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71 Applicant: **UNILEVER NV**
Burgemeester s'Jacobplein 1 P.O. Box 760
NL-3000 DK Rotterdam(NL)
Applicant: **UNILEVER PLC**
Unilever House Blackfriars P.O. Box 68
London EC4P 4BQ(GB)

72 Inventor: **Donker, Cornelis Bernard**
Abeelstraat 10
NL-3329 AD Dordrecht(NL)
Inventor: **van de Pas, Johannes Cornelis**
Thomas à Kempisstraat 136
NL-3132 CK Vlaardingen(NL)

74 Representative: **Van Gent, Jan Paulus et al**
Unilever N.V. Patent Division P.O. Box 137
NL-3130 AC Vlaardingen(NL)

54 **Liquid cleaning and softening compositions.**

57 Aqueous liquid detergent composition for simultaneous cleaning and softening of fabrics, comprising a binary active suspending system, and a long-chain fatty amine as softening agent, the pH of the composition being above the isoelectric point of the amine component. A stable suspending composition is achieved, delivering good cleaning and softening performance.

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LIQUID CLEANING AND SOFTENING COMPOSITIONS

The present invention relates to aqueous liquid detergent compositions of the suspending type, i.e. compositions in which particles of a different density can be stably suspended. In particular, the invention relates to aqueous liquid detergent compositions of the suspending type which exhibit good cleaning performance and simultaneously impart a softening quality to the fabrics being laundered.

Simultaneous cleaning and softening is desirable, as it provides the user with increased convenience in the laundering operation, rendering redundant the after-wash softening/rinse cycle and the separate dosing of special-purpose softening compositions.

A number of attempts have been made to formulate fabric-washing detergent compositions which exhibit the cleaning performance as expected by the modern user and simultaneously provide sufficient softening efficacy. In the field of solid detergent compositions, proposals have been made to incorporate cationic fabric softeners in anionic detergent-based compositions by inclusion of means which overcome the natural incompatibility of anionic and cationic detergent actives due to complexation of these compounds resulting in a consequent decrease in detergency and softening efficacy.

To our knowledge, no proposals have been made to formulate aqueous liquid compositions based on structured active systems including a combination of anionic and cationic detergent actives.

It has now been found that long-chain fatty amines, which are suitable to impart through-the-wash softening, can be stably incorporated in aqueous liquid detergent compositions of the suspending type, provided the compositions are formulated to have a pH value above the isoelectric point of the fatty amine.

Accordingly, the present invention provides an aqueous suspending liquid detergent composition for the cleaning and softening of fabrics which comprises:

(a) a nonionic detergent-active material and/or an anionic derivative of a polyalkoxylated nonionic detergent-active material; and

(b) an anionic detergent-active material other than component (a),

characterized in that it further comprises:

(c) an effective amount of a long-chain fatty amine, the pH of said composition being above the isoelectric point of said amine.

In general the composition also comprises one or more electrolytes as part of the active system, thereby providing the structure necessary for the suspending properties of the composition.

The invention will now be discussed in more detail.

The nonionic detergent-active material

Suitable nonionic detergent-actives for use in the present invention may be found in the following classes: fatty acid alkylolamides, alkylene oxide condensates of alkylphenols or primary and secondary aliphatic alcohols, alkylamines, alkyl mercaptans and amine oxides.

The ethylene oxide condensates and mixtures of ethylene oxide condensates with fatty acid alkylolamides are preferred. Particularly suitable have been found ethylene oxides having a hydrophilic-lipophilic balance of between 11 and 15, such as C₁₃-C₁₅ alcohols condensed with 6-8 ethylene oxides.

Also anionic derivatives of, in particular, polyalkoxylated nonionic detergent materials which have retained to a large extent a nonionic character, can be used instead of or in combination with nonionic detergent-actives. Suitable examples are the sulphated, phosphated or carboxylated polyalkoxylated nonionic detergent-actives, such as the alkyl and alkylaryl polyethoxy ether sulphates. Suitable alkyl polyethoxy ether sulphates have about 10 to about 18 carbon atoms in the alkyl chain and have an average of 1 to 12, preferably 1 to 6 ethylene oxide units.

The anionic detergent-active material

A wide range of anionic surfactants can be used in the compositions of the present invention.

Suitable anionic non-soap surfactants are water-soluble salts of alkyl benzene sulphonates, alkyl sulphates, paraffin sulphonates, alpha-olefin sulphonates, alpha-sulphocarboxylates and their esters, alkyl glyceryl ether sulphonates, fatty acid monoglyceride sulphonates and sulphonates, 2-acyloxy-alkane-1-sulphonates, and beta-alkoxy alkane sulphonates. Soaps are also suitable anionic surfactants.

