not react and degrade on storage.

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Wrapping or encapsulating tablets adds to the complexity and cost of manufacture, as does the inclusion of multiple compartments in a tablet or pouch. Also, such products have been known to rupture when handled by children leading to exposure of the child to harmful detergents and therefore potentially less safe than completely solid detergent products.

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It would therefore be highly desirable to provide a detergent composition in a solid, easy to handle form, preferably not encased or encapsulated in a polymer and which does not need individual protective wrappings.

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Environmental concerns are becoming increasingly important and it is highly desirable to provide detergent compositions in plastic-free packaging.

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In order to reduce the environmental impact of detergents it is also preferable to provide compositions in concentrated form to avoid the unnecessary transportation of water. Thus compositions having a low water content are highly desirable.

A detergent composition also needs to be aesthetically pleasing and attractive to consumers.

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A further challenge in the manufacture of solid detergent compositions compared with bulk liquid or powder compositions is to provide a composition which has good dissolution characteristics.

Also important in the manufacture of detergents is the safety of the components used, with skin and ocular irritancy reduced as much as possible.

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It is an aim of the present invention to provide a novel detergent composition which overcomes at least one disadvantage of the prior art whether stated herein or otherwise.

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According to a first aspect of the present invention there is provided a detergent product in the form of a single solid block comprising multiple portions and including at least a first detergent composition; wherein the first detergent composition comprises:

- (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
- (b) at least one nitrogen containing surfactant;
- (c) at least one anionic surfactant;
- (d) at least one solvent including at least one hydroxy functional group; and
- (e) up to 20 wt% water.

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The detergent product of the present invention is in the form of a single solid block comprising multiple portions. Thus the product is a single physical entity and does not comprise separate physically distinct parts.

The detergent product of the present invention is not a unit dose form which cannot be divided. Rather the single solid block comprises multiple portions. The block can suitably be divided into these portions if desired.

5 The detergent product of the present invention comprises at least the first detergent composition. It can optionally comprise further component parts. However the first detergent composition is part of the single solid block which forms the detergent product of the first aspect of the present invention.

10 The first detergent composition comprises (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms.

Any suitable salt of fatty acid may be used. Suitable salts include metal salts, ammonium salts and amine salts.

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Suitable metal salts include alkali metal and alkaline earth metal salts. Preferred metal salts are alkali metal salts, especially sodium or potassium salts.

In some embodiments component (a) comprises a salt of ammonia or an amine and a fatty acid.

20 Preferably component (a) comprises an amine salt of a fatty acid.

The amine is preferably a primary amine, i.e. the amine preferably includes an NH₂ functional group.

25 Suitably the amine has 3 to 20 carbon atoms, preferably 3 to 12 carbon atoms, for example 3 to 6 carbon atoms, 3 to 5 carbon atoms or 3 to 4 carbon atoms. Most preferably the amine has 3 carbon atoms.

30 Preferably the amine is an alkanolamine. The amine may be monoalkanolamine, a dialkanolamine, a trialkanolamine, an N-alkyl alkanolamine or an N-hydroxyalkyl alkanolamine. Suitable N-alkyl alkanolamines are methyl alkanolamines. Suitable N-hydroxyalkyl alkanolamines are N-hydroxymethyl alkanolamines. Preferably the amine is a monoalkanolamine.

35 Preferably the hydroxy group of the monoalkanolamine is not joined to a terminal carbon atom.

Most preferably the amine is monoisopropanolamine, i.e. the compound of formula CH₃CH(OH)CH₂NH₂.

Component (a) preferably comprises the salt of an amine and a fatty acid or the sodium or potassium salt of a fatty acid. Although reference is made to a fatty acid, it will be understood that this material may comprise a mixture of components. At least 50% of the fatty acid molecules have at least 16 carbon atoms.

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The fatty acid may comprise a mixture of compounds, typically a mixture of isomers and/or homologues.

The skilled person will appreciate that natural sources of fatty acids often contain mixtures.

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The present inventors have surprisingly found that when using fatty acid salts in the present invention at least 50% of the fatty acid molecules must have at least 16 carbon atoms in order to achieve beneficial properties. This feature is defined in terms of the number of fatty acid molecules present in component (a) and their number of carbons. Therefore in order to determine whether a fatty acid mixture has at least 50% of fatty acid molecules having at least 16 carbon atoms, molar ratios of each fatty acid present should be used. For the avoidance of doubt, weight ratios of the fatty acids present should not be used to determine whether a fatty acid mixture has at least 50% of fatty acid molecules having at least 16 carbon atoms.

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20 Suitably the fatty acid comprises compounds of formula RCOOH wherein R is an optionally substituted alkyl, alkenyl, aryl alkyl or aryl alkenyl group. Preferably R is an unsubstituted alkyl or alkenyl group. In preferred embodiments R is an alkyl group.

Preferred fatty acids are saturated fatty acids.

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The fatty acid may comprise some unsaturated components but predominantly saturated compounds are preferred. Suitably at least 50% of the fatty acid molecules are saturated, suitably at least 75% or at least 90%. Preferably all or substantially all of the fatty acid molecules are saturated.

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At least 50% of the fatty acid molecules have at least 16 carbon atoms. Fatty acid components having fewer than 16 carbon atoms, for example fatty acids having 12 carbon atoms may be included but these are present in a total amount of less than 50 mol%. Natural sources comprising C12 fatty acids, such as coconut fatty acid or palm kernel fatty acid may be included.

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At least 50% of the fatty acid molecules have at least 16 carbon atoms. Preferred are fatty acids having 16 to 30 carbon atoms, preferably 16 to 24 carbon atoms, more preferably 16 to 20 carbon atoms, most preferably 16 to 18 carbon atoms.

In especially preferred embodiments at least 80%, preferably at least 90% of the fatty acid molecules have 16 to 18 carbon atoms.

Preferably at least 90% of the fatty acid molecules are saturated C16 to C18 fatty acids.

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In especially preferred embodiments the fatty acid comprises an approximately equimolar mixture of C16 and C18 saturated fatty acids.

Component (a) preferably comprises the monoisopropanolamine salt of a mixture of C16 and C18 fatty acids and/or the sodium salt of a mixture of C16 and C18 fatty acids.

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The components (a), (b) and (c) of the first detergent composition of this first aspect are suitably provided by different ingredients. Although component (a) may in some embodiments be considered to be a nitrogen-containing surfactant and/or an anionic surfactant, the salt of fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms provides only component (a) of the first detergent composition. Therefore the first detergent composition comprises one or more nitrogen containing surfactant component (b) which is/are different to component (a) and one or more anionic surfactant component (c) which is/are different to component (a) and component (b).

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Component (b) comprises at least one nitrogen containing surfactant.

Component (b) may comprise a mixture of two or more nitrogen containing surfactants.

Any suitable nitrogen containing surfactant may be used and suitable surfactant compounds will be known to the person skilled in the art.

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Preferably component (b) comprises one or more nitrogen containing surfactants selected from alkanolamides, amine oxides and amphoteric or zwitterionic compounds, or mixtures thereof.

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In some embodiments component (b) comprises an alkanolamide.

In some embodiments component (b) comprises an amine oxide.

In some embodiments component (b) comprises an amphoteric or zwitterionic nitrogen containing surfactant, preferably a betaine.

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In some embodiments, component (b) comprises a betaine.

In some embodiments component (b) comprises a betaine and an alkanolamide.

In some embodiments, component (b) comprises an alkanolamide, an amine oxide and a betaine.

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In preferred embodiments, component (b) comprises a betaine and an amine oxide.

In preferred embodiments, component (b) comprises an amine oxide and an alkanolamide.

- 10 By alkanolamide we mean to refer to the reaction product of an alkanolamine and a fatty acid donor (for example a fatty acid, a fatty acid ester or a triglyceride). The alkanolamide may be referred to as a fatty acid alkanolamide. The reaction product of a fatty acid and alkanolamine suitably mainly contains the fatty acid alkanolamide. The reaction product may contain some ester compound formed by the fatty acid and the alkanolamine. Therefore the reaction product
- 15 of the fatty acid and the alkanolamine may be a mixture of fatty acid alkanolamide and fatty acid amino ester.

The alkanolamide may be prepared from a monoalkanolamine or a dialkanolamine.

- 20 Preferably the alkanolamide is prepared from a monoalkanolamine.

In some embodiments the alkanolamide is prepared from a dialkanolamine.

- 25 Preferably the alkanolamide comprises the reaction product of a fatty acid donor and an alkanolamine selected from monoethanolamine, monopropanolamine, monoisopropanolamine monobutanolamine and diethanolamine.

- 30 Preferably the alkanolamide comprises the reaction product of a fatty acid donor and monoisopropanolamine. Therefore the alkanolamide is suitably a fatty acid alkanolamide comprising a fatty acid moiety.

- Suitably the fatty acid moiety has the formula $RC(O)-$ wherein R is an optionally substituted alkyl, hydroxyalkyl, alkenyl or hydroxyalkenyl group, for example hydroxystearic acid group. Preferably R is an unsubstituted alkyl or alkenyl group. In preferred embodiments R is an alkyl
- 35 group.

Preferably R is an alkyl or alkenyl group having 6 to 36 carbon atoms, preferably 6 to 30 carbon atoms, more preferably 8 to 24 carbon atoms, for example 10 to 20 carbon atoms.

In some preferred embodiments the fatty acid moiety comprises predominantly C12 fatty acids.

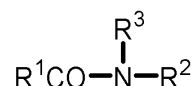
The skilled person will appreciate that natural sources of fatty acids typically comprise mixtures of compounds.

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Preferably the fatty acid moiety is coconut fatty acid, or a fatty acid derived from palm oil or palm kernel oil. In such embodiments, the alkanolamide may be formed by the reaction of the fatty acid ester with an alkanolamine.

- 10 Preferably the alkanolamide is formed by the reaction of a coconut fatty acid ester with monoisopropanolamine.

Suitably the alkanolamide has the formula:



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wherein R¹ is an alkyl, alkenyl hydroxyalkyl and hydroxyalkenyl containing 6 to 22 carbon atoms, R² is a hydroxyalkyl group containing 2, 3, 4, 5 or 6 carbon atoms, and R³ is hydrogen or an alkyl group or has the same meaning as R². Preferably, R² is a hydroxyisopropyl group, in which case the molecule can be referred to as an alkanoyl isopropanol amide. Preferably R³ is hydrogen.

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- Suitable examples of such fatty acid alkanolamides are Cocamide MIPA (i.e. EMPILAN® CIS), Cocamide MEA (i.e. EMPILAN® CME / T), Cocamide DEA (i.e. EMPILAN® 2502), Cocamide methyl MEA, Lauramide MEA, Lauramide DEA, Lauramide MIPA, Myristamide MEA, Myristamide DEA, Myristamide MIPA, Stearamide MEA, Stearamide DEA, Stearamide MIPA, Hydroxystearamide MEA, Isostearamide DEA, N-Tris(hydroxymethyl) methyl lauramide, Oleamide MEA, Oleamide DEA; Oleamide MIPA, Soyamide MEA, Soyamide DEA, Soyamide MIPA, Behenamide MEA, Behenamide DEA, Palmitamide MEA, Palmitamide DEA, Ricinoleamide MEA, Ricinoleamide DEA, Ricinoleamide MIPA, Tallowamide MEA, Tallowamide DEA, Undecylenamide MEA, Undecylenamide DEA, N-Lauroyl-N-methylglucamide, N-Cocoyl-N-methylglucamide or a mixture thereof.

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Most preferably component (b) comprises cocamide MIPA.

Preferred amine oxides for use herein are oxides of tertiary amines.

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Suitable amine oxides include oxides of alkyl or alkenyl amines or oxides of amido alkyl amines.

Preferred amido alkyl amine oxides include C12-14 amidopropyl amine oxide.

