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(54) **Thickened hypochlorite detergent compositions with improved cleaning performance.**

(57) The present invention is a thickened aqueous detergent composition. Said composition contains an alkali metal hypochlorite, an alkali metal salt of a fatty acid, a long chain amine oxide and a short chain surfactant to boost cleaning and a tertiary alcohol to restore viscosity.

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Technical Field

The present invention relates to thickened aqueous bleaching and cleaning compositions based on hypochlorite.

Background of the Invention

Liquid compositions comprising hypochlorite bleach and the combination of long chain amine oxides and fatty acids as a thickening agent therein are well-known in the art.

It is desirable that such compositions should have good cleaning properties. However, long chain amine oxides do not provide the optimum cleaning effect. Therefore, it is a first object of the present invention to provide hypochlorite based bleaching compositions with improved cleaning.

In response to this object, it has now been found that the incorporation of short chain surfactants is beneficial and meets this object thereby enhancing the cleaning performance. However, it has been observed that the incorporation of short chain surfactants in such compositions results in the reduction of the viscosity of said compositions. Yet, it is considered highly desirable that said compositions should be viscous so that the compositions adhere longer to vertical surfaces and surfaces which are inclined to the horizontal.

Therefore it is a further object of the present invention to provide a liquid composition which comprises a hypochlorite bleach and short chain surfactants, which retains viscosity.

In response to this object, the present invention proposes to formulate a liquid composition which comprises long chain amine oxides and fatty acids, further comprising short chain surfactants to boost cleaning and a long chain tertiary alcohol to restore viscosity.

A further advantage of the present invention is that the stability of the bleach is not affected by the tertiary alcohol which resists the oxidation of the hypochlorite.

Thickened bleaching compositions comprising long chain amine oxides and fully saturated fatty acids are well-known in the art.

US 4 282 109 discloses a thickened bleach composition comprising hypochlorite and linear and branched long chain C_{10}-C_{18} amine oxides as thickeners. There is no mention of short chain C_6-C_8 amine oxides or tertiary alcohols.

EP 274 885 discloses thickened bleaching compositions comprising alkali metal hypochlorite and straight chain C_{14} amine oxide with a mixture of branched and straight chain C_{15} amine oxide and optionally fatty acids. There is no mention of short chain amine oxide or tertiary alcohols.

EP 233 666 discloses a process for the manufacture of a thickened bleaching compositions comprising hypochlorite, a hypochlorite-soluble surfactant and an alkali metal salt of a fatty acid. The detergent actives include amine oxides, preferably lauryldimethylamine. There is no mention of tertiary alcohols.

DE 28 37 880 covers bleaching compositions comprising alkali metal hypochlorite and mixtures of branched and linear amine oxides of varying chain length, (C_5-C_{17}) for increased viscosity. The compositions optionally comprise fatty acids, but there is no disclosure of tertiary alcohols.

EP 30 401 covers thickened bleaching compositions comprising hypochlorite and a certain number of product characteristics including pH and viscosity. Mixtures of C_8-C_{18} amine oxides and fatty acids are preferred as thickening agents. There is no disclosure of tertiary alcohols.

Summary of the Invention

The compositions according to the present invention are liquid bleaching compositions having a viscosity of from 20cps to 200cps at a 50 r.p.m. shear rate and a pH greater than 12, comprising an alkali metal hypochlorite, a hypochlorite compatible long chain amine oxide and an alkali-metal salt of a fatty acid. Said composition further comprises a a hypochlorite compatible short chain surfactant for improved cleaning and a tertiary alcohol to restore viscosity.

The long chain amine oxides suitable include amine oxides according to the formula $R_1R_2R_3NO$, wherein R_1 is a C_{10}-C_{18} alkyl group and R_2 and R_3 are independently C_1 to C_3 alkyl groups and wherein the ratio of said long chain amine oxide to short chain surfactants is from 4:1 to 1.5:1. The tertiary alcohol is selected from $R_7R_8R_9COH$, wherein R_7 is a C_4-C_9 alkyl group, R_8 and R_9 are C_1-C_3 alkyl groups and total number of carbon atoms is from 8 to 12.

All ratios, percentages and parts given herein are by % weight of the total composition unless otherwise specified.

Detailed Description of the Invention

The liquid detergent composition according to the present invention comprises an alkali metal hypochlorite, an alkali metal salt of a fatty acid and a hypochlorite compatible long chain amine oxide. The cleaning ability of said composition has been improved by the addition of a a hypochlorite compatible short chain surfactant and the viscosity is restored by the addition of a C_8-C_{12} tertiary alcohol.

Thus an essential ingredient for use herein is a hypochlorite bleaching agent, preferably an alkali metal hypochlorite. Although alkali metal hypochlorites are preferred other hypochlorite compounds may also be used herein and can be selected from calcium and magnesium hypochlorite. Preferred alkali metal hypochlorite for use herein is sodium hypochlorite. Compositions according to the present invention comprise said hypochlorite bleaching agents such that the content of active chlorine in the compositions is from 0.4% to 4%, preferably from 1% to 2%.

Another essential component according to the present invention is the combination of a hypochlorite compatible long chain amine oxide and a fatty acid. Said combination is used as a thickening aid.

Suitable long chain amine oxides for use herein may be chosen from amine oxides according to the formula $R_1R_2R_3NO$, wherein R_1 is a C_{10}-C_{18} alkyl group, preferably C_{10} to C_{14} and R_2 and R_3 are independently C_1 to C_3 alkyl groups and mixtures thereof.

Preferred long chain amine oxides for use herein are be Genaminox^R LA, (available from Hoechst) and C_{12}-C_{14} Aromox^R DMMCO-W (AKZO). According to the present invention, said compositions may comprise from 0.6% to 3% of said long chain amine oxides.

Suitable fatty acids for use herein are alkali metal salt of a C_8-C_{18} fatty acid. Suitable fatty acids can be any C_8-C_{18} fatty acids, preferably fully saturated fatty acids preferably a sodium, potassium or lithium salt, more preferably the sodium salt. Fatty acids for use herein may be selected from caprylic acid, capric acid, lauric acid, myristic acid, palmitic acid, stearic acid and