Especially preferred alkyl benzene sulphonates have about 9 to about 15 carbon atoms in a linear or branched alkyl chain, more especially about 11 to about 13 carbon atoms. Suitable alkyl sulphates have about 10 to about 22 carbon atoms in the alkyl chain, more especially from about 12 to about 18 carbon atoms.

Suitable paraffin sulphonates are essentially linear and contain from about 8 to about 24 carbon atoms, more especially from about 14 to about 18 carbon atoms.

Suitable alpha-olefin sulphonates have about 10 to about 24 carbon atoms, more especially about 14 to about 16 carbon atoms; alpha-olefin sulphonates can be made by reaction with sulphur trioxide, followed by neutralization under conditions such that any sultones present are hydrolyzed to the corresponding hydroxy alkane sulphonates. Suitable alpha-sulphocarboxylates contain from about 6 to about 20 carbon atoms; included herein are not only the salts of alpha-sulphonated fatty acids, but also their esters made from alcohols containing about 1 to about 14 carbon atoms.

Suitable alkyl glyceryl ether sulphates are ethers of alcohols having about 10 to about 18 carbon atoms, more especially those derived from coconut oil and tallow. Suitable alkyl phenol polyethoxy ether sulphates have about 8 to about 12 carbon atoms in the alkyl chain and an average of about 1 to about 6 ethylene oxide units per molecule. Suitable 2-acyloxy-alkane-1-sulphonates contain from about 2 to about 9 carbon atoms in the acyl group and about 9 to about 23 carbon atoms in the alkane moiety. Suitable beta-alkyloxy alkane sulphonates contain about 1 to about 3 carbon atoms in the alkyl group and about 8 to about 20 carbon atoms in the alkane moiety.

The alkyl chains of the foregoing non-soap anionic surfactants can be derived from natural sources such as coconut oil or tallow, or can be made synthetically, as for example by using the Ziegler or Oxo processes. Water-solubility can be achieved by using alkali metal, ammonium, or alkanolammonium cations; sodium is preferred. Mixtures of anionic surfactants are contemplated by this invention; a satisfactory mixture contains alkyl benzene sulphonate having 11-13 carbon atoms in the alkyl group and alkyl sulphate having 12 to 18 carbon atoms in the alkyl group.

Suitable soaps contain about 8 to about 18 carbon atoms, more especially about 12 to about 18 carbon atoms. Soaps can be made by direct saponification of natural fats and oils such as coconut oil, tallow and palm oil, or by neutralization of

free fatty acids obtained from either natural or synthetic sources. The soap cation can be alkali metal, ammonium or alkanolammonium; sodium is preferred.

5 The amount of the active detergent material may vary from 1 to 60%, preferably from 2-40% and especially preferably from 5-25%; when mixtures of e.g. anionics and nonionics are used, the relative weight ratio varies from 10:1 to 1:10, preferably from 6:1 to 1:6. When a soap is also incorporated, the amount thereof is from 1-40% by weight.

10 A particularly preferred active detergent mixture is that of a water-soluble anionic sulphonate or sulphate detergent and a nonionic detergent in a weight ratio of from about 6:1 to 1:1, with or without a soap in a ratio of up to 2:1 with respect to the nonionic detergent constituent.

20 The electrolytes

In order to establish the suspending properties of the compositions according to the present invention, the inclusion of one or more electrolytes, in particular of the salting-out type, is often essential.

25 It is well known that the extent to which a nonionic detergent-active or derivative thereof is salted out by a salting-out electrolyte, resulting in a certain lowering of the cloud point, is dependent upon the nature and the amount of salting-out electrolyte used. In general, the composition may contain from 1 to 60% by weight, and preferably from 3 to 50% by weight, and particularly preferably from 10 to 35% by weight of the salting-out electrolytes.

30 Typical examples of such salting-out electrolytes are water-soluble builder salts, such as the alkali metal ortho-and pyrophosphates, the alkali metal tripolyphosphates, such as sodium tripolyphosphate, the alkali metal silicates, alkali metal borates, alkali metal carbonates, alkali metal sulphates, alkali metal citrates; alkali metal salts of nitrilotriacetate; alkali metal salts of carboxymethyloxy succinate. Instead of the alkali metal salts, the ammonium and ethanol-substituted ammonium salts can be used.

