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54 **Concentrated cleaning compositions.**

57 Stable and clear concentrated cleaning compositions are disclosed which comprise at least one long chain surfactant, and which are stabilized by the additional presence of short chain surfactants. The short chain surfactants further boost grease cleaning performance.

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Technical Field

The present invention relates to concentrated cleaning compositions. Although the present invention relates primarily to cleaning compositions for hard surfaces, it may also be of interest for other cleaning compositions including dishwashing and laundry detergent compositions.

Background of the Invention

Concentrated cleaning compositions are well known in the art. Concentrated compositions are mainly characterized by the fact that they comprise a higher concentration of active ingredients compared to a conventional cleaning composition, and a problem which is typically encountered when formulating concentrated cleaning compositions is therefore the physical stability of such compositions. Indeed, because such compositions comprise a high amount of active ingredients in a limited amount of water, stability problems appear which lead, if not solved, to compositions which separate into several phases. This phenomenon affects the performance of the composition and is visually noticeable, thereby rendering such formulations unfit for commercialization.

Various solutions have been proposed to solve this problem which typically involve the use of specific stabilizing ingredients, or hydrotropes. Such ingredients have the sole function of stabilizing the composition. They thus increase the cost of formulating such compositions without providing any cleaning performance benefits, and they furthermore require to free up parts in the formulation which could otherwise be used to formulate more actives.

For instance, EP 316 726 discloses concentrated compositions in the form of microemulsions which comprise water, perfume, a surfactant and a so-called co-surfactant. The co-surfactant is said to reduce the interfacial tension at interfaces between dispersed and continuous phases of an emulsion of said surfactant, thereby creating a stable microemulsion. The so-called co-surfactants in the '726 publication are listed as specific glycol ethers, which are traditionally regarded as solvents in this field, or specific carboxylic acids. The co-surfactants in the '726 publication do not appear to participate to the overall cleaning performance of the product.

It is therefore an object of the present invention to formulate a stable concentrated cleaning composition without using ingredients which are provided for the sole purpose of providing stability to the compositions herein, but which also participate significantly to the cleaning performance of said compositions.

It has now been found that this object can be met by formulating a concentrated aqueous composition comprising a traditional long-chain surfactant, in combination with at least one short chain surfactant, i.e. with a hydrophobic group consisting of a C₆-C₁₀ alkyl chain. Said short chain surfactants provide stability to the compositions herein and, in the same time, significantly boost the overall cleaning performance, especially grease cleaning, both in neat and dilute usage.

Summary of the Invention

The compositions herein are stable clear concentrated cleaning compositions comprising from 10 % to 80 % by weight of the total composition of water, less than 15 % perfume and at least one long chain surfactant comprising a C₁₁- C₂₄ alkyl chain as its hydrophobic portion, or mixtures thereof, said compositions further comprising at least one co-surfactant consisting of a short chain surfactant comprising a C₆-C₁₀ alkyl chain as its hydrophobic portion, or mixtures thereof, except where said short chain surfactant is an alkyl ether carboxylate, said alkyl chain as said hydrophobic portion is a C₆-C₈ alkyl chain.

Detailed Description of the Invention

The compositions of the present invention are concentrated aqueous compositions. By concentrated, it is meant herein that the compositions comprise from 10 % to 80 % by weight of the total composition of water, preferably from 15 % to 75 %, most preferably from 30 % to 75 %.

The compositions according to the present invention are clear and stable. By clear and stable, it is meant herein that the compositions of the present invention are macroscopically substantially transparent, in the absence of any opacifier, and that said compositions do not macroscopically separate into separate phases during at least 1 month, at temperatures ranging from 4 °C to 50 °C, upon standing.

The compositions according to the present invention further comprise a long chain surfactant, or mixtures thereof. All surfactants have in common that they comprise a hydrophobic portion and a hydrophilic portion. By long chain surfactants, it is meant herein surfactants which comprise a C₁₁ to C₂₄