Preferably the amine oxide is an oxide of a tertiary alkylamine or alkenylamine having 6 to 36 carbon atoms, preferably 6 to 30 carbon atoms, more preferably 8 to 24 carbon atoms, for example 10 to 20 carbon atoms.

The skilled person will understand that alkyl or alkenyl amine oxide surfactants typically have the structure $R^1R^2R^3N^+O^-$ wherein R^1 is an alkylamine or alkenylamine having 6 to 36 carbon atoms, preferably 6 to 30 carbon atoms, more preferably 8 to 24 carbon atoms, for example 10 to 20 carbon atoms as described above and R^2 and R^3 are C_1 to C_4 alkyl, preferably methyl.

Also useful herein are amido alkyl amine oxides of formula $R^1CO(CH_2)_nR^2R^3N^+O^-$ wherein R^1 is an alkylamine or alkenylamine having 6 to 36 carbon atoms, preferably 6 to 30 carbon atoms, more preferably 8 to 24 carbon atoms, for example 10 to 20 carbon atoms; n is from 1 to 6, preferably 2 to 3, for example 3; and R^2 and R^3 are C_1 to C_4 alkyl, preferably methyl.

Preferably the amine oxide is an oxide of a tertiary alkylamine. The amine oxide may comprise a mixture of compounds, suitably a mixture of homologues. The skilled person will understand that amines obtained from natural sources typically comprise mixtures of compounds.

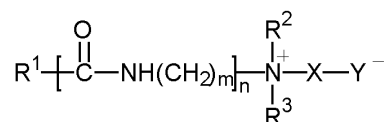
Amine oxides obtained from petrochemical sources are also within the scope of the invention.

Preferably the amine oxide comprises a mixture of C12 to C16 amine oxides.

In some embodiments component (b) comprises a mixture of C12 to 14 amidopropyl amine oxides and C12 to C16 amine oxides.

In some embodiments component (b) comprises an amphoteric or zwitterionic nitrogen containing surfactant.

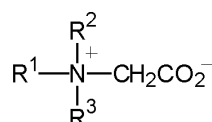
Amphoteric or zwitterionic nitrogen containing surfactants for use as component (b) in the compositions of the present invention may include those which have an alkyl or alkenyl group of 7 to 22 carbon atoms and comply with an overall structural formula:



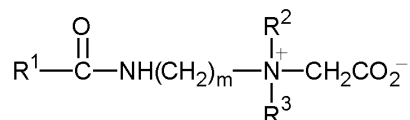
where R^1 is an alkyl or alkenyl group having 7 to 22 carbon atoms; R^2 and R^3 are each independently alkyl, hydroxyalkyl or carboxyalkyl of 1 to 6 carbon atoms; m is 2 to 4; n is 0 or 1; X is alkylene of 1 to 6 carbon atoms optionally substituted with hydroxyl; and Y is $-\text{CO}_2$ or $-\text{SO}_3$.

- 5 Such amphoteric or zwitterionic nitrogen containing surfactants may comprise compounds of the above formula having different numbers of carbon atoms in the R^1 group, within the range of 7 to 22 carbon atoms. For example when the R^1 is derived from a natural source such as a coconut fatty acid derivative.

- 10 Surfactants suitable for use as component (b) may include simple betaines of formula:



and amido betaines of formula:



- 15 where m is 2 or 3.

In both formulae R^1 , R^2 and R^3 are as defined previously. R^1 may, in particular, be a mixture of C_{12} and C_{14} alkyl groups derived from coconut so that at least half, preferably at least three quarters, of the groups R^1 has 10 to 14 carbon atoms. R^2 and R^3 are preferably methyl.

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In some preferred embodiments, R^1 may be a C8 alkyl group so that at least half, preferably at least three quarters, of the groups R^1 has 8 carbon atoms. R^2 and R^3 are preferably methyl.

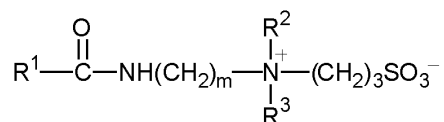
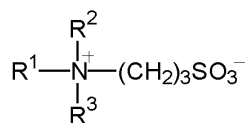
- 25 In some preferred embodiments, R^1 may be a C10 alkyl group so that at least half, preferably at least three quarters, of the groups R^1 has 10 carbon atoms. R^2 and R^3 are preferably methyl.

In some preferred embodiments, R^1 may be a mixture of C8 and C10 alkyl groups so that at least half, preferably at least three quarters, of the groups R^1 has 8 to 10 carbon atoms. R^2 and R^3 are preferably methyl.

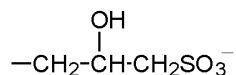
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Surfactant component (b) may include sultaines (or sulphobetaines) of formula:

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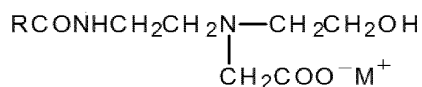
- 5 wherein m is 2 or 3, or variants of these in which
 -(CH₂)₃SO₃⁻ is replaced by



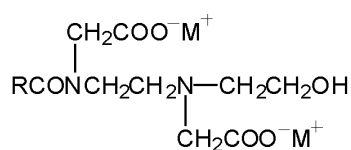
wherein R¹, R² and R³ in these formulae are as defined previously.

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Surfactant component (b) may include amphoacetates and diamphoacetates. Amphoacetates generally conform to the following formula:



- 15 Diamphoacetates generally conform to the following formula:



- 20 wherein R is an aliphatic group of 7 to 22 carbon atoms and M is a cation such as sodium, potassium, ammonium, or substituted ammonium.

- Suitable acetate-based amphoteric surfactants include lauroamphoacetate; alkyl amphoacetate; cocoampho(di)acetate; cocoamphoacetate; disodium cocoamphodiacetate; sodium cocoamphoacetate; disodium cocoamphodiacetate; disodium capryloamphodiacetate; disodium lauroamphoacetate; sodium lauroamphoacetate and disodium wheatgerm amphodiacetate.
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Suitable betaine surfactants include alkylamido betaine; alkyl betaine, C_{12/14} alkyldimethyl betaine; cocoamidopropylbetaine; tallow bis(hydroxyethyl) betaine; hexadecyldimethylbetaine; cocodimethylbetaine; alkyl amido propyl sulfo betaine; alkyl dimethyl amine betaine; coco amido propyl dimethyl betaine; alkyl amido propyl dimethyl amine betaine; cocamidopropyl betaine; 5 lauryl betaine; laurylamidopropyl betaine, coco amido betaine, lauryl amido betaine, alkyl amino betaine; alkyl amido betaine; coco betaine; lauryl betaine; diemethicone propyl PG-betaine; oleyl betaine; N-alkyldimethyl betaine; coco biguamide derivative, C8 amido betaine; C12 amido betaine; lauryl dimethyl betaine; alkylamide propyl betaine; amido betaine; alkyl betaine; cetyl betaine; oleamidopropyl betaine; isostearamidopropyl betaine; lauramidopropyl betaine; 2-alkyl- 10 *N*-carboxymethyl-*N*-hydroxyethyl imidazolinium betaine; 2-alkyl-*N*-carboxyethyl-*N*-hydroxyethyl imidazolinium betaine; 2-alkyl-*N*-sodium carboxymethyl-*N*-carboxymethyl oxyethyl imidazolinium betaine; *N*-alkyl acid amidopropyl-*N,N*-dimethyl-*N*-(3-sulfopropyl)-ammonium-betaine; *N*-alkyl-*N,N*-dimethyl-*N*-(3-sulfopropyl)-ammonium-betaine; cocodimethyl betaine; apricotamidopropyl betaine; isostearamidopropyl betaine; myristamidopropyl betaine; 15 palmitamidopropyl betaine; cocamidopropyl hydroxyl sultaine; undecylenamidopropyl betaine; cocoamidosulfobetaine; alkyl amido betaine; C12/18 alkyl amido propyl dimethyl amine betaine; lauryldimethyl betaine; ricinol amidobetaine; tallow aminobetaine; octyl amidopropyl betaine; decyl amidopropyl betaine; C8 amidopropyl betaine; C10 amidopropyl betaine; C8-C10 amidopropyl betaine and C12-C18 amidopropyl betaine.

20 Suitable glycinate-based amphoteric surfactants include cocoamphocarboxyglycinate; tallowamphocarboxyglycinate; capryloamphocarboxyglycinate, oleoamphocarboxyglycinate, bis-2-hydroxyethyl tallow glycinate; lauryl amphoglycinate; tallow polyamphoglycinate; coco amphoglycinate; oleic polyamphoglycinate; *N*-C_{10/12} fatty acid amidoethyl-*N*-(2-hydroxyethyl)- 25 glycinate; *N*-C_{12/18}-fatty acid amidoethyl-*N*-(2-hydroxyethyl)-glycinate and dihydroxyethyl tallow glycinate.

Preferred acetate-based amphoteric surfactants for use as component (b) include sodium lauroamphocaetate, disodium lauroamphoacetate and mixtures thereof.

30 Preferred betaine surfactants for use as component (b) are amido betaines. Especially preferred compounds include cocoamidopropyl betaine and amidopropyl betaines prepared from C8 and/or C10 fatty acids.

35 Preferably component (b) comprises one or more of: the reaction product of a fatty acid having 8 to 20 carbon atoms and a monoalkanolamine; an amine oxide having 8 to 20 carbon atoms; and an amido betaine prepared from C6 to C20 fatty acids.

Suitably component (b) is selected from cocoamidopropyl betaine and amidopropyl betaines prepared from C8 and/or C10 fatty acids, a mixture of C12 to C16 amine oxides and an alkanolamide of coconut fatty acid and monoisopropanolamine.

- 5 Component (c) comprises at least one anionic surfactant.

Component (c) may comprise a mixture of two or more anionic surfactants.

- 10 Any suitable anionic surfactant may be included. Such compounds will be known to the person skilled in the art.

- 15 Suitable anionic surfactants for use herein include salts of: fatty acids; alkoxyated carboxylic acids; ester carboxylates; ethoxylated ester carboxylates; mono- or dialkyl sulfates; mono- or dialkyl ether sulfates; lauryl ether sulfates; alkyl sulfonates; alkyl aryl sulfonates; primary alkane disulfonates; alkene sulfonates; hydroxyalkane sulfonates; isethionates, alkyl isethionates, acyl isethionates, acyl alkyl isethionates, alkyl glyceryl ether sulfonates; alpha-olefin sulfonates; alkyl phosphates; sulfonates of alkylphenolpolyglycol ethers; alkyl sulfopolyacrylic acid esters; alkyl sulfosuccinates; alkyl ether sulfosuccinates; taurates; acyl taurates; products of condensation of fatty acids with oxy- and aminoalkanesulfonic acids; sulfated derivatives of fatty acids and polyglycols; alkyl and acyl sarcosinates; sulfoacetates; alkyl phosphates; alkyl phosphate esters; acyl lactates; alkanolamides of sulfated fatty acids, lipoamino acids and acyl substituted amino acids, for example acyl glycines and acyl glutamates. Particularly exemplary salts, where applicable, are the sodium, potassium, ammonium, magnesium and triethanolamine salts.

- 25 Preferred anionic surfactants include alkyl or alkenyl sulfates, alkyl or alkenyl ether sulfates, alkyl glyceryl ether sulfates, taurates, acyl taurates, (alkyl) isethionates (alkyl) acyl isethionates, acyl substituted amino acids, sarcosinates, sulfosuccinates, sulfosuccinamates, sulfoacetates, monoalkyl phosphate esters, di-alkyl phosphate esters, mono-alkyl ether phosphate esters, di-alkyl ether phosphate esters, alpha-olefin sulfonates, acyl lactates, alkyl ether carboxylates and glyceryl ether carboxylates.

