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(54) Detergent composition.

(57) A detergent composition, especially for washing fabrics, comprises an anionic surfactant, a mixture of nonionic surfactants having an HLB above and below 10.5 and from 1% to 4% of a fatty acid (eg. coconut) monoethanolamide to improve oily soil removal.

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DETERGENT COMPOSITION

This invention relates to a detergent composition, in particular to a detergent composition for washing fabrics.

Fabric washing compositions contain, as an essential ingredient, a detergent active system whose role is to assist in the removal of soil from fabric and its suspension in the wash liquor. Suitable detergent active materials fall into a number of classes, including anionic and nonionic materials.

It is known to include in such detergent active systems an anionic detergent active material such as an alkyl benzene sulphonate and a mixture of nonionic detergent active materials. The latter can be classified according to their HLB and proposals have been made in the art to use a mixture of a high or medium HLB material with a low HLB material to provide detergency benefits, especially at low temperatures.

Such a composition is disclosed in, for example, British patent specification GB 1241754 (Unilever Limited/Gilbert).

We have now discovered that the performance of such a composition particularly in terms of oily soil removal can be further improved by the addition of a fatty acid monoethanolamide of a given alkyl chain length.

Thus according to the invention there is provided a detergent composition which comprises a detergent active system comprising an anionic detergent active material and a nonionic detergent active mixture of:

i) a nonionic detergent active material with an HLB above 10.5

ii) a nonionic detergent active material with an HLB below 10.5; and

iii) a fatty acid monoethanolamide in which the number of carbon atoms in the alkyl chain is from 10 to 18, preferably from 12 to 14.

We are aware that fatty acid monoethanolamides are not unknown as ingredients of fabric washing compositions. Thus, for example, GB 1529454 (Henkel) describes their use in compositions which contain aluminosilicate builder materials. The use of the fatty acid monoethanolamides in such compositions is said to lead to a number of advantages, including foam control. It has not previously been appreciated however that fatty acid monoethanolamides of a specific alkyl chain length can provide detergency benefits in compositions which contain both anionic and mixed nonionic detergent active materials.

Preferred compositions according to the invention include the detergent active materials in a total amount which is from 2% to 50%, such as from 7.5% to 30% by weight of the composition.

The amount of the anionic detergent active material is preferably from 4.5% to 18%, such as from 6% to 12% by weight of the composition. The higher HLB nonionic material may be present at from 0.5% to 4% by weight and the lower HLB material at from 1.5% to 6%, most preferably from 2% to 4% by weight. The fatty acid ethanolamide is effective from 1% to 4% by weight of the composition. The ratio of the anionic to nonionic surfactants may be from 5.5:1 to 1:1.2, preferably from 2.25:1 to 1:1. The amount of ethanolamide is preferably equal to or greater than the individual amounts of each of the two said nonionic materials.

The anionic detergent active materials may be the usual water-soluble alkali metal salts of organic sulphonates having alkyl radicals containing from about 8 to about 22 carbon atoms, the term alkyl being used to include the alkyl portion of higher acyl radicals. Examples of suitable synthetic anionic detergent compounds are sodium and potassium alkyl (C_9 - C_{20}) benzene sulphonates, particularly sodium linear secondary alkyl (C_{10} -C_{15}) benzene sulphonates; sodium alkyl glyceryl ether sulphates, especially those ethers of the higher alcohols derived from tallow or coconut oil and synthetic alcohols derived from petroleum; sodium coconut oil fatty monoglyceride sulphates and sulphonates; sodium and potassium salts of sulphuric acid esters of higher (C_8 -C_{18}) fatty alcohol-alkylene oxide, particularly ethylene oxide, reaction products; the reaction products of fatty acids such as coconut fatty acids esterified with isethionic acid and neutralised with sodium hydroxide; sodium and potassium salts of fatty acid amides of methyl taurine; alkane monosulphonates such as those derived by reacting alpha-olefins (C_8 -C_{20} with sodium bisulphite and those derived from reacting paraffins with SO_2 and Cl_2 and then hydrolysing with a base to product a random sulphonate; and olefin sulphonates, which term is used to describe the material made by reacting olefins, particularly C_{10} - C_{20} alpha-olefins, with SO_3 and then neutralising and hydrolysing the reaction product.