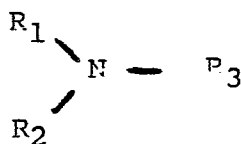
45 Depending upon type and level of salting-out electrolyte used, it may be advantageous to include also a certain level of a non-salting-out electrolyte. This can be determined by routine experimentation, using the general indications below as to level and type of auxiliary electrolytes.

50 Typical examples of suitable auxiliary electrolytes are alkali metal iodides, alkali metal (per)-chlorates, alkali metal rhodanides, and alkali metal nitrates, and alkali metal bromides and alkali metal

chlorides. The corresponding ammonium and ethanol-substituted ammonium salts can also be used. The auxiliary electrolyte is generally used in the composition in an amount of 0.5 to 35% by weight, preferably 1 to 30% by weight, and particularly preferably 2 to 25% by weight.

The long-chain fatty amine

Long-chain fatty amines suitable for the purpose of the invention are substantially water-insoluble compounds that have the general formula:



wherein: R_1 is a C_{10} - C_{26} alkyl or alkenyl group,

R_2 is H or a C_1 - C_{26} alkyl or alkenyl group, and

R_3 is H or a C_1 - C_7 alkyl, alkenyl or alkylaryl group.

Preferably R_3 is methyl or ethyl.

Suitable amines include:

monotallowyl amine

ditallowyl amine

dilauryl methylamine

dimyristyl methylamine

dicetyl methylamine

distearyl methylamine.

Preferred are monotallowyl amine, ditallowyl amine and ditallowyl methylamine. These are commercially available as Armeen HT, 2HT and M2HT from Akzo N.V..

Mixtures of any of these amines may be used.

The compositions should contain from 0.5% to 15% by weight of the amine, preferably from 1% to 10% by weight and most preferably from 2% to 5% by weight.

The pH

It has been found that the pH of the composition is essential to obtain physically stable formulations, and should be above the isoelectric point of the amine used. Preferably, the compositional pH is at least one pH unit above said isoelectric point.

For enzymatic formulations it is of advantage to select amines in the lower range of isoelectric points. Preferably amines having an isoelectric point in the range of 7 to 8.5 are used in combination with enzymes.

The isoelectric point of any given amine can be determined by measuring the electrophoretic mobility of an aqueous dispersion of the amine under standard conditions of concentration and temperature at a series of pHs, with plotting of the mobilities against pH to determine the pH of zero mobility.

The isoelectric points of a series of amines are given in the following table, in which T and Co represent the mixed alkyl radical derived from hydrogenated tallow acid and coconut oil acid, respectively.

T_2NH 7.4

T_3N 8.2

T_2NCH_3 8.8

Co_2NCH_3 9.1

$TN(CH_3)_2$ 10.0

TNH_2 10.9

Minor ingredients

The liquid detergent composition of the invention may further contain any of the adjuncts normally used in fabric-washing detergent compositions, e.g. sequestering agents such as ethylene diamine tetraacetate; alkali silicates for adjusting the pH; soil-suspending and anti-redeposition agents such as sodium carboxymethylcellulose, polyvinylpyrrolidone, etc.; fluorescent agents; perfumes, germicides and colourants.

Further, the addition of lather depressors such as silicones; and enzymes, particularly proteolytic and amylolytic enzymes; and peroxygen or chlorine bleaches, such as sodium perborate and potassium dichlorocyanurate, including bleach activators, such as N,N,N',N'-tetraacetylenediamine, may be necessary to formulate a complete heavy

duty detergent composition suitable for use in washing machine operations. These ingredients can be employed in the liquid detergent compositions of the invention without the danger of undue decomposition during storage if a proper protective coating is applied.

Preferably the composition of the invention has a viscosity of up to 1.2 Pas, and most preferably from 0.4 to 1.0 Pas as measured at 20°C and at a shear rate of 21 seconds⁻¹.

5 The invention will now be further illustrated by way of examples, percentages in which are by weight of the total composition unless otherwise indicated.

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Specifications and properties of ingredients:

Armeen HT = primary hardened tallow amine $R-NH_2$
 melting range : 47-55°C
 isoelectric pH : 10.9 M = 256
 R : C_{16} = 31%
 C_{18} = 59%
 supplier : AKZO Chemie

Armeen 2 HT = secondary dihardened tallow amine R_2NH
 melting range : 60-64°C
 isoelectric pH : 7.4 M = 496
 R : C_{16} = 31%
 C_{18} = 59%
 supplier : AKZO Chemie

Armeen M2HT = tertiary dihardened tallow dimethyl
 amine R_2NCH_3
 melting point : 31°C
 isoelectric pH : 8.8 M = 510
 R : C_{16} = 31%
 C_{18} = 59%
 supplier : AKZO Chemie