- 35 Particularly preferred anionic surfactants for use herein include alkyl or alkenyl sulfates, alkyl or alkenyl ether sulfates, taurates, isethionates, acyl substituted amino acids, sarcosinates, and sulfosuccinates.

References herein to taurate surfactants or acyl taurates include compounds such as sodium lauroyl methyl taurate, sodium methyl cocoyl taurate and sodium methyl oleoyl taurate which could also be regarded as alkyl acyl taurates.

Illustrative examples of preferred anionic surfactants include sodium lauryl sulphate, sodium lauryl ether sulfate, sodium lauroyl methyl taurate, sodium methyl cocoyl taurate, sodium methyl oleoyl taurate, sodium cocoyl isethionate, sodium lauroyl isethionate, sodium cocoyl methyl isethionate, sodium lauroyl methyl isethionate, sodium lauroyl glycinate, sodium cocoyl glycinate, sodium lauryl sarcosinate, and disodium oleamido monoisopropanolamine (MIPA) sulfosuccinate.

Suitable alkyl or alkenyl sulfates and ether sulfates are compounds of formula:



wherein R^1 is a C5 to C39 alkyl or alkenyl group, R^2 is an alkylene group having 1 to 4 carbon atoms and n is from 0 to 12.

Preferably R^1 is a C7 to C15 alkyl or alkenyl group or a C9 to C13 alkyl or alkenyl group, suitably an alkyl group. For example, R^1 may be a C11 alkyl group.

R^2 is preferably a propylene or especially an ethylene moiety. Preferably n is from 0 to 6, preferably from 0 to 4, for example from 0 to 3. In some embodiments n is 0. In some embodiments n is 2. The skilled person will understand that alkyl or alkenyl ether sulfates typically contain mixtures of compounds with different n numbers due to the statistical nature of the alkoxylation reaction used in their formation. Some molecules are not alkoxyated in such a reaction and therefore some molecules wherein n = 0 may be present, e.g. alkyl sulfate

In some preferred embodiments, n is 2 or 3, or a mixture of compounds wherein n is 2 and compounds wherein n is 3.

In some preferred embodiments, n is 1.

The above n numbers suitably represent an average n number of a mixture of such alkyl or alkenyl sulfates and ether sulfates.

Suitable anionic surfactants include salts of alkyl sulfates, alkyl ether sulfates, fatty acids, carboxylates, alkyl sulfonates, aryl sulfonates, alkyl benzene sulphonates, isethionates, alkyl phosphates, sulfosuccinates, taurates, sarcosinates, sulfoacetates, lactates, acyl amino acids and phosphonates.

Suitable anionic surfactants for use in laundry compositions of the present invention typically comprise one or more moieties selected from the group consisting of carbonate, phosphate, phosphonate, sulphate, sulphonate, carboxylate and mixtures thereof. The anionic surfactant may be one or mixtures of more than one of alkyl or alkenyl sulphates, alkyl or alkenyl ether sulphates, alkyl sulphonates, alkenyl sulphonates and hydroxyalkyl sulphonates. Preferred anionic surfactants include lauryl ether sulfates and taurates (including acyl taurates and alkyl acyl taurates). Particularly preferred anionic surfactants are lauryl ether sulfates.

Component (d) comprises at least one solvent including at least one hydroxy functional group. For the avoidance of doubt component (d) does not include water. Water is present in the composition in addition to component (d).

For the avoidance of doubt component (d) is provided as a separate ingredient to components (a), (b) and (c).

Preferably component (d) is an organic solvent.

Suitable such solvents include monohydric alcohols, polyhydric alcohols, alkoxy alcohols and aryloxy alcohol.

Suitable solvents are monohydric alcohols, polyhydric alcohols and alkoxy alcohols.

Preferred solvents are miscible with water.

In some preferred embodiments the solvent of component (d) does not include an amino group.

Suitable simple monohydric alcohols include methanol, ethanol, isopropanol and butanol.

Preferably component (d) comprises a polyhydric alcohol or an alkoxyalcohol.

Suitable alkoxy alcohols include diethylene glycol monobutyl ether, 3-methoxy-3-methyl-1-butanol and 2-butoxyethanol.

One especially preferred alkoxy alcohol for use herein is 3-methoxy-3-methyl-1-butanol.

Suitable aryloxy alcohols include 2-phenoxyethanol.

Suitable polyhydric alcohols include glycerol, ethylene glycol, polyethylene glycol, propylene glycol, dipropylene glycol, polypropylene glycol and 2-methylpentanediol.

Suitable polyhydric alcohols include glycerol, ethylene glycol, polyethylene glycol, propylene glycol, dipropylene glycol and polypropylene glycol.

- 5 A mixture of propylene glycol and dipropylene glycol is especially preferred.

A further suitable solvent for use in component (d) is isopropylideneglycerol.

- 10 Preferably component (d) comprises propylene glycol, dipropylene glycol, 3-methoxy-3-methyl-1-butanol, 2-methylpentanediol, 2-phenoxyethanol, isopropylideneglycerol or a mixture thereof.

Preferably component (d) comprises propylene glycol, dipropylene glycol, 3-methoxy-3-methyl-1-butanol, 2-methylpentanediol, 2-phenoxyethanol or a mixture thereof.

- 15 In some embodiments, component (d) comprises propylene glycol and dipropylene glycol.

In some embodiments, component (d) comprises 3-methoxy-3-methyl-1-butanol and dipropylene glycol.

- 20 In some embodiments, component (d) comprises 3-methoxy-3-methyl-1-butanol, dipropylene glycol and isopropylideneglycerol.

In some embodiments, component (d) comprises a mixture of propylene glycol and 2-phenoxyethanol.

- 25 In some embodiments, component (d) may comprise a second solvent in addition to the solvent including at least one hydroxy functional group. The second solvent may be a non-water miscible solvent. Suitable such solvents may be selected from one or more of hydrocarbon oils, alkylcarbonates, synthetic and vegetable oils, essential oils, oily esters, silicon oils or perfumes.

- 30 In such embodiments, the ratio of solvent including at least one hydroxy functional group to the second solvent (non-water miscible solvent) may be from 100:1 to 1:5, suitably from 10:1 to 1:2, from 5:1 to 1:1 or from 3:1 to 1:1.

- 35 In some embodiments the second solvent may be a perfume. This may be present in an amount of up to 1 wt%, preferably up to 5 wt%, for example up to 10 wt%.

Component (e) comprises water.

The water content of the first detergent composition is up to 20 wt%.

It is preferred that water is present in the first detergent composition.

- 5 Preferably the first detergent composition comprises at least 0.1 wt%, preferably at least 0.5 wt%, suitably at least 1 wt% of water.

In preferred embodiments the first detergent composition comprises from 5 to 20 wt% water.

- 10 In some embodiments the first detergent composition comprises less than 19 wt% water, for example, less than 18 wt% or less than 17 wt%.

- For the avoidance of doubt, wherein amounts of components in a composition are described in wt%, this means the weight percentage of the specified component in relation to the whole composition referred to, for example the whole first detergent composition.
- 15

- Component (a) is preferably present in the first detergent composition of the present invention in an amount of from 0.1 to 50 wt%, preferably from 1 to 40 wt%, more preferably from 5 to 30 wt%, for example from 10 to 25 wt% or from 15 to 23 wt%.
- 20

- Component (b) is preferably present in the first detergent composition of the present invention in an amount of from 0.1 to 50 wt%, preferably from 1 to 40 wt%, more preferably from 3 to 35 wt%, for example from 5 to 32 wt% or 6 to 30 wt%.

- 25 Component (c) is preferably present in the first detergent composition of the present invention in an amount of from 0.1 to 50 wt%, preferably from 1 to 40 wt%, more preferably from 2 to 30 wt%, for example from 5 to 25 wt% or from 8 to 18 wt%.

- Component (d) is preferably present in the first detergent composition of the present invention in an amount of from 0.1 to 60 wt%, preferably from 1 to 50 wt%, more preferably from 5 to 40 wt%, for example from 8 to 38 wt% or 10 to 35 wt%.
- 30

- Each of components (a), (b), (c) and (d) may comprise a mixture of compounds. Unless otherwise stated any reference to components (a), (b), (c) and (d) and amounts thereof refer to the total amount of all such compounds present in the composition.
- 35

Preferably the first detergent composition comprises:

- 5 (a) from 5 to 30 wt%, preferably from 10 to 25 wt% of a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
- (b) from 1 to 40 wt%, preferably from 5 to 32 wt% of a nitrogen containing surfactant;
- (c) from 2 to 30 wt%, preferably from 5 to 25 wt% of an anionic surfactant;
- (d) from 5 to 40 wt% preferably from 8 to 38 wt% of a solvent including at least one hydroxy functional group; and
- (e) less than 20 wt%, preferably 5 to 20 wt%, more preferably 6 to 18 wt% water.

Preferably the first detergent composition comprises:

- 10 (a) from 5 to 30 wt%, preferably from 10 to 25 wt% of a salt of an amine and a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
- (b) from 1 to 40 wt%, preferably from 5 to 32 wt% of a nitrogen containing surfactant;
- (c) from 2 to 30 wt%, preferably from 5 to 25 wt% of an anionic surfactant;
- 15 (d) from 5 to 40 wt% preferably from 8 to 38 wt% of a solvent including at least one hydroxy functional group; and
- (e) less than 20 wt%, preferably 5 to 20 wt%, more preferably 6 to 18 wt% water.

In preferred embodiments the first detergent composition comprises:

- 20 (a) the salt of an alkali metal or a monoalkanolamine having 3 to 6 carbon atoms and a mixture of fatty acids wherein at least 80% of the fatty acid molecules are C16 to C18 fatty acids;
- (b) a nitrogen containing surfactant selected from alkanolamides, amine oxides, betaines and mixtures thereof;
- 25 (c) one or more anionic surfactants selected from alkyl or alkenyl sulphates, alkyl or alkenyl ether sulphates, alkyl sulphonates, alkenyl sulphonates, hydroxyalkyl sulphonates and taurates;
- (d) a solvent selected from polyhydric alcohols, alkoxy alcohols, aryloxy alcohols and mixtures thereof; and
- 30 (e) up to 20 wt% water.

In some embodiments the first detergent composition comprises:

- 35 (a) the salt of an alkali metal or a monoalkanolamine having 3 to 6 carbon atoms and a mixture of fatty acids wherein at least 80% of the fatty acid molecules are C16 to C18 fatty acids;
- (b) a nitrogen containing surfactant selected from alkanolamides, amine oxides, betaines and mixtures thereof;

- (c) one or more anionic surfactants selected from alkyl or alkenyl sulphates, alkyl or alkenyl ether sulphates, alkyl sulphonates, alkenyl sulphonates and hydroxyalkyl sulphonates;
- (d) a solvent selected from polyhydric alcohols, alkoxy alcohols and mixtures thereof; and
- (e) up to 20 wt% water.

5

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- (b) a nitrogen containing surfactant selected from alkanolamides, amine oxides and amphoteric or zwitterionic compounds, or mixtures thereof;
- (c) one or more anionic surfactants selected from alkyl or alkenyl sulphates, alkyl or alkenyl ether sulphates, alkyl sulphonates, alkenyl sulphonates, hydroxyalkyl sulphonates and taurates;
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- (c) one or more anionic surfactants selected from alkyl or alkenyl sulphates, alkyl or alkenyl ether sulphates, alkyl sulphonates, alkenyl sulphonates and hydroxyalkyl sulphonates;
- (d) a solvent selected from polyhydric alcohols, alkoxy alcohols and mixtures thereof; and
- (e) up to 20 wt% water.