alkyl chain as their hydrophobic portion. Such long chain surfactants are accordingly those conventionally used in this field and can be of any type. Accordingly, suitable long chain surfactants for use herein include C_{11} - C_{24} alkyl sulfates (C_{11} - $C_{24}SO_4$), alkyl ether sulfates (C_{11} - $C_{24}(OCH_2CH_2)_eSO_4$), alkyl sulfonates (C_{11} - $C_{24}SO_3$), alkyl succinates (C_{11} - $C_{24}OOCCH_2CH_2COOZ$), alkyl carboxylates (C_{11} - $C_{24}COOM$), alkyl ether carboxylates (C_{11} - $C_{24}(OCH_2CH_2)_eCOOM$), alkyl sarcosinates (C_{11} - $C_{24}CON(CH_3)R$), alkyl sulfo succinates (C_{11} - $C_{24}OOCCH(SO_3M)CH_2COOZ$), amine oxides (C_{11} - $C_{24}RR'NO$), glucose amides (C_{11} - $C_{24}CONR''X$), alkyl pyrrolidones (C_{11} - $C_{24}(C_4H_6ON)$), alkyl polysaccharides (C_{11} - $C_{24}OGg$), alkyl alkoxyates (C_{11} - $C_{24}(OCH_2CH_2)_e(OCH_2CH_2CH_2)_pOH$) and betaines (C_{11} - $C_{24}N^+(CH_3)_2CH_2COO^-$). In the formulae in brackets, e and p are independently from 0 to 20 and $e+p>0$, Z is M or R, M is H or any counterion such as those known in the art, including Na, K, Li, NH_4 , amine, X is a polyhydroxyhydrocarbyl having a linear hydrocarbyl chain with at least 3 hydroxyls directly connected to the chain, or an alkoxyated derivative thereof, R, R' and R'' are C_1 - C_5 alkyl groups, possibly functionalized with hydroxyl groups, R and R' are preferably C_1 - C_3 , most preferably methyl, R'' is preferably 2-hydroxyethyl or 2 hydroxypropyl, G is a saccharide, preferably glucose, and g is of from 1.5 to 8. All these surfactants are well known in the art. A more complete disclosure of glucose amides can be found for instance in WO 92-06154 and a more complete disclosure of alkyl polysaccharides can be found for instance in US 4,536,319. The compositions according to the present invention may comprise any of the above surfactants alone, or any combination thereof, depending on the end use envisioned. In the compositions herein, preferred long chain surfactants are selected from long chain alkyl sulfonates and long chain alkyl ethoxyates, and mixtures thereof.

The compositions according to the present invention further comprise at least one short chain surfactant, or mixtures thereof. The definition of short chain surfactants is as above for long chain surfactants, except that said alkyl group as said hydrophobic portion is a C_6 to C_{10} alkyl group, and where said short chain surfactant is an alkyl ether carboxylate, said alkyl chain in said hydrophobic portion is a C_6 - C_8 alkyl chain. Accordingly, suitable short chain surfactants for use herein include those listed herein above in the description of long chain surfactants, but with shorter alkyl chain.

Preferred short chain nonionic surfactants for use herein are alkyl alkoxyates according to the formula C_6 - $C_{10}(OCH_2CH_2)_e(OCH_2CH_2CH_2)_pOH$, where e and p representing respectively the degree of ethoxylation and propoxylation are independently of from 0 to 20, and that $e+p>0$. Most preferred short chain nonionic surfactants for use herein are those where e and p are such that $e+p$ is from 3 to 10, particularly those where p is 0 and e is from 3 to 8. Also, most preferred short chain nonionic surfactants for use herein are those where said short chain is a hydrocarbon chain comprising from 7 to 10 carbon atoms.

Said preferred short chain nonionic surfactants for use herein can be manufactured by the processes well known to the man skilled in the art, such as condensation of the corresponding alcohol and alkylene oxide, but such short chain surfactants are more conveniently commercially available for instance from Sidobre under the trade name Mergital®C4 (C8EO4), from Kolb under the trade names Imbentin® AG/810/050 and AG/810/080 (respectively C8-10EO5 and C8-10EO8).

Preferred short chain anionic surfactants for use herein are C_6 - C_{10} alkyl sulfates (C_6 - $C_{10}SO_4$) and alkyl sulfonates (C_6 - $C_{10}SO_3$). Most preferred are the C_6 - C_8 alkyl sulfates and sulfonates. Such short chain anionic surfactants can be made by well known sulphonation or sulphonation processes followed by neutralization, but said anionic short chain surfactants are more conveniently commercially available, for instance from Rhone Poulenc under the trade name Rhodapon® OLS, or from Witco under the trade name Witconate®.