LAS-acid = linear alkyl benzene sulphonic acid:
 99% LAS; 0.05% sulphuric acid;
 1.8% non-detergent matter; ex Huls

LFS-acid = lauryl polyethoxy sulphate (3 EO); ex Shell

Synperonic A7 = ethoxylated nonionic with C_{13-15}
 and 7 ethylene oxide chains; ex ICI

STP = $Na_5P_3O_{10}$; Thermphos MW; ex Knapsack

Borax = $Na_2B_4O_7 \cdot 10$ aq; pro analysis; ex Merck

Glycerol = $C_3H_8O_3$ (86.5%), water (13.5%)

TABLE 1

Example N°	1	2	3	4	5	6	7	8
<u>Ingredients</u>								
	(%)							
NaLAS	10.5	14.5	7.0	6.5	6.5	5.0	10.0	8.0
NaLFS	4.0		5.5		2.0			2.3
Synperonic A7	6.0	6.0	0.5	2.0	1.5	1.0	4.0	1.0
Na ₂ CO ₃			3.5					6.0
Na ₂ SO ₄						10.0	8.9	
STP				20.0	20.0			11.4
Na citrate	6.5	3.0	20.0					
Triethanolamine	4.0	2.0						
Glycerol	7.0			7.0				
Borax	3.5			3.5	3.0			
Sodium formate					7.0			
Water	----- balance -----							

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TABLE 2

<u>Example N°</u>	<u>pH</u>	<u>+ amine</u>	<u>Stability*</u>	<u>Remarks</u>
1	10.0	-	+	
	10.0	4% M2HT	+	
	8.0	-	+	
	8.0	4% M2HT	-	
2	11.5	-	+	
	11.5	5% HT	+	
	8.0	-	+	
	8.0	5% HT	-	
3	11.0	-	+	
	11.0	5% M2HT	+	
	8.0	-	+	
	8.0	5% M2HT	+/-	very thick: paste
4	9.5	-	+	
	9.5	5% 2HT	+	
	7.5	-	+	
	7.5	5% 2HT	-	
5	11.0	-	+	
	11.0	2% 2HT/2% M2HT	+	
	7.5	-	+	
	7.5	2% 2HT/2% M2HT	-	
6	9.4	4% 2HT	+	
	5.5	4% 2HT	-	
7	9.4	6% 2HT	+	
	5.5	5% 2HT	-	
8	10.5	-	+	
	10.5	3% M2HT	+	
	10.5	6% M2HT	+	
	10.5	6.6% 2HT	+	

* + = physically stable
 - = physically unstable

Claims

1. Aqueous suspending liquid detergent composition for the cleaning and softening of fabrics, comprising:

(a) a nonionic detergent-active material and/or an anionic derivative of a polyalkoxylated nonionic detergent-active material; and

(b) an anionic detergent-active material other than component (a),

characterized in that the composition further comprises:

(c) an effective amount of a long-chain fatty

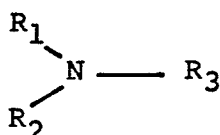
amine, the pH of said composition being above the isoelectric point of the amine.

2. Composition according to claim 1, which further comprises as component (d) from 1-60% by weight of electrolytes of the salting-out type.

3. Composition according to claim 2, which comprises from 10-35% by weight of component (d).

4. Composition according to claim 2 or 3 which further comprises as component (e) from 0.5-35% by weight of electrolytes of the non-salting-out type.

5. Composition according to any one of the preceding claims, wherein component (c) has the general formula:



wherein R_1 is a C_{10} - C_{26} alkyl or alkenyl group,

R_2 is H or a C_1 - C_{26} alkyl or alkenyl group, and

R_3 is H or a C_1 - C_7 alkyl, alkenyl or alkylaryl group.

6. A composition according to claim 5, wherein R_2 is methyl or ethyl.

7. Composition according to claim 5, wherein the amine is a monotallowyl amine, a ditallowyl amine or a ditallowyl methyl amine.

8. Composition according to any one of the preceding claims, which comprises from 0.5-15% by weight of component (c).

9. Composition according to any one of the preceding claims, which has a pH at least one pH unit above the isoelectric point of the amine.

10. Composition according to any one of the preceding claims, which comprises enzymes, component (c) being selected from the group of amines having an isoelectric point in the pH range of from 7 to 8.5.



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	ER-A-2 328 792 (UNILEVER) * Whole document *	1-10	C 11 D 1/40

Y	ER-A-2 329 746 (PROCTER & GAMBLE) * Whole document *	1-10	

			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			C 11 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29-08-1986	Examiner GOLLER P.
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	