In preferred embodiments the first detergent composition comprises:

- (a) the salt of sodium or monoisopropanolamine and a mixture of fatty acids wherein at least 80% of the fatty acid molecules are C16 to C18 fatty acids;
- (b) a nitrogen containing surfactant selected from cocoamidopropyl betaine and amidopropyl betaines prepared from C8 and/or C10 fatty acids;

- (c) one or more anionic surfactants selected from alkyl or alkenyl sulphates, alkyl or alkenyl ether sulphates, alkyl sulphonates, alkenyl sulphonates, hydroxyalkyl sulphonates and taurates;
- (d) a solvent selected from polyhydric alcohols, alkoxy alcohols, aryloxy alcohols and mixtures thereof; and
- (e) up to 20 wt% water.

In some embodiments the first detergent composition comprises:

- (a) the salt of sodium or monoisopropanolamine and a mixture of fatty acids wherein at least 80% of the fatty acid molecules are C16 to C18 fatty acids;
- (b) a nitrogen containing surfactant selected from cocoamidopropyl betaine and amidopropyl betaines prepared from C8 and/or C10 fatty acids;
- (c) one or more anionic surfactants selected from alkyl or alkenyl sulphates, alkyl or alkenyl ether sulphates, alkyl sulphonates, alkenyl sulphonates and hydroxyalkyl sulphonates;
- (d) a solvent selected from polyhydric alcohols, alkoxy alcohols, and mixtures thereof; and
- (e) up to 20 wt% water.

In preferred embodiments first detergent composition comprises:

- (a) from 5 to 30 wt%, preferably from 10 to 25 wt% of the salt of a monoalkanolamine having 3 to 6 carbon atoms and a mixture of fatty acids wherein at least 80% of the fatty acid molecules are C16 to C18 fatty acids;
- (b) from 1 to 40 wt%, preferably from 5 to 32 wt% of a nitrogen containing surfactant selected from alkanolamides, amine oxides, betaines and mixtures thereof;
- (c) from 2 to 30 wt%, preferably from 5 to 25 wt% of one or more anionic surfactants selected from alkyl or alkenyl sulphates, alkyl or alkenyl ether sulphates, alkyl sulphonates, alkenyl sulphonates, hydroxyalkyl sulphonates and taurates;
- (d) from 5 to 40 wt% preferably from 8 to 38 wt% of a solvent selected from polyhydric alcohols, alkoxy alcohols, aryloxy alcohols and mixtures thereof; and
- (e) less than 20 wt%, preferably 5 to 20 wt%, more preferably 6 to 18 wt% water.

In some embodiments the first detergent composition comprises:

- (a) from 5 to 30 wt%, preferably from 10 to 25 wt% of the salt of a monoalkanolamine having 3 to 6 carbon atoms and a mixture of fatty acids wherein at least 80% of the fatty acid molecules are C16 to C18 fatty acids;
- (b) from 1 to 40 wt%, preferably from 5 to 32 wt% of a nitrogen containing surfactant selected from alkanolamides, amine oxides, betaines and mixtures thereof;

- (c) from 2 to 30 wt%, preferably from 5 to 25 wt% of one or more anionic surfactants selected from alkyl or alkenyl sulphates, alkyl or alkenyl ether sulphates, alkyl sulphonates, alkenyl sulphonates, hydroxyalkyl sulphonates;
- (d) from 5 to 40 wt% preferably from 8 to 38 wt% of a solvent selected from polyhydric alcohols, alkoxy alcohols, and mixtures thereof; and
- (e) less than 20 wt%, preferably 5 to 20 wt%, more preferably 6 to 18 wt% water.

In preferred embodiments the first detergent composition comprises:

- (a) from 5 to 30 wt%, preferably from 10 to 25 wt% of the salt of monoisopropanolamine and a mixture of fatty acids wherein at least 80% of the fatty acid molecules are C16 to C18 fatty acids;
- (b) from 1 to 40 wt%, preferably from 5 to 32 wt% of a nitrogen containing surfactant selected from cocoamidopropyl betaine and amidopropyl betaines prepared from C8 and/or C10 fatty acids;
- (c) from 2 to 30 wt%, preferably from 5 to 25 wt% of one or more anionic surfactants selected from alkyl or alkenyl sulphates, alkyl or alkenyl ether sulphates, alkyl sulphonates, alkenyl sulphonates, hydroxyalkyl sulphonates and taurates;
- (d) from 5 to 40 wt% preferably from 8 to 38 wt% of a solvent selected from polyhydric alcohols, alkoxy alcohols, aryloxy alcohols and mixtures thereof; and
- (e) less than 20 wt%, preferably 5 to 20 wt%, more preferably 6 to 18 wt% water.

In some embodiments the first detergent composition comprises:

- (a) from 5 to 30 wt%, preferably from 10 to 25 wt% of the salt of monoisopropanolamine and a mixture of fatty acids wherein at least 80% of the fatty acid molecules are C16 to C18 fatty acids;
- (b) from 1 to 40 wt%, preferably from 5 to 32 wt% of a nitrogen containing surfactant selected from cocoamidopropyl betaine and amidopropyl betaines prepared from C8 and/or C10 fatty acids;
- (c) from 2 to 30 wt%, preferably from 5 to 25 wt% of one or more anionic surfactants selected from alkyl or alkenyl sulphates, alkyl or alkenyl ether sulphates, alkyl sulphonates, alkenyl sulphonates and hydroxyalkyl sulphonates;
- (d) from 5 to 40 wt% preferably from 8 to 38 wt% of a solvent selected from polyhydric alcohols, alkoxy alcohols, and mixtures thereof; and
- (e) less than 20 wt%, preferably 5 to 20 wt%, more preferably 6 to 18 wt% water.

The detergent product of the present invention may be suitable for any one or more of the following uses: toilet care, automatic dishwashing, manual dishwashing, laundry, fabric care,

kitchen care, carpet cleaning, air fresheners, vehicle care, polishing products, machine cleaning and maintenance, pesticides, insecticides, fungicides, herbicides, oilfield chemical applications, marine applications and institutional / industrial cleaning.

- 5 Preferably the detergent product of the present invention is used in one or more of: toilet care, automatic dishwashing, manual dishwashing, laundry, fabric care and kitchen care.

More preferably the detergent product is used in automatic dishwashing, manual dishwashing, or laundry applications.

10

In some preferred embodiments the first detergent composition further comprises (f) a non-ionic surfactant.

Suitable non-ionic surfactants will be known to the person skilled in the art.

15

Suitable non-ionic surfactants include glycolipids, alkyl alkoxylates, alkenyl alkoxylates, C6-C22 alcohol condensates with ethylene oxide/propylene oxide block polymers; C14-C22 mid-chain branched alcohols, C14-C22 mid-chain branched alkyl alkoxylate, alkylpolysaccharides, (for example alkylpolyglycosides), methylester ethoxylates, polyhydroxy fatty acid amides, ether capped poly(oxyalkylated) alcohol surfactants, acyl polyethoxylated-glycerol esters (for example cocoyl POE-glycerol esters) and mixtures thereof.

20

Suitable glycolipids include rhamnolipids, trehalolipids, sophorolipids, mannosylerythritol lipids, and glycolipids produced by *Meyerozama guilliermondii*, *Saccharomyces cerevisiae*, *Candida utilis*, *Candida bombicola* and/or *Marinobacter hydrocarbonoclasticus*.

25

Preferred glycolipids are selected from one or more of a rhamnolipid, a trehalolipid, a sophorolipid and/or a mannosylerythritol lipid.

- 30 Sophorolipids are especially preferred.

In some embodiments, the non-ionic surfactant may be a condensation product of straight or branched chain fatty alcohols containing between 6 and 22 carbon atoms with between 4 and 30 moles of ethylene oxide having a HLB between 8 and 15.

35

Preferably a non-ionic surfactant comprises an alkoxylated compound. Preferably the alkoxylated non-ionic surfactants comprises at least two alkoxy residues, preferably at least two ethoxy residues.

Suitable alkoxyated non-ionic surfactants include any compound comprising one or more alkylene oxide residue and a hydrophobic group. Preferred non-ionic surfactants are compounds which include one or more ethylene oxide and/or propylene oxide residue and a hydrophobic group. Suitable non-ionic surfactants may be formed by the reaction of aliphatic alcohols, acids or amides with alkylene oxides. Preferably the hydrophobic group comprises a hydrocarbon chain having at least 4 carbon atoms, preferably at least 5 carbon atoms, more preferably at least 6 carbon atoms. Preferably the hydrophobic group comprises from 6 to 30 carbon atoms, more preferably from 6 to 21 carbon atoms, most preferably from 8 to 18 carbon atoms. Preferably the hydrophobic group is an alkyl group. The non-ionic surfactant component (f) may include more than one hydrophobic residue.

Preferred non-ionic surfactants for use herein are alkoxyated alcohols prepared from a C8 to C20 alcohol and 2 to 16 equivalents of ethylene oxide.

Especially preferred non-ionic surfactants are alkoxyated alcohols are C12-16 or C12-18 alcohols ethoxylated with 7 equivalents of ethylene oxide or C10 alcohol ethoxylated with 5 equivalents of ethylene oxide.

In some embodiments, the nitrogen containing surfactant of component (b) may be provided by a non-ionic surfactant which is a nitrogen containing surfactant. For the avoidance of doubt, component (f), when present, is present in the first detergent composition in addition to the nitrogen containing detergents of component (b).

Component (f) is preferably present in the first detergent composition in an amount of from 1 to 30 wt%, preferably 2 to 20 wt%, more preferably 5 to 15 wt%.

The first detergent composition of the present invention may optionally comprise one or more further components.

Suitable further components may include any components commonly used in detergent compositions.

Suitable additional components for use in automatic dishwashing compositions include cationic surfactants, zwitterionic surfactants, amphoteric surfactants, enzymes, organic solvents, glass corrosion inhibitors, corrosion inhibitors, scents, perfume carriers, chelating agents, enzymes, bleaching agents, bleach activators, biocides, rinse aids, dyes, pigments, fragrances, glass care agents, pH adjusting agents, builders (preferably silicates or zeolites), peroxide based compounds (especially hydrogen peroxide) chlorine bleaches, perborate compounds, bleach activators and catalysts.

When the detergent product of the first aspect is an automatic dishwashing composition the first detergent composition it may include any of these components.

- 5 Preferably the detergent product of the first aspect of the present invention is a laundry detergent product.

Suitable additional components for inclusion in laundry compositions will be known to the person skilled in the art and include chelating agents, builders, bleaching agents, bleach activators, pigments, dispersants, polymeric dispersing agents, dyes, dye transfer inhibitors, fragrances, fragrance delivery systems, enzymes, enzyme stabilizers, biocides, probiotics, preservatives, pH adjusting agents, phosphates, silicates, zeolites, peroxide based compounds (especially hydrogen peroxide, chlorine bleaches), perborate compounds, percarbonate compounds, bleach activators and catalysts, cationic surfactants, anti-redeposition additives, brighteners, sud suppressors, fabric softeners, anti-oxidants and hydrotropes.

In some preferred embodiments the first detergent composition comprises an anti-redeposition agent. These compounds help maintain salts in solution during the wash cycle machine.

- 20 Suitable anti-redeposition agents will be known to the person skilled in the art. Such components often comprise polyimides. One suitable compound is sold under the trade mark Sokalan HP20 and is an ethoxylated polyethylene polyimine.

Anti-redeposition agents are typically included in an amount of from 0.1 to 2 wt%.

- 25 Preferably the first detergent composition comprises a chelating agent. Suitable chelating agents will be known to the person skilled in the art.

Suitable chelating agents include ethylenediamine-N,N'-disuccinic acid, methylglycinediacetic acid, glutamic acid N,N-diacetic acid, imino disuccinic acid, diethylene triamine pentaacetic acid, ethylenediamine tetraacetic acid, diethylenetriamine penta methylene phosphonic acid, etidronic acid, citric acid and anions, salts and mixtures thereof.

In some embodiments preferred chelating agents are phosphonate chelating agents.