Suitable nonionic surfactants which may be used are the reaction products of compounds having a hydrophobic group and a reactive hydrogen atom, for example aliphatic alcohols, acids, amides or alkyl phenols with alkylene oxides, especially ethylene oxide either alone or with propylene oxide. Specific nonionic detergent compounds are alkyl (C_7 - C_{22}) phenols-ethylene oxide condensates, the condensation

products of aliphatic (C_8 - C_{18}) primary or secondary linear or branched alcohols with ethylene oxide, and products made by condensation of ethylene oxide with the reaction products of propylene oxide and ethylenediamine.

Suitable nonionic surfactants are described in British Patent Specification GB 1460646 (The Procter & Gamble Company).

Alkylene oxide adducts of fatty materials can be used as the nonionic surfactants. The number of alkylene oxide groups per molecule has a considerable effect upon the HLB of the nonionic surfactant. The chain length and nature of the fatty material is also influential, and thus the preferred number of alkylene oxide groups per molecule depends upon the nature and chain length of the fatty material.

Typical nonionic surfactants having a low HLB are the ethoxylated straight chain alcohols containing 13 to 15 carbon atoms and an average of 3 ethylene oxide groups per molecule. The HLB of such a material is about 8.3. Typical high HLB nonionics are similar materials having an average of 7 ethylene oxide groups per molecule. These have an HLB of about 11.7.

The fatty acid monoethanolamides used in accordance with the invention are the derivatives of individual fatty acids or fatty acid mixtures with a chain length of 10 to 18, preferably 12 to 14 carbon atoms, which may be of either natural or synthetic origin. The fatty acids may be saturated or unsaturated; the monoethanolamides of mixed fatty acids derived from natural sources, such as the erivatives of the fatty acids obtained from coconut fat, are particularly suitable. It is possible for a minor amount of the total fatty acid monoethanolamide material to be derived from fatty acids having an alkyl chain length outside the above range. Examples of useful fatty acid monethanolamides are the following compounds:

lauric acid monoethanolamide;

coconut fatty acid monoethanolamide;

palm kernel fatty acid monoethanolamide;

myristic acid monoethanolamide;

whereas the materials derived from tallow, palm oil, olive oil and from palmitic and stearic acids are less preferred.

We have found it advantageous if in addition to the fatty acid monoethanolamide, a small amount, say from 0.1% up to 4%, of an amine oxide having at least one alkyl or alkenyl chain containing from 10 to 22 carbon atoms is included. A particular example is coconut alkyl amine oxide.

The compositions of the invention may include surfactant materials other than those listed above, such as from the classes of amphoteric, zwitterionic and cationic detergent active materials. Any such further surfactant materials should be present in no more than a minor amount.

The compositions of the invention may include a detergency builder which has the ability to reduce the free calcium ion concentration of the wash liquor. Another advantage of the presence of builders (when such materials are water-soluble) is the generation of an alkaline pH, it being preferred that the compositions of the invention exhibit a pH of at least 8, preferably at least 10, at a concentration of 1 g/l in distilled water at 25° C.

When the compositions of the invention contain a detergency builder material, this may be any material capable of reducing the level of free calcium ions in the wash liquor and will preferably provide the compositions with other beneficial properties such as the generation of an alkaline pH and the suspension of soil removed from the fabric.

Examples of phosphorus-containing inorganic detergency builders, when present, include the water-soluble salts, especially alkali metal pyrophosphates, orthophosphates, polyphosphates and phosphonates. Specific examples of inorganic phosphate builders include sodium and potassium tripolyphosphates, ortho phosphates and hexametaphosphates.

Examples of non-phosphorus-containing inorganic detergency builders, when present, include water-soluble alkali metal carbonates, bicarbonates, silicates and crystalline and amorphous alumino silicates. Specific examples include sodium carbonate (with or without calcite seeds), potassium carbonate (with or without calcite seeds), sodium and potassium bicarbonates and silicates.

