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(12) # EUROPEAN PATENT APPLICATION

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(54) **Liquid detergent composition.**

(57) Aqueous, built liquid detergent compositions on the basis of a nonionic detergent, a builder salt, and a mono alkyl- or alkenyl C_7-C_{12} succinate (as hydrotrope) suffer from unsatisfactory storage stability at lower temperatures or under changing temperature conditions. By inclusion of a small amount of a C_{10}-C_{15} alkylbenzene sulphonate, the storage stability under these conditions is significantly improved.

These compositions are particularly suitable for industrial laundering purposes.

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"LIQUID DETERGENT COMPOSITION"

The present invention relates to an aqueous, built liquid detergent composition with an improved storage stability at low temperatures.

Aqueous, built liquid detergent compositions are well-known in the art. They are usually based upon an active-detergent system together with suitable builder salts, and, to provide for the required stability on storage they normally comprise a hydrotrope system. Such hydrotrope systems are manifold, the most well-known being toluene-, xylene-, or cumene-sulphonates, alkanephosphonates, and solvents such as ethylalcohol. Frequently, however, the choice of a suitable hydrotrope is restricted by the type of active detergent and builder salt, and although satisfactory results can be obtained e.g. when the product is stored at room temperature, less satisfactory results are achieved when the product is stored under changing temperature conditions, or at lower temperatures.

It is therefore an object of the present invention to provide for an aqueous, built liquid detergent composition which includes a hydrotrope system such, that the storage stability at lower temperatures is significantly improved. In particular, it is an object of the present invention to improve the low-temperature storage stability of aqueous, built liquid detergent compositions which are based on a nonionic detergent-active system and water-soluble phosphate builder salts, where this problem is particularly acute.

It has already been proposed in GB Patent Specification 1,285,582

to improve the storage-stability of aqueous, built liquid detergent compositions which contain a nonionic detergent-active system and builder salts by inclusion therein of mono-alkyl- or alkenyl-succinates, in which the alkyl- or alkenylgroup contains from 7 to 12 carbon atoms, such as monooctenyl- and mononononenyl-succinate. Although such compositions have indeed a satisfactory storage stability at ambient temperatures, it is less satisfactory at low temperatures or under changing temperature conditions.

It has now been found that the low-temperature stability of such compositions can be significantly improved by inclusion therein of a small amount of an alkalimetal, ammonium or substituted ammonium salt of an alkyl benzene sulphonic acid in which the alkylgroup contains from 10 to 15 carbon atoms.

According to the present invention therefore, an aqueous built liquid detergent composition with improved low-temperature storage stability comprises a nonionic detergent-active system, a water-soluble builder salt, and a mono alkyl- or alkenylsuccinate hydrotrope, and furthermore a small amount of an alkylarylsulphonate as hereinabove defined.

The nonionic detergent-active system used in the present invention can be any suitable type of well-known nonionics, either alone or mixtures thereof.

Nonionics are alkylene oxide condensation products with hydrophobic organic compounds. Typical examples are ethylene- and/or propylene-oxide condensation products with alcohols, fatty acids, alkylphenols, fatty acid amides, and glycols. Numerous examples can be found in Schick, "Nonionic Surfactants", 1967.

Especially suitable are the condensation products of ethylene oxide (6-10 moles) with nonylphenol, of ethylene- and/or propylene-oxide (3-12 moles) with linear monohydric primary or secondary alcohols with 9-15 carbon atoms, or mixtures thereof.

In general, the amount of nonionic detergent active ranges from 5-25% by weight, the preferred range being 6-20% by weight.

The water-soluble builder salts used in the present invention can be organic and/or inorganic builder salts, such as sodium citrate, sodium carboxymethyloxysuccinate, sodium nitrilotriacetate, sodium carbonate, sodium or potassium salts of ortho-, pyro- or tripolyphosphoric acid, such as sodium and potassium tripolyphosphate, tripotassium orthophosphate, tetrapotassiumpyrophosphate, and mixtures thereof. In general the amount of the phosphate builder salts ranges from 5-25% by weight, the preferred range being 12-20% by weight.