- 35 Chelating agents are typically included in an amount of from 0.1 to 2 wt%.

In some embodiments the first detergent composition may comprise a dye. Suitable dyes will be known to the person skilled in the art. The dye may be included in an amount of less than 1 wt%,

for example less than 0.5 wt% or less than 0.1 wt%. The amount of dye will depend on the nature of the dye and the intended colour intensity.

5 Suitable anti-oxidants are known to those skilled in the art and include, for example, tocopheryl acetate.

10 Other preferred components for inclusion in the first detergent compositions include probiotics, enzymes, dye transfer inhibitors and wash performance boosting polymers. Wash performance boosting polymers are known to those skilled in the art. For example, the composition of the first aspect may comprise polyacrylates, polycarboxylates, cellulose derivatives, polyesters based on terephthalic acid, ethylene/propylene glycol-based polymers, poly(vinylpyrrolidone (PVP), poly(vinylpyridine N-oxide) (PVP-NO), poly(vinylpyridine betaine), biodegradable polymeric dispersants (for example polyamino acid polymers such as polyaspartate and polysaccharides such as oxidized starch), poly(vinyl alcohol), polyalkylene glycol and copolymers of alkylene oxide and vinyl acetate, modified ethoxylated urethane or multifunctional polyethylene imine.

Dye transfer inhibitors are also known to those skilled in the art.

20 In some embodiments the first detergent composition may comprise an opacifier and/or a pearlescent agent. Suitable opacifier and pearlescent agents will be known to the person skilled in the art.

25 In some embodiments, in order to provide an opaque composition the first detergent composition may comprise one or more surfactants that are poorly soluble or insoluble in water, for example stearates and cetearates, especially glycol stearates, such as glycol distearate, and glycol cetearate. Also useful for providing an opaque appearance are inorganic salts, for example carbonates or sulfates, such as sodium carbonate; titanium dioxide; and opacifying polymers, for example styrene/acrylate copolymers.

30 Stearates and inorganic salts are preferably present in the first detergent composition in an amount of less than 5 wt%, preferably less than 3 wt%.

35 In some preferred embodiments, the first detergent compositions is opaque.

In some preferred embodiments the first detergent composition does not comprise an opacifier or a pearlescent agent.

- The first detergent composition is suitably a solid. By this we mean that the composition is solid at the temperatures encountered during normal storage and/or prior to use of the compositions, for example ambient temperature or room temperature (for example between 15°C and 25°C, or between 18°C and 22°C). Preferably the composition is solid at temperatures below 50°C.
- 5 The first detergent composition preferably has a melting point of at least 50°C.

Preferably the first detergent composition is provided as a solid block of material of substantially homogeneous consistency.

- 10 In some especially preferred embodiments, the first detergent compositions is transparent. By this we mean that light passes through the material and it is possible to look through the material and observe objects on the other side of the material.

- Transparency may suitably be measured using the test described in example 4.
- 15

The provision of transparent compositions is highly attractive to consumers.

- The first detergent composition of the present invention preferably has favourable dissolution properties. It is particularly important that the first detergent composition quickly and fully
- 20 dissolves at the start of the wash and does not become stuck in one portion of a machine.

Reference herein to dissolution rates refers to the rate which a material dissolves in water.

- The dissolution rate of the first detergent composition may be measured using the method
- 25 described in example 3.

- Preferably the first detergent composition has a dissolution rate of at least 0.5 g/min as measured by the method of example 3, preferably at least 0.6 g/min, more preferably at least 0.7 g/min.
- 30

The present invention relates to a detergent product in the form of a single solid block comprising multiple portions and including at least a first detergent composition or it may comprise one or more further component parts.

- 35 In some embodiments, the detergent product may consist of or consist essentially of the solid detergent composition of the first aspect.

In some embodiments the detergent product may comprise one or more additional component parts.

In some embodiments the detergent product may comprise one or more further detergent compositions.

- 5 For example the detergent product of the first aspect may further comprise a second detergent composition comprising:

- 10 (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
(b) at least one nitrogen containing surfactant;
(c) at least one anionic surfactant;
(d) at least one solvent including at least one hydroxy functional group; and
(e) up to 20 wt% water.

- 15 Components (a) to (e) of the second detergent composition are preferably as defined herein above in relation to the first detergent composition.

In preferred embodiments the second detergent composition is a solid composition.

- 20 In some embodiments the detergent product of the first aspect may comprise:

- a first detergent composition comprising:
- 25 (a) a salt of an amine and a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
(b) at least one nitrogen containing surfactant;
(c) at least one anionic surfactant;
(d) at least one solvent including at least one hydroxy functional group; and
(e) up to 20 wt% water; and
- 30 - a second detergent composition comprising:
- (a) a metal salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
35 (b) at least one nitrogen containing surfactant;
(c) at least one anionic surfactant;
(d) at least one solvent including at least one hydroxy functional group; and
(e) up to 20 wt% water;

The skilled person will understand that although the first detergent composition and the second detergent composition each comprise components (a) to (e) as defined herein this does not mean that they are identical.

- 5 In preferred embodiments the first detergent composition has a different appearance to the second detergent composition. For example the two detergent compositions may have different colours.

- 10 The first detergent composition and the second detergent composition suitably each have a different formulation and do not comprise the same ingredients in the same amounts. In some embodiments the first detergent composition and the second detergent composition may each provide a different function.

- 15 In some embodiments the first detergent composition and the second detergent composition are both transparent.

In some embodiments first detergent composition and the second detergent composition are both opaque.

- 20 In some embodiments the first detergent composition is suitably transparent and the second detergent composition is suitably non-transparent.

- 25 In such embodiments component (a) of the first detergent composition preferably comprises an amine salt of a fatty acid, especially a monoisopropanolamine salt; and component (a) of the second detergent composition preferably comprises an alkali metal salt of a fatty acid, especially a sodium salt.

- 30 In some embodiments the detergent product may comprise two or more layers in which each layer comprises a different detergent composition.

- 35 In some embodiments each detergent composition may comprise components (a) to (e) as defined in relation to the first detergent composition. However embodiments in which further detergent compositions (in addition to the first detergent composition) are present that comprise different ingredients are also within the scope of the invention.

In some embodiments the detergent product may comprise the first detergent composition and one or more additional component parts wherein the one or more additional component parts are not additional formulated detergent compositions.

For example the one or more additional component parts may comprise a specific ingredient or combination of ingredients that perform a particular function.

For example the one or more additional component parts may comprise ingredients that are
5 desirably kept apart from other ingredients to prevent reaction or degradation thereof.

The one or more additional component parts may be in the form of particles which are dispersed throughout the detergent product.

10 Thus in some embodiments the detergent product of the first aspect of the invention may comprise a block of a first detergent composition having dispersed throughout particles of a further component part.

The particles may comprise one or more ingredients selected from further non-ionic and/or
15 anionic surfactants, cationic surfactants, zwitterionic surfactants, amphoteric surfactants, enzymes, organic solvents, glass corrosion inhibitors, corrosion inhibitors, scents, perfume carriers, chelating agents, enzymes, bleaching agents, bleach activators, biocides, rinse aids, dyes, pigments, fragrances, glass care agents, pH adjusting agents, builders (preferably silicates or zeolites), peroxide based compounds (especially hydrogen peroxide) chlorine
20 bleaches, perborate compounds, bleach activators, probiotics and catalysts.

The one or more additional component parts may be in the form of larger shapes of material, for example spheres, discs, cubes, flakes, needles, granules, agglomerates or other blocks of a different solid material.

25 In some embodiments the one or more additional component parts may comprise a capsule comprising a liquid or powered composition.

The one or more additional component parts may be spread evenly or randomly throughout the
30 detergent product.

Suitably the one or more additional component parts are spread evenly across the different portions of the detergent product which make up the single solid block.

35 The one or more additional component parts may comprise specific functional ingredients, for example a particular surfactant, a bleach and/or a bleach activator (e.g. tetraacetylenediamine or TAED), a fragrance, a biocide, an enzyme, a probiotic, a catalyst, a rinse aid, a glass protection agent or an anti-redeposition agent.

The one or more additional component parts may have a different dissolution profile to the first detergent composition. For example they may dissolve at a different rate or temperature. This is useful if it is desired to deliver different components of the product during different stages of the wash cycle.

5

In some embodiments the first detergent composition and/or the one or more further component parts comprises a taste aversive agent or bitterant, for example to deter ingestion by children or pets. Such compounds will be known to the person skilled in the art and include, for example, denatonium benzoate.

10

The detergent product of the first aspect of the present invention is in the form of a single solid block comprising multiple portions.

By this we mean that the detergent product is a single item which can be held by a user.

15

The detergent product comprises multiple portions.

Suitably the product is marked to provide an indication of the portions.

20

Preferably the form of the detergent product is such that it can be easily divided into separate portions.

Suitably the detergent product is shaped to enable portions of the product to be broken off by the user. Suitably the detergent product can be divided into portions by hand.

25

Suitably the detergent product includes weaker points to facilitate breaking one or more portions from the solid block. These may be areas of the detergent product where the composition is thinner or is provided with score lines.

30

In preferred embodiments the shape of the detergent product of the first aspect resembles that of a bar of chocolate.

A bar of chocolate typically comprises a single block designed to be broken into small portions. For example a bar of chocolate may suitably comprise multiple square or rectangular portions joined to form a single block but in a configuration in which they could easily be broken from the block.

35

The detergent product may be provided in any suitable shape.

The detergent product may be in the form of any three dimensional shape configured to facilitate easy division of the multiple portions.

For example the detergent product may be in the form of a square or rectangular block.

5

The detergent product may be disc shaped. It may be shaped in a prism, for example a triangle prism.

10

The detergent product may comprise multiple layers. Each layer may or may not extend across the depth, width or length of the product.

In preferred embodiments the first detergent composition is provided as a single piece within the detergent product.

15

The detergent product comprises multiple portions. Preferably the portions are clearly indicated on the product.

The portions may be of differing sizes.

20

Preferably the portions are each of substantially equal size.

Each portion may comprise a single dose of detergent. In some embodiments multiple portions may make up a single dose.

25

In some embodiments the product may be arranged to provide different doses. For example the product may comprise one or more smaller portions and one or more larger portions.

In such embodiments the larger portions may be suitable for larger loads and/or heavy soiling whereas smaller portions are suitable for smaller loads and/or light soiling.

30

In some embodiments the portions may be sized such that a different number of portions are used in a dose depending on the level of soiling, size of the load or water hardness.

35

In some embodiments the detergent product may comprise two or more portions having different compositions. For example only some portions of the detergent product may comprise one or more additional component parts. These parts may, for example, comprise a boosting component to provide additional cleaning power or enhanced shine.

In preferred embodiments each portion of the detergent product comprises the first detergent composition.

5 In preferred embodiments the portions of the detergent product are joined together as a continuous block and are not divided by a separate attachment means.

The detergent product of the present invention may provide a number of advantages over compositions of the prior art.

10 The compositions of the present invention are highly effective detergents and have a low water content. They therefore comprise high levels of active ingredients. This allows small doses to be provided and prevents unnecessary transportation of water.

15 Preferably the detergent products of the present invention are sufficiently non-irritating and non-toxic that they can be directly handled by the user. Thus in preferred embodiments the detergent product of the present invention does not comprise any individual coating, encapsulation or wrapping.

20 The detergent product forms may be provided in plastic free packaging.

In some preferred embodiments the detergent product is provided as a solid block of material of substantially homogeneous consistency.

25 In some preferred embodiments, the detergent product is opaque.

In some preferred embodiments, the detergent product is transparent. By this we mean that light passes through the material and it is possible to look through the material and observe objects on the other side of the material.