The compositions according to the present invention may comprise from 0.1 % to 50 % by weight of the total composition, preferably from 1% to 40%, most preferably from 1.5% to 30% of said short chain surfactants. The short chain surfactants herein act not only as active cleaning ingredients, but also as stabilizers. If short chain anionic surfactants are used, it is preferred to observe a minimum weight ratio of short chain anionic surfactant to longer chain surfactant of 1:10. If short chain nonionic surfactants are used, it is preferred to observe a minimum weight ratio of short chain nonionic to longer chain surfactant of 1:5.

Depending on the end use envisioned, the compositions herein may further comprise a variety of other optional ingredients including builders, alkanolamines, pH adjusting agents, perfumes in amounts of less than 15% by weight of the total composition, dyes, bleaches, enzymes and the like.

In some instances, it may be appropriate to include a suds suppressing system in the compositions herein. Said suds suppressing system can advantageously be a mixture of 2-alkyl alkanols as described for instance in DE 40 21 265, or mixtures thereof, with a C_8 to C_{22} fatty acid, or mixtures thereof. Such a system is particularly advantageous as both ingredients appear to act in synergy. Thus even a very low amount of said system is enough to control suds efficiently. Accordingly, said system is present in amounts of from 0.1% to 5% by weight of the total composition, preferably 0.5% to 3%.

The compositions herein do not require the presence of a stabilizing compound. By stabilizing compound, it is meant herein a compound whose sole function is to enhance the physical stability of the composition. Such compounds are typically xylene or toluene sulphonate salts, and glycol ethers, including ethylene glycol monobutyl ether, diethylene glycol monobutyl ether, dipropylene glycol monobutyl ether, dipropylene glycol methyl ether, propylene glycol methyl ether, tripropylene glycol methyl ether, propylene glycol monobutyl ether and other various solvents such as ethanol and butanol. Accordingly, the compositions of the present invention are preferably substantially free of such stabilizing compounds.

The present invention further encompasses a method of cleaning a hard surface which comprises the steps of diluting a composition according to the preceding claims in water, then applying it to said hard surface. Depending on the exact formulation, the compositions herein may be used both neat and diluted from 10 to 500 times.

Examples

The present invention will be further illustrated by the following examples.

	I	II	III	IV
C _{12/15} alkyl ethoxylate EO ₃	3	3	-	-
C _{13/15} alkyl ethoxylate EO ₇	-	-	20	-
C _{13/15} alkyl ethoxylate EO ₃₀	5	5	-	-
C _{12/14} alkyl sulfonate	-	-	-	30
C ₈ alkyl sulfate	-	10	10	10
C ₈ alkyl ethoxylate EO ₆	-	9	-	-
Citric acid	3	3	1	-
Monoethanolamine	3	3	1	-
Triethanolamine	-	-	3	-
Water & minors	-----up to 100%-----			

All compositions were evaluated for their physical stability at 4 °C, at room temperature (20 °C), and at 50 °C. Composition I, which is not within the invention, was a gel at 4 °C, and an emulsion at room temperature and at 50 °C. All other compositions, within the invention, were clear transparent liquids in the same conditions.

Other compositions were made by mixing the listed ingredients in the listed proportions.

	V	VI	VII	VIII
C _{13/15} alkyl ethoxylate EO ₃	4	3	5	1
C _{13/15} alkyl ethoxylate EO ₇	-	-	-	5
C _{7/9} alkyl sulfate	7.5	-	-	-
C ₈ alkyl sulfate	-	8	-	10
C ₈ alkyl sulfonate	-	-	10	-
C _{7/9} alkyl ethoxylate EO ₆	-	-	10	5
C _{8/10} alkyl ethoxylate EO ₅	10	9	-	9
C _{13/15} alkyl ethoxylate EO ₃₀	6	4	3	5
Na Paraffin Sulfonate	-	5	-	-
Citric acid	3	-	-	3
2-hexyl decanol	1	0.6	1	-
Palm Kernel Fatty Acid	0.4	0.4	1	-
Sodium Carbonate	-	3	-	-
Water & minors	-----up to 100%-----			