The mono alkyl- or alkenyl-succinate hydrotrope to be used in the present invention contains from 7-12, particularly from 8-9 carbon atoms in the alkyl or alkenylgroup. These groups may be branched or straight-chain, the latter being preferred. They may be used in the acid or anhydride form, their corresponding salts being formed in situ in the composition by neutralisation with alkaline material present therein, or they may be added in their salt form. Suitable salts are the alkalimetal, ammonium or substituted ammonium salts.

In general, the amount of the alkyl- or alkenyl succinate ranges from 3-15% by weight, the preferred range being from 4-10% by weight. The composition of the invention may furthermore comprise other ingredients, commonly used in aqueous, built liquid detergent compositions, Thus, it may comprise alkaline material such as potassiumhydroxide or potassium carbonate (up to 10%), sequestering agents such as ethylene-diaminetetraacetic acid, ethanehydroxydiphosphonic acid, ethylenediaminetetraphosphonic acid, triethanolamine etc. (up to 2%), foam depressors such as soaps, silicones, paraffins etc. (up to 5%), fluorescers in minor amounts, enzymes, perfumes, colouring agents, germicides, anti-soil redeposition agents and so on.

The alkylbenzenesulphonate which is used according to the present invention is an alkalimetal ammonium or substituted ammonium salt of alkylbenzenesulphonic acid, in which the alkylgroup is branched

or, preferably, straight-chain and which comprises from 10-15 carbon atoms. Suitable examples are sodium or potassium straight-chain C_{12}-alkylbenzenesulphonate.

Generally, a small amount of these sulphonates is used, from 0.5-3% by weight, the preferred range being from 0.75-1.5% by weight.

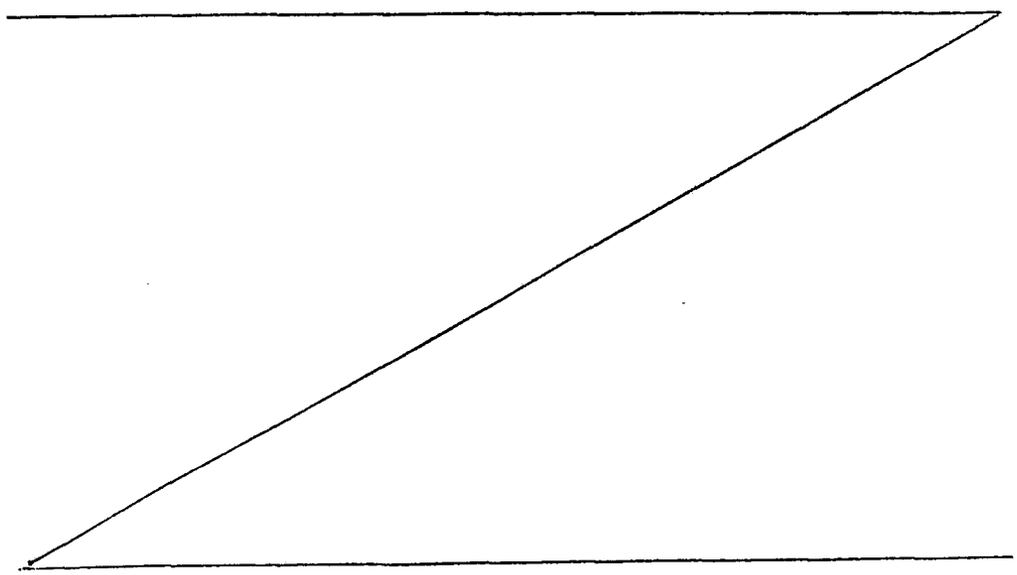
The compositions of the invention can be prepared in any suitable manner; it is however advantageous to add the hydrotrope to the composition prior to the phosphate builder salts and neutralize the hydrotrope in situ.