30 Transparency may suitably be measured using the test described in example 4.

The detergent product of the present invention preferably has favourable dissolution properties. Preferably the detergent product quickly and fully dissolves at the start of the wash and does not become stuck in one portion of a machine.

35 The dissolution rate of the detergent product may be measured using the method described in example 3.

Preferably the detergent product has a dissolution rate of at least 0.5 g/min as measured by the method of example 3, preferably at least 0.6 g/min, more preferably at least 0.7 g/min.

5 In order to obtain the desirably homogeneous and preferably transparent first detergent compositions that are included in the detergent products of the present invention the first detergent composition is preferably prepared from a melt.

10 Preferably the melting point of the first detergent compositions is at least 45°C, preferably at least 50°C.

Preferably the melting point of the first detergent composition is from 45 to 70°C, more preferably from 50 to 65°C.

15 One way in which the melting point of the first detergent composition of the can be measured is described in example 5.

In preferred embodiments, the first detergent composition has a dissolution rate of at least 0.5g/min as measured by the method of example 3 and has a melting point of from 45 to 70°C.

20 In especially preferred embodiments, the first detergent composition is transparent, has a dissolution rate of at least 0.7 g/min as measured by the method of example 3 and has a melting point of from 50 to 65°C.

25 In some embodiments, the detergent product is transparent, has a dissolution rate of at least 0.5g/min as measured by the method of example 3 and has a melting point of from 45 to 70°C.

In some embodiments, the detergent product is transparent, has a dissolution rate of at least 0.7 g/min as measured by the method of example 3 and has a melting point of from 50 to 65°C.

30 The solid detergent product of the first aspect may be a toilet care product, an automatic dishwashing product, a manual dishwashing, a laundry detergent product, a fabric care product, a kitchen care product, a carpet cleaning product, an air freshener, a vehicle care product, a polishing product, a machine cleaning and maintenance product, a pesticide, an insecticide, a fungicide, a herbicide, an oilfield chemical product, a marine applications product or an
35 institutional / industrial cleaning product.

Preferably the detergent product is an automatic dishwashing product, a manual dishwashing product or a laundry detergent product.

More preferably the detergent product is an automatic dishwashing product or a laundry detergent product.

More preferably the detergent product is a laundry detergent product.

5

According to a second aspect of the present invention there is provided a method of manufacturing a detergent product in the form of a single solid block comprising multiple portions, the method comprising the steps of:

10 (i) preparing a molten first detergent composition comprising at least the following components:

(a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;

15 (b) at least one nitrogen containing surfactant;

(c) at least one anionic surfactant;

(d) at least one solvent including at least one hydroxy functional group; and

(e) up to 20 wt% water;

20 and

(ii) shaping and/or cooling the composition obtained in step (i).

25 Step (i) involves providing a molten first detergent composition comprising components (a) to (e). The molten first detergent composition may optionally comprise one or more further components, as defined in relation to the first aspect. Preferably the molten first detergent composition further comprises (f) a non-ionic surfactant.

Preferred features of the second aspect are as defined in relation to the first aspect.

30

Step (i) involves providing a molten first detergent composition in molten form by combining components (a) to (e).

Components (a) to (e) may be added in any order.

35

In some embodiments one or more components may be melted and then further components added to the mixture.

In some embodiments, liquid components are mixed together first followed by addition of the solid components.

Component (a) may be added in step (i) as a salt or it may be formed *in situ* by separate addition of the fatty acid and base, for example an amine. The formation of the salt of component (a) may not convert all of the fatty acid and/or all of the base (e.g. amine/alkali metal) to the salt. Therefore component (a) may contain some free fatty acid and/or some free base (e.g. amine/alkali metal). Preferably all or substantially all of the fatty acid is converted to the salt with the base (e.g. amine/alkali metal). Preferably all or substantially all of the base (e.g. amine/alkali metal) is converted to the salt with the fatty acid.

In preferred embodiments step (i) of the method of the second aspect involves:

- (p) melting component (b);
- (q) adding component (c) whilst heating and mixing; and
- (r) adding component (a) to the mixture obtained following steps (p) and (q).

Components (d) and (e) may be added at any stage and are typically included with one of the other components. Commonly raw ingredients may include an amount of water or solvent.

Other components, including further surfactants, dyes, fragrances, chelating agents and active anti-redeposition agents, may be added at any stage.

In preferred embodiments in which a non-ionic surfactant (f) is included, this is preferably added during step (p) or step (q).

Throughout step (i) the mixture is preferably heated, preferably to a temperature of at least 60°C, preferably at least 65°C, for example to a temperature of 70 to 80°C or 70 to 75°C.

Step (i) is preferably completed when a homogeneous mixture is obtained.

Step (ii) involves shaping and/or cooling the composition obtained in step (i).

In some embodiments step (ii) may involve pouring the molten composition into moulds. In such embodiments this is preferably carried out at a temperature of at least 65°C, preferably at least 70°C.

After pouring into the moulds, the composition may be actively or passively cooled.

For example the composition may be allowed to cool passively by leaving the moulds in ambient air.

5 Active cooling may involve blowing cool air over the moulds, passing them over a chilled belt or through a chilled environment or storing in a cold cabinet.

In preferred embodiments the moulds are shaped to provide the detergent products as solid blocks shaped to indicate multiple portions.

10 In some embodiments step (ii) may involve contacting the composition provided in step (i) with a cooled belt or may involve moving the composition provided in step (i) to a cooled chamber.

The composition may be dosed into the belt to provide single product units or poured to provide a strip or block which is subsequently cut into single product units.

15 The product may be scored as the composition cools to provide points of weakness such that the product can be easily broken into portions.

20 In some embodiments the method of the second aspect may include a step of including one or more additional components parts. Suitable additional component parts are as defined in relation to the first aspect.

In embodiments in which the detergent product comprises a second detergent composition the method of the second aspect may further include the steps of:

25 (iii) preparing a molten second detergent composition comprising at least the following components:

- 30 (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
- (b) at least one nitrogen containing surfactant;
- (c) at least one anionic surfactant;
- (d) at least one solvent including at least one hydroxy functional group; and
- (e) up to 20 wt% water;

35 and

(iv) shaping and/or cooling the composition obtained in step (iii).

In such embodiments the second detergent composition preferably has a different melting point to the first detergent composition.

5 Suitably melting point of the second detergent composition differs from that of the first detergent composition by at least 5°C, preferably at least 8°C or more preferably at least 10°C.

10 In some embodiments the method of the second aspect may involve preparing the molten first detergent composition; pouring said molten composition into a mould; allowing said first detergent composition to solidify; and pouring a second molten detergent composition onto the solidified first detergent composition; thereby forming a two layered detergent product.

Detergent products comprising three or more layers could be provided following a similar method.

15 In some embodiments in which the method of the second aspect may include a step after step (i) of admixing one or more additional components parts into the molten first detergent composition, prior to step (ii). For example the method may involve adding solid shapes of one or more additional components; and/or particles of one or more additional components; and/or capsules comprising one or more additional components, for example in liquid and/or powdered form.
20

In some embodiments in which the method of the second aspect may include a step of positioning one or more additional components within the molten first detergent composition, for example as it cools in a mould. Thus each portion of the detergent product could be provided
25 with a portion of the one or more additional components.

According to a third aspect of the present invention there is provided a packaged detergent product comprising a receptacle and a solid detergent product, wherein the detergent product is in the form of a single solid block comprising multiple portions and includes at least a first detergent composition;
30

wherein the first detergent composition comprises:

- (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
- (b) at least one nitrogen containing surfactant;
- 35 (c) at least one anionic surfactant;
- (d) a solvent including at least one hydroxy functional group; and
- (e) up to 20 wt% water.

Preferred features of the third aspect are as defined in relation to the first and second aspects.

Preferably the solid detergent product is provided in homogeneous form and is not coated or encapsulated.

- 5 The receptacle may be any suitable container, packaging or wrapper within which the product can be stored and suitably presented for sale.

Advantageously the receptacle may be made of cardboard or paper, especially biodegradable cardboard or paper. It may be plastic free.

10

In some embodiments the receptacle comprises a cardboard box. In some embodiments the receptacle comprises a wrapper. The wrapper may be made of any suitable material, for example foil or paper.

- 15 In some preferred embodiments the wrapper is not made of plastic.

Suitably the receptacle is recyclable.

In preferred embodiments the receptacle is biodegradeable.

20

In some embodiments the packaged detergent product may be provided with dosage and/or washing instructions.

- 25 According to a fourth aspect of the present invention there is provided a method of laundering items, the method comprising the steps of:

- (w) loading the items into a washing machine;
(x) breaking a portion of a solid detergent product from a solid block thereof;
(y) adding the portion of the solid detergent into the washing machine; and
30 (z) running a wash cycle of the washing machine;

wherein the solid detergent product is in the form of a single solid block comprising multiple portions and includes at least a first detergent composition; and

wherein the first detergent composition comprises:

- 35 (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
(b) at least one nitrogen containing surfactant;
(c) at least one anionic surfactant;
(d) a solvent including at least one hydroxy functional group; and
(e) up to 20 wt% water.

Preferred features of the fourth aspect are as defined in relation to the first, second and third aspects.

- 5 Step (w) may be carried out before or after steps (x) and (y).

Step (x) involves breaking a portion of a solid detergent product from a solid block thereof. In some embodiments step (x) may involve breaking two or more portions of solid detergent product from the solid block thereof. For example, as previously described herein, in some
10 embodiments more than one portion of detergent may make up a unit dose and/or the dose may be varied to account for different levels of soiling, different loads or different water hardness.

Preferred features of the fourth aspect are as defined in relation to the first, second and third aspects.

15

According to a fifth aspect of the present invention, there is provided a use of a solid detergent product in toilet care, automatic dishwashing, manual dishwashing, laundry, fabric care, kitchen care, carpet cleaning, air fresheners, vehicle care, polishing products, machine cleaning and maintenance, pesticides, insecticides, fungicides, herbicides, oilfield chemical applications,
20 marine applications or institutional / industrial cleaning;
wherein the solid detergent product is in the form of a single solid block comprising multiple portions and includes at least a first detergent composition; and
wherein the first detergent composition comprises:

- 25 (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
(b) at least one nitrogen containing surfactant;
(c) at least one anionic surfactant;
(d) a solvent including at least one hydroxy functional group; and
(e) up to 20 wt% water.

30

Preferred features of the fifth aspect are as defined in relation to the first, second, third and fourth aspects as appropriate.

Preferably the fifth aspect involves use of the detergent product in one or more of: toilet care,
35 automatic dishwashing, manual dishwashing, laundry, fabric care and kitchen care.

More preferably the fifth aspect involves use of the detergent product in automatic dishwashing, manual dishwashing or laundry applications.

Any feature of any aspect may be combined with any other aspect as appropriate.

The invention will now be further defined with reference to the following non-limiting examples and the accompanying figures, in which figures 1 to 8 illustrate embodiments of the invention; and
5 figures 9 to 12 are described in relation to the examples.

Figure 1 illustrates a simple embodiment of the invention comprising a block of solid detergent product 1 consisting of the first detergent composition. The block is divided into eight portions 3 arranged in a 2 x 4 array using score lines 2 across the surface of the thin rectangular block of
10 material.

Figure 2 illustrates a further embodiment of the invention comprising a single block 10 divided into twelve portions 11. Dispersed throughout the block of the first detergent composition are particulates 12 comprising, for example, an encapsulated enzyme or an encapsulated bleaching
15 agent (e.g. tetraacetylenediamine or TAED).

Figure 3 shows a triangular prism shaped block 21 divided into portions 22 having spaces 23 therebetween to facilitate breaking into portions.

20 Figure 4 illustrates a further embodiment of the invention. Figure 5 is a cross sectional view of the product of figure 4 along the line AA.

Figures 4 and 5 show a solid detergent product of the invention 30 comprising a continuous base layer 31 of a first detergent composition and discrete spaced blocks 32 of a second detergent
25 composition.