Examples of organic detergency builders, when present, include the alkali metal, ammonium and substituted ammonium polyacetates, carboxylates, polycarboxylates, polyacetyl carboxylates and polyhydroxsulphonates. Specific examples include sodium, potassium, lithium, ammonium and substituted ammonium salts of ethylenediaminetetraacetic acid, nitrilotriacetic acid, oxydisuccinic acid, melitic acid, benzene polycarboxylic acids and citric acid.

Apart from the ingredients already mentioned, a number of optional ingredients may also be present.

Examples of other ingredients which may be present in the composition include fabric softening agents such as fatty amines, fabric softening clay materials and bleaching agents such as sodium perborate and sodium percarbonate, peracid bleach precursors, chlorine-releasing bleaching agents such as

tricloroisocyanuric acid, inorganic salts such as sodium sulphate, and, usually present in very minor amounts, fluorescent agents, perfumes, enzymes such as proteases and amylases, germicides and colourants.

The detergent compositions according to the invention may be in any suitable form, especially powders but also bars, liquids, and pastes and may be prepared by a number of different methods according to their physical form. In the case of granular products they may be prepared by dry-mixing or coagglomeration. A preferred physical form is a granule incorporating a detergency builder salt and this is most conveniently manufactured by spray-drying at least part of the composition. In this process a slurry is prepared containing the heat-insensitive components of the composition such as the surfactant system, builder material and filler salt. The slurry is spray-dried to form base powder granules with which any solid heat-sensitive ingredients may be mixed, such ingredients including bleaches and enzymes. The specified nonionic surfacants and the fatty acid monoethanolamide can be liquified by melting or solvent dissolution and sprayed onto the base powder granules, rather than including them in the slurry for spray-drying. We have found that when the monoethanolamide and the nonionic surfactants are all sprayed onto the base powder granules, a higher bulk density results if the monoethanolamide is sprayed first, onto hot base powder granules (above 50° C), followed by the high HLB nonionic and then the low HLB nonionic. A lower bulk density results if the base powder is cold (below 50° C) and the low HLB nonionic is sprayed first, followed by the monoethanolamide and the high HLB nonionic together. As an alternative, the nonionic surfactants, or part thereof, and/or the ethanolamide and/or any amine oxide may be incorporated on a suitable porous carrier material which is dry-mixed with the spray dried powder. Suitable carrier materials include water-soluble inorganic salts. The invention will now be described in more detail in the following non-limiting examples.

EXAMPLES 1A TO 1E

Wash liquors were prepared in water having a hardness of 25° FH (equivalent to a free calcium ion concentration of 2.5 x 10^{-3} moles). The wash liquor contained the equivalent of 6 g/l of a composition containing (by weight).

DOB - 113 (Anionic detergent active)	9%
Specified nonionic surfactant	4%
Sodium tripolyphosphate	23%
Sodium carbonate	6%
Sodium alkaline silicate	5.5%
Sodium sulphate	30.8%
Sodium chloride	2.93%
Water	Balance

The sodium chloride was included as being equivalent in ionic strength to 5% sodium perborate monohydrate which would be present in practice. The bleach is left out of these experiments in order to avoid confusion between detergency and bleaching effect in the interpretation of the results.

The wash liquors were used to wash a fabric load at a liquor to cloth ratio of 50:1. The load consisted of a number of polyester monitors to which had previously been applied an amount of C^{14} tagged triolein. Measurement of the level of tagged triolein after washing, using standard radio-tracer techniques, gives an indication of the degree of detergency, ie. soil removal, obtained.

The wash time was 20 minutes with an agitation at 70 rpm. Washes were isothermal at 40° C.

In addition to the anionic surfactant listed above the compositions contained variously the nonionic comprising:

E_7: $C_{13/15}$ alcohol ethoxylated with approximately 7 moles of ethylene oxide per molecule, having a HLB of approximately 11.7.