The products of the invention are particularly suitable for industrial laundering, especially to prepare stock solutions therefrom to be used in industrial laundering processes where these solutions are automatically dosed into the washing system. They are of particular benefit for the laundering of polyester/cottong laundry.

The invention is further illustrated by the following examples.

Example I

The following compositions were prepared:



% by weight

	A	B	C	D	E	F	G	H	K	L	M
sodiumtripolyphosphate	9	12	12	12	12	12	12	12	12	12	12
potassiumtripolyphosphate	3	-	-	-	-	-	-	-	-	-	-
tetrapotassiumpyrophosphate	6	6	6	6	6	6	6	6	6	6	6
nonylphenol, condensed with 6 moles of EO	5	3.5	3.5	3.5	3.5	3.5	3.5	5	5	5	5
nonylphenol, condensed with 10 moles of EO	5	3.5	3.5	3.5	3.5	3.5	3.5	5	5	5	5
sodium straight-chain C_{12}-alkylbenzenesulphonate	1	-	1	-	1	-	1	-	1	-	1
oleic acid	3	3	3	-	-	1.8	1.8	-	-	-	-
triethanolamine	1	1	1	1	1	1	1	1	1	1	1
nonenyl succinic anhydride	6	5.5	5.5	5.5	5.5	5.5	5.5	6	6	6	6
potassiumhydroxide (50%)	14	14	14	14	14	14	14	14	14	14	14
cocofatty acids	-	-	-	3	3	1.2	1.2	3	3	2	2
fluorescers	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156
water (balance)	bal.	bal.	bal.	bal.	bal.	bal.	bal.	bal.	bal.	bal.	bal.

These compositions were stored under cycling conditions, i.e. at temperatures of -12°C and + 20°C changing the temperature every 24 hours, which was repeated 6 times, as well as in a refrigerator (temp. + 3°C). Their stability was visually assessed as to phase separation. The following results were obtained:

	A	B	C	D	E	F	G	H	K	L	M
cycling conditions	>30	1	>30	12	12	1	>30	1	10	1	17
refrigerator condition	30	1	16	1	10	1	1	1	1	1	>30

The figures in the above table denote the amount of days after which instability, i.e. phase separation was observed. It can be seen that the addition of the alkylbenzenesulphonate in each case greatly enhances the storage stability under both storage conditions.

Example 2

Replacing the nonionic detergent active of Example 1 by a 1:1 mixture of C_{9-11} monohydric alcohol, condensed with 6 moles of EO and C_{12-15} monohydric alcohol, condensed with 3 moles of EO produces similar results.

C L A I M S

1. An aqueous, built liquid detergent composition comprising a nonionic detergent-active material, a water-soluble builder salt, and a mono alkyl- or alkenyl succinate hydrotrope in which the alkyl- or alkenyl group contains from 7-12 carbon atoms, characterized in that the composition further comprises from 0.5-3% by weight of an alkylbenzene sulphonate in which the alkyl group contains from 10-15 carbon atoms.

2. A composition according to claim 1, characterized in that it comprises from 0.75-1.5% by weight of the alkylbenzene sulphonate.

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EUROPEAN SEARCH REPORT

Application number

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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.³)
X	FR - A1 - 2 296 683 (LANKRO CHEMICALS GROUP LTD.) * claims 1, 2, 5; page 8, table 4 *	1	C 11 D 1/08 C 11 D 1/83 C 11 D 1/12
A	DE -A1 - 2 853 136 (ALBRIGHT & WILSON LTD.) * complete document *		
A	US - A - 3 936 317 (H.J. LEHMANN et al.) * complete document *		TECHNICAL FIELDS SEARCHED (Int. Cl.³) C 11 D 1/00
A	US - A - 3 910 855 (R.M. ABELES) * complete document *		

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	18-12-1980	SCHULTZE