Figure 6 illustrates a further embodiment of the invention in cross sectional view. Figure 6 shows a solid detergent product 40 comprising a first detergent composition 41, a second detergent composition 42 and a third detergent composition 43.
30

Figure 7 illustrates a further embodiment of the invention. Figure 8 is a cross sectional view of the product of figure 7 along the line BB.

Figures 7 and 8 illustrate a detergent product of the invention 50 comprising a block of moulded detergent product 51 divided into a 3 x 4 array, each block 52 of the array comprising a sphere
35 53 of a second composition.

Figure 9 is a photograph of a transparent detergent product of the invention, prepared according to example 7.

Figure 10 is a photograph of an opaque detergent product of the invention, prepared according to example 9.

5 Figures 11 and 12 illustrate apparatus used in example 3.

In the examples below, the following abbreviations are used:

Component	Chemical Names
Cocamide MIPA	Coconut Monoisopropanolamide
SLES	Sodium lauryl ether sulfate
C16-C18 FATTY ACID	a mixture of C16 and C18 fatty acids
C12-16 Amine oxide	Lauryl dimethylamine Oxide or Lauramine oxide
C10 + 5 EO (deceth 5)	C10 fatty alcohol ethoxylated with 5 moles of ethylene oxide
C10 amidopropyl betaine	Decylamidopropyl betaine
C8 amidopropyl betaine	Octylamidopropyl betaine
C12-18 + 7 EO	C12 - 18 fatty alcohol ethoxylated with 7 moles of ethylene oxide
C8-10 amidopropyl betaine	Blend of Octylamidopropyl betaine and Decylamidopropyl betaine
C12-18 amidopropyl betaine	Cocamidopropyl betaine
Phosphonate	diethylenetriamine penta (methylenephosphonic) acid, sodium salt - DTPMP
EGDS/ EGMS	Ethylene glycol distearate mixed with minor amounts of ethylene glycol monostearate
Poly-imine	ethoxylated polyethylene polyimine
MIPA C16-C18	Monoisopropanolamine salt of a mixture of C16 and C18 fatty acids
EDTA	ethylenediamine tetraacetic acid
C8 APB	C8 amido propyl betaine
C10 APB	C10 amido propyl betaine
LMDO	C12-14 amidopropyl amine oxide
C14-16 AOS	sodium C14-16 alpha-olefin sulfonate
SMCT	sodium methyl cocoyl taurate

10 **Example 1**

A first detergent composition of the present invention was prepared as follows:

A blend of C₈-C₁₀ amidopropyl betaine, propylene glycol and water was admixed with dipropylene glycol and an ethoxylated polyethylene polyimine. The mixture was stirred and heated to 75 to 80°C. An alcohol ethoxylate (C₁₂-C₁₈ alcohol and 7EO) was added at 70°C, followed by the slow addition of sodium laureth-1-sulfate. Whilst maintaining a temperature of at least 70°C, monoisopropanolamine and a fatty acid (1:1 C₁₆:C₁₈) were added. Perfume and colourants were added and mixing continued until homogenization was achieved. The mixture was discharged from the vessel at temperature of at least 75°C and poured into moulds.

10 Example 2

Further transparent embodiments of the first detergent compositions of the present invention were prepared using a procedure analogous to that described in example 1.

15 The details of the compositions are provided in table 1 wherein “Comp.” denotes a comparative example:

COMPOSITION								
Component (wt%)	1	2 (Comp.)	3	4	5	6 (Comp.)	7	8
Cocamide MIPA	12.7	12.7						
SLES	12.8	13	14	14	14	14	9.8	15.75
Sodium methyl cocoyl taurate (de-salted)								
C16-C18 FATTY ACID	12.8	12.8	14	14	14	14	14	15.7
C12-16 Amine oxide	7.1	7						
C10 + 5 EO	9.4	9.4						
C10 amidopropyl betaine			7.8	7.8	3.9	3.9	3.9	4.42
C8 amidopropyl betaine					4.56	4.56	4.56	5.14
C12-18 + 7 EO			11	11	11	11	11	
C8-10 amidopropyl betaine								
Monoisopropanolamine	3.6	3.6	3.9	3.9	3.9	3.9	3.9	4.4
C12-18 amidopropyl betaine								
Propylene Glycol	9.4		29.4	3.4	5.6		5.6	4.16
Water	8.27	22.6	14.7	14.7	14.7	27.74	17.6	16.6

Dipropylene Glycol	21.2	17			26.1	19.4	26.1	29.3
2-methyl pentanediol								
2-phenoxyethanol								
3-methoxy-3-methyl-1-butanol (MMB)				26				
Phosphonate	0.8		1	1	1			1.1
Poly-imine	0.8	1.28	0.8	0.8	0.8		1.6	0.8
Others (impurities)	to 100	to 100	to 100	to 100	to 100	to 100	to 100	to 100

5

Table 1 continued

COMPOSITION								
Component (wt%)	9	10	11	12 (Comp.)	13	14	15	16
Cocamide MIPA	14.2	13	6.38	6.38				5.43
SLES	14.28	13	13.4	13.4	9.8	9.8	9.8	
Sodium methyl cocoyl taurate (de-salted)								8.66
C16-C18 FATTY ACID	14.2	13	13.4	13.4	14	14	14	13.4
C12-16 Amine oxide	8	4.9	3.56	3.56				3.63
C10 + 5 EO	10	9	4.72	4.72				4.7
C10 amidopropyl betaine					3.9	3.9		3.03
C8 amidopropyl betaine					4.56	4.56		3.54
C12-18 + 7 EO			5.5	5.5	11	11	11	5.5
C8-10 amidopropyl betaine		2.8	4.2	4.2				
Monoisopropanolamine	4	3.7	3.75	3.75	3.9	3.9	3.9	3.75
C12-18 amidopropyl betaine							8.5	
Propylene Glycol	10	6.8	7.52		5.6	5.6	5.6	9.05
Water	9.87	10.3	10.8	25.1	17.6	17.6	17.6	11.7
Dipropylene Glycol	12.4	21.6	23.65	18.35				23.65
2-methyl pentanediol						13.05		

2-phenoxyethanol					26.1	13.05	26.1	
3-methoxy-3-methyl-1-butanol (MMB)								
Phosphonate	-	-						
Poly-imine	1.44	1.3	1.44	1.44	1.6	1.6	1.6	1.44
Others (impurities)	to 100	to 100	to 100	to 100	to 100	to 100	to 100	to 100

Example 3

5 The dissolution rate of the compositions was measured using the following method, with reference to figures 11A, B and C:

Apparatus

- 5000 mL beaker.
- 10 • Lab Stirrer with variable speed.
- Stirrer 9.5 cm length impeller (Fig. 11c).
- Hot plate with Temperature probe
- Stopwatch
- Oven
- 15 • Distilled Water
- Silicone mould able to contain a ~ 15 g sample of the test compositions

Analytical Procedure

- 20 • ~ 15 grams of the molten test composition (70 - 75°C) was poured into a silicone mould. The exact weight dispensed was recorded (W_1)
- The composition was cooled to room temperature (i.e. between 18°C and 22°C) in the silicone mould and allowed to stand (solidify) for 60 minutes (see Fig. 11A)
- A 5000 mL glass beaker was filled with deionized water (4000 mL) and placed on a hot
- 25 plate. A temperature probe was immersed in the water (Fig. 11B)
- The water was heated to 30°C; this temperature was maintained throughout the analysis
- Overhead stirring was applied to the glass beaker contents using an impeller (Fig. 11C) with stirrer speed 300 RPM
- 30 • When the temperature had stabilized at 30°C, the moulded test composition was added and a stopwatch was immediately started

- When the sample had completely dissolved the stopwatch was stopped and the dissolution time in seconds was noted (T_1)
- The dissolution rate (g/min) was calculated from W_1 and T_1
- Use an electric torch to highlight the visibility of the sample in the beaker.

5

Example 4

The transparency of the composition was assessed by the following method:

10 **Apparatus**

- Transparent Petri capsules, inner $\varnothing$ ca.50mm, height ca. 12mm. (Fig. 12A)
- Pasteur pipette.
- Technical balance.
- White paper with printed boldface type of 14 point size. (Fig. 12B)

15

Analytical Procedure

- The test composition was melted at 70 - 75°C
- 20 • A sample of the molten test composition (14.00 g) was weighed into the transparent Petri capsule, which was then covered with the cap
- The sample was cooled to 25°C and stood for at least for 60 minutes. The cap was removed
- The Petri capsule was placed on the white paper, on top the printed boldface type.
- 25 The clarity of the boldface type was visually assessed as set out below

Calculation of results

- The test composition was defined as “transparent” when the 14 point boldface type could
- 30 be clearly read through a 6.35 mm section of material (corresponding to 14.00 g of test sample in the transparent Petri capsule as described above).

Example 5

- 35 The melting point of the test compositions was measured by the following method:

Apparatus

- Water bath with thermoregulation

Analytical Procedure

- 5
- 10
- 15
- A sample of the test composition (~ 50 g) was weighted into a transparent glass or plastic container, and allowed to warm to room temperature
 - The bath temperature was set to a starting temperature, typically ~ 45°C. The starting temperature was recorded
 - Upon reaching the bath temperature, the container containing the sample was immersed and held at the starting temperature for 30 minutes
 - The bath temperature was increased in 0.5°C increments, holding at each temperature for 15 minutes. The experiment was ended when the coexistence of liquid and solid phases was visually observed, at the end of a 15 minute hold period
 - The melting point was defined as (T – 0.4°C) where T = bath set temperature for the experiment end point

Example 6

The compositions of Table 1 were tested for dissolution rate, transparency and melting point using the procedures of examples 3 to 5. The results are shown in Table 2.

Table 2

Composition	Form/ appearance	Melting point (°C)	Dissolution rate (g/min)	Transparent?
1	Solid	51	0.79	yes
2 (comparative)	Separates	<40	0.67	yes
3	Solid	54	0.72	yes
4	Solid	60-65	0.89	yes
5	Solid	61	0.87	yes
6 (comparative)	Solid	46	0.73	yes
7	Solid	53	0.90	yes
8	Solid	64	0.94	yes
9	Solid	55	0.77	yes
10	Solid	59	0.72	yes
11	Solid	60	0.7	yes

12 (comparative)	Solid	40	0.57	yes
13	Solid	50	0.97	yes
14	Solid	50	0.96	yes
15	Solid	50	0.95	yes
16	Solid	55	0.84	yes

Example 7

A transparent solid detergent product of the present invention (composition 17) was prepared
5 comprising the ingredients listed in table 3, according to the method detailed below.

Table 3

Component	Wt %
C8 to C10 amidopropyl betaine	8.6
2-phenoxyethanol	26.1
Propylene glycol	5.5
Water	17.6
C12-18 + 7 EO	11
Poly-imine	2
SLES	9.8
Monoisopropanolamine	3.9
C16-18 [1:1] fatty acid	14
Perfume	0.3
Blue dye	0.0003
Other impurities	To 100

10 A vessel was charged with C8 to C10 amidopropyl betaine, 2-phenoxyethanol, water and poly-
imine. The mixture was stirred and heated to 70°C before the alcohol ethoxylate surfactant was
added followed slowly by SLES at about 70°C.

Monoisopropanolamine was added and then the fatty acid was added at 70°C. The perfume was
15 added and the mixture homogenized before discharging at 70°C into a chocolate bar shaped
mould and allowing to solidify.

A photograph of this product is shown in figure 9.

Example 8

Two opaque solid detergent products of the present invention were prepared comprising the ingredients listed in table 5, according to the method detailed below.