E_3: $C_{13/15}$ alcohol ethoxylated with approximately 3 moles of ethylene oxide per molecule, having a HLB of approximately 8.3.

CEA: Coconut monoethanolamide.

Details of the compositions tested and the results obtained were as follows:

EXAMPLE NO.	E7(%)	E3(%)	CEA(%)	Detergency
1A	1	3	0	45.1
1B	1	2	1	49.8
1C	1	1	2	56.3
1D	1	0	3	54.3
1E	0	1	3	49.3

These results show that despite the total amount of E7, E3 and CEA remaining the same (4%), the best detergency results are obtained, in Example 1C, when all three components are present. Example 1B, with all three components is superior to the Example 1A with only E7 and E3.

When Example 1B is modified by replacing 0.5% of the CEA with a similar amount of coconut amine oxide, all other conditions remaining the same, the detergency was further improved to 50.0%.

Beneficial results can also be obtained when the CEA is repiaced by tallow fatty acid mono-ethanolamide.

EXAMPLES 2A AND 2B

In a separate series of experiments the procedure of Example 1 was repeated to compare a composition which was the same as Example 1C, and a composition in which the nonionic surfactants E3 and E7 are repiaced with E5, a $C_{13/15}$ alcohol ethoxylated with approximately 5 moles of ethylene oxide per molecule, having an HLB of approximately 10.0.

Results were:

EXAMPLE NO.	E7(%)	E5(%)	E3(%)	CEA(%)	Detergency
2A	1	0	1	2	53.4
2B	0	2	0	2	52.7

Claims

1. A detergent composition which comprises a detergent active system comprising an anionic detergent active material and a nonionic detergent active system which is a mixture of:

i) a nonionic detergent active material with an HLB above 10.5

ii) a nonionic detergent active material with an HLB below 10.5; and

iii) a fatty acid monoethanolamide in which the number of carbon atoms in the alkyl chain is from 10 to 18, preferably from 12 to 14.

2. A composition according to claim 1 wherein the amount of anionic detergent active material is from 4.5% to 18% by weight of the composition.

3. A composition according to claim 1 or claim 2 wherein the amount of the higher HLB nonionic material is from 0.5% to 4% by weight of the composition, and the level of the lower HLB nonionic material is from 1.5% to 6% by weight of the composition.

4. A composition according to any one of the preceding claims wherein the amount of fatty acid ethanolamide is from 1% to 4% of the composition.

5. A composition according to any one of the preceding claims wherein the ethanolamide is derived from fatty acid of 12 to 14 carbon atoms.

6. A composition according to any one of the preceding claims wherein the total amount of said anionic and nonionic detergent active materials is from 7.5 to 30% by weight of the composition.

7. A composition according to any one of the preceding claims additionally containing an amine oxide with at least one alkyl or alkenyl chain containing from 10 to 22 carbon atoms, the amine oxide being present in an amount from 0.1% to 4% by weight of the composition.

8. A composition according to any one of the preceding claims which is in granular form and incorporates detergency builder.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 30 1221

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	US-A-3 953 382 (R.E. NELSON et al.) * claim 3, lines 7-34; claims 4,5,6,7; lines 1-32; claim 8, lines 34-38; claim 9, lines 57-68; claim 10, lines 1-17; claims 1-4,9 *	1-6,8	C 11 D 1/83 C 11 D 1/52
A	---	7	
Y	GB-A- 818 158 (KENNETH RICHARD DUTTON) * page 2, lines 79-86; page 3, lines 81-90; claims 1-7,12-14,16-21 *	1-6,8	
A	---		
A	GB-A-1 540 386 (WILLIAM HAYON THOMAS JOHN) * page 1, lines 54-63; page 2, lines 61-66; claims 1-5,10-12,16-28,31-36 *	1-6,8	
A	---		
A	GB-A-1 573 908 (LANKRO CHEMICALS LIMITED) * claim 5 *	1	
	-----		TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			C 11 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	12-05-1989	PELLI-WABLAT B

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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