Claims

- 5 1. A stable and clear concentrated cleaning composition comprising from 10 % to 80 % by weight of the total composition of water, less than 15 % perfume and at least one long chain surfactant comprising a C₁₁-C₂₄ alkyl chain as its hydrophobic portion, or mixtures thereof, **characterized in** that said composition further comprises at least one co-surfactant consisting of a short chain surfactant comprising a C₆-C₁₀ alkyl chain as its hydrophobic portion, or mixtures thereof, except where said short chain surfactant is an alkyl ether carboxylate, said alkyl chain as said hydrophobic portion is a C₆-C₈ alkyl chain.
- 10 2. A composition according to claim 1 wherein said short chain surfactant or mixtures thereof represents from 0.1 % to 50 % by weight of the total composition, preferably from 1 % to 40%, most preferably from 1.5% to 30%.
- 15 3. A composition according to the preceding claims wherein said short chain surfactant, or mixtures thereof is :
 - a nonionic surfactant according to the formula C₆-C₁₀(OCH₂CH₂)_e(OCH₂CH₂CH₂)_pOH, where e and p representing respectively the degree of ethoxylation and propoxylation are independently of from 0 to 20, and that e + p > 0; or
 - 20 - an anionic surfactant according to the formula C₆-C₁₀SO₄ or C₆-C₁₀SO₃; or
 - Mixtures thereof.
- 25 4. A composition according to claim 3 wherein e and p are such that e + p is from 3 to 10, preferably p is 0 and e is from 3 to 8.
5. A composition according to claim 3 wherein said anionic surfactant is C₆-C₁₀SO₄ or C₆-C₁₀SO₃.
- 30 6. A composition according to the preceding claims which comprises from 30% to 70% by weight of the total composition of water.
7. A composition according to any of the preceding claims wherein said long chain surfactants are selected from long chain alkyl sulfonates and long chain alkyl ethoxylates, and mixtures thereof.
- 35 8. A composition according to any of the preceding claims which is substantially free of stabilizing compounds.
9. A composition according to any of the preceding claims which comprises from 0.1% to 5% by weight of the total composition, preferably 0.5% to 3% of a suds suppressing system, said suds suppressing system comprising a 2-alkyl alkanol, or mixtures thereof and a C₈-C₂₂ fatty acid, or mixtures thereof.
- 40 10. A method of cleaning a hard surface which comprises the steps of diluting a composition according to the preceding claims in water, then applying it to said hard surface.



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EUROPEAN SEARCH REPORT

Application Number
EP 93 87 0125

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.5)
X	WO-A-92 02604 (HENKEL) * claims 1-3,7,8 * ---	1-6	C11D1/00 C11D1/825 C11D1/83
X	DE-A-39 43 070 (HENKEL) * page 2, line 66 - page 4, line 4; claims 1-6; example 4 * ---	1-3,5,10	
X	FR-A-2 345 513 (RHONE-POULENC-INDUSTRIES) * claims 1-9,11 * ---	1-4,6,7	
X	FR-A-2 247 531 (THE PROCTER & GAMBLE CO.) * page 9, line 1 - page 14, line 38; claim 1; example 5 * ---	1-4,6,7	
X	FR-A-2 550 959 (DIVERSEY CORP.) * claims; example 8 * ---	1-4	
X	GB-A-2 011 944 (UNILEVER) * the whole document * ---	1-4,6,7	
D,X	EP-A-0 316 726 (COLGATE - PALMOLIVE CO.) * page 5, line 40 - page 6, line 50 * * page 9, line 22 - line 26; claims 1,3,4; examples 1,3,4,10 * ---	1-4,6,7	TECHNICAL FIELDS SEARCHED (Int.Cl.5) C11D
X	EP-A-0 125 854 (THE PROCTER & GAMBLE CO.) * page 10, line 7 - line 9; claims; examples 1,3 * ---	1-4,6	
X	GB-A-1 462 134 (THE PROCTER & GAMBLE CO.) * claims 1-17; example IV * ---	1-4,6,7	
X	FR-A-2 207 981 (BASF) * page 9, line 18 - line 21; claim 1; examples 6,8,9,13-16 * ---	1-4,6,7	
X	EP-A-0 244 006 (UNILEVER) * claims 1,2; example 1 * ---	1-4,6,7	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14 June 1994	Examiner Serbetsoglou, A
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 L : document cited for other reasons & : member of the same patent family, corresponding document			



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EUROPEAN SEARCH REPORT

Application Number
EP 93 87 0125

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.5)
X	EP-A-0 496 188 (THE PROCTER & GAMBLE CO.) * page 3, line 36 - page 4, line 45; claims 1,5; examples * ---	1-4,7	
E	WO-A-93 15172 (HENKEL) * claims 1-11; examples * -----	1-3,5-7	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14 June 1994	Examiner Serbetsoglou, A
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 L : document cited for other reasons & : member of the same patent family, corresponding document			