5

Table 4

Component	Composition 18 (Wt %)	Composition 19 (Wt %)
Cocamide MIPA	5.43	5.43
Sodium methyl cocoyl taurate (de-salted)	8.66	8.66
C16-C18 FATTY ACID	13.4	13.4
C12-16 Amine oxide	3.63	3.63
C10 + 5 EO	4.7	4.7
C10 amidopropyl betaine	3.03	3.03
C8 amidopropyl betaine	3.54	3.54
C12-18 + 7 EO	5.5	5.5
Monoisopropanolamine	3.75	-
Sodium hydroxide	-	3.75
Propylene Glycol	9.05	9.05
Water	11.7	15
Dipropylene Glycol	23.65	22
Poly-imine	1.44	1.44
Stearates/inorganics	QS for opacity	-
Other components	To 100	To 100

The solvents were charged into the vessel and the mixture was heated to 70°C.

- 10
- The liquid surfactants (amine oxide, amidopropyl betaines), poly-imine and fatty alcohol were added followed by flakes of Sodium methyl cocoyl taurate at least 65°C.

Monoisopropanolamine (composition 18) or sodium hydroxide (composition 19) was added followed by the fatty acid and additives. The mixture homogenized before discharging at 70°C
15 into a chocolate bar shaped mould and allowing to solidify.

The compositions had the following properties:

Table 5

Composition	18	19
Appearance	White solid	White solid
Melting point (°C)	55	60
Dissolution rate (g/min)	0.84	0.75

Example 9

5 A further opaque detergent product of the present invention was prepared comprising the ingredients listed in table 6, using a method analogous to that described in example 7 above. A photograph of this product is shown in figure 10.

Table 6

Component	Wt %
C8 to C10 amidopropyl betaine	8.6
2-phenoxyethanol	26.1
Propylene glycol	5.5
Water	18
C12-18 + 7 EO	11
Poly-imine	1.6
SLES	9.8
Monoisopropanolamine	3.9
C16-18 [1:1] fatty acid	14
EGDS/EGMS	0.5
Blue dye	0.003
Other impurities	To 100

10

Example 10

15 A further detergent product of the present invention was prepared comprising the ingredients listed in table 7. The product was in the form of an amorphous transparent solid and was prepared according to the method described below.

Table 7

Component	Wt %
Sophorolipid	7.5
C12-16 Amine oxide	7.6

SLES	9.8
C10 + 5EO (deceth 5)	10
MIPA C16-C18	17.9
EDTA	0.2
NaOH	q.s. x pH >9
Poly-imine	1.2
2-phenoxyethanol	20
Propylene Glycol	10
Additives	≤ 0.5
Water	To 100

A composition comprising C12-16 amine oxide, deceth-5, propylene glycol and water was mixed with 2-phenoxyethanol and a sodium hydroxide solution.

- 5
- Solutions of sophorolipids and polyethylene imine were added, along with EDTA, and the mixture heated to 60-65°C. A solution of SLES was added and the mixture homogenized. Monoisopropanolamine was added, followed by C16-18 saturated fatty acid and further homogenization.
- The remaining additives (colorant solution, tocopheryl acetate oil mixture) were added and
- 10
- mixed and then the mixture discharged at 60-65°C to a mould and cooled to room temperature as quickly as possible.

Example 11

- 15
- Further detergent products of the invention were prepared comprising detergent compositions A to H detailed in table 8 according to a the preparation method set out below.

Table 8

	Composition							
Component	A	B	C	D	E	F	G	H
2-phenoxy ethanol	24.8	23.7		26.1	26.1			
3-methyl-3-methoxy-1-butanol (MMB)						26.1	26.1	20
propylene glycol	4.1	3,9	4.3	10.4		4.3	4.3	9.6

Isopropylidene glycerol			26.1					
C10 + 5EO (deceth 5)						11	11	
C12-18 + 7EO	10.4	10	11	11	32			
C8 APB	3.7	3.6	3.9			3.9	3.9	
C10 APB	4.56	4.4	4.8			4.8	4.8	
LMDO				7.4				6.8
SLES	9.3	8.9	9.8	9.8	9.8	9.8		
C14-16 AOS							9.5	
Poly-imine	1.5	1.4	1.6	1.6	1.6	1.6	1.6	1.6
Cocamide MIPA								9.5
SMCT								9.5
Lauryl glucoside								10
MIPA C16-18	17	16.3	17.9	17.9	17.9	17.9	17.9	18
Perfume	4.8	9.1						
Enzymes			0.15					
Water	To 100	To 100	To 100	To 100	To 100	To 100	To 100	To 100
Appearance	T	O	T	T	T	T	T	O

For the appearance, T indicates transparent and O indicates opaque.

5 Method:

The solvents, betaine and amine oxide surfactants, non-ionic surfactants, poly-imine and water were mixed and heated to 65-70°C. The anionic surfactants were added as a paste or powder and the mixture homogenized, followed by addition of monoisopropanolamine and fatty acids.

- 10 After further homogenization, additives (perfume, enzymes, antioxidant, colorant, etc) were introduced before discharging the hot composition to the desired recipient.

Claims

1. A detergent product in the form of a single solid block comprising multiple portions and including at least a first detergent composition; wherein the first detergent composition comprises:
- 5
- (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
- (b) at least one nitrogen containing surfactant;
- 10 (c) at least one anionic surfactant;
- (d) at least one solvent including at least one hydroxy functional group; and
- (e) up to 20 wt% water.
2. A detergent product according to claim 1 wherein component (a) comprises the salt of an amine and a fatty acid.
- 15
3. A detergent product according to claim 1 or claim 2 wherein component (a) comprises the alkali metal salt of a fatty acid.
- 20
4. A detergent product according to claim 2 wherein component (a) comprises the salt of a monoalkanolamine having 3 to 6 carbon atoms and a mixture of fatty acids wherein at least 80% of the fatty acid molecules are C16 to C18 fatty acids
5. A detergent product according to any preceding claim wherein component (b) comprises a nitrogen containing surfactant selected from alkanolamides, amine oxides, betaines and mixtures thereof.
- 25
6. A detergent product according to any preceding claim wherein component (c) comprises one or more anionic surfactants selected from alkyl or alkenyl sulphates, alkyl or alkenyl ether sulphates, alkyl sulphonates, alkenyl sulphonates, hydroxyalkyl sulphonates and taurates.
- 30
7. A detergent product according to any preceding claim wherein component (d) comprises a solvent selected from polyhydric alcohols, alkoxy alcohols, aryloxy alcohols and mixtures thereof.
- 35

8. A detergent product according to any preceding claim wherein component (a) is present in the first detergent composition in an amount of from 5 to 30 wt%, preferably from 10 to 25 wt%.
- 5 9. A detergent product according to any preceding claim wherein component (b) is present in the first detergent composition in an amount of from 1 to 40 wt%, preferably from 5 to 32 wt%.
- 10 10. A detergent product according to any preceding claim wherein component (c) is present in the first detergent composition in an amount of from 2 to 30 wt%, preferably from 5 to 25 wt%.
- 15 11. A detergent product according to any preceding claim wherein component (d) is present in the first detergent composition in the first detergent composition in an amount of from 5 to 40 wt% preferably from 8 to 38 wt%.
12. A detergent product according to any preceding claim wherein the first detergent composition further comprises component (f), a non-ionic surfactant.
- 20 13. A detergent product according to claim 12 wherein component (f) comprises one or more non-ionic surfactants selected from glycolipids, alkyl alkoxylates, alkenyl alkoxylates, C6-C22 alcohol condensates with ethylene oxide/propylene oxide block polymers; C14-C22 mid-chain branched alcohols, C14-C22 mid-chain branched alkyl alkoxylate, alkylpolysaccharides, (for example alkylpolyglycosides), methylester ethoxylates, 25 polyhydroxy fatty acid amides, ether capped poly(oxyalkylated) alcohol surfactants, acyl polyethoxylated-glycerol esters (for example cocoyl POE-glycerol esters) and mixtures thereof
- 30 14. A detergent product according to any preceding claim wherein:
component (a) is the salt of monoisopropanolamine or sodium and a mixture of fatty acids wherein at least 80% of the fatty acid molecules are C16 to C18 fatty acids;
- 35 component (b) is selected from cocoamidopropyl betaine and amidopropyl betaines prepared from C8 and/or C10 fatty acids, a mixture of C12 to C16 amine oxides and an alkanolamide of coconut fatty acid and monoisopropanolamine; and

component (c) is one or more anionic surfactants selected from alkyl or alkenyl sulphates, alkyl or alkenyl ether sulphates, alkyl sulphonates, alkenyl sulphonates, hydroxyalkyl sulphonates and taurates.

- 5 15. A detergent product according to any preceding claim which further comprises a second detergent composition comprising:
- 10 (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
- (b) at least one nitrogen containing surfactant;
- (c) at least one anionic surfactant;
- (d) at least one solvent including at least one hydroxy functional group; and
- (e) up to 20 wt% water.
- 15 16. A detergent product according to any preceding claim which has a dissolution rate of at least 0.6 g/min, preferably at least 0.7 g/min.
17. A method of manufacturing a detergent product in the form of a single solid block comprising multiple portions, the method comprising the steps of:
- 20 (i) preparing a molten first detergent composition comprising at least the following components:
- 25 (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
- (b) at least one nitrogen containing surfactant;
- (c) at least one anionic surfactant;
- (d) at least one solvent including at least one hydroxy functional group; and
- 30 (e) up to 20 wt% water;
- and
- (ii) shaping and/or cooling the composition obtained in step (i).
- 35 18. A method according to claim 17 which includes a step after step (i) of admixing one or more additional components parts into the molten first detergent composition, prior to step (ii).
19. A method according to claim 17 or claim 18 which further includes the steps of:

(iii) preparing a molten second detergent composition comprising at least the following components:

- 5 (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
- (b) at least one nitrogen containing surfactant;
- (c) at least one anionic surfactant;
- (d) at least one solvent including at least one hydroxy functional group; and
- 10 (e) up to 20 wt% water;

and

(iv) shaping and/or cooling the composition obtained in step (iii).

- 15
20. A packaged detergent product comprising a receptacle and a solid detergent product, wherein the detergent product is in the form of a single solid block comprising multiple portions and includes at least a first detergent composition;
- wherein the first detergent composition comprises:
- 20 (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
- (b) at least one nitrogen containing surfactant;
- (c) at least one anionic surfactant;
- (d) a solvent including at least one hydroxy functional group; and
- 25 (e) up to 20 wt% water.

21. A method of laundering items, the method comprising the steps of:
- (w) loading the items into a washing machine;
- (x) breaking a portion of a solid detergent product from a solid block thereof;
- (y) adding the portion of the solid detergent into the washing machine; and
- (z) running a wash cycle of the washing machine;
- wherein the solid detergent product is in the form of a single solid block comprising multiple portions and includes at least a first detergent composition; and
- wherein the first detergent composition comprises:
- (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least 16 carbon atoms;
- (b) at least one nitrogen containing surfactant;
- (c) at least one anionic surfactant;

- (d) a solvent including at least one hydroxy functional group; and
- (e) up to 20 wt% water.

22. The use of a solid detergent product in toilet care, automatic dishwashing, manual
5 dishwashing, laundry, fabric care, kitchen care, carpet cleaning, air fresheners, vehicle
care, polishing products, machine cleaning and maintenance, pesticides, insecticides,
fungicides, herbicides, oilfield chemical applications, marine applications or institutional /
industrial cleaning;
wherein the solid detergent product is in the form of a single solid block comprising
10 multiple portions and includes at least a first detergent composition; and
wherein the first detergent composition comprises:
- (a) a salt of a fatty acid wherein at least 50% of the fatty acid molecules have at least
16 carbon atoms;
 - (b) at least one nitrogen containing surfactant;
 - 15 (c) at least one anionic surfactant;
 - (d) a solvent including at least one hydroxy functional group; and
 - (e) up to 20 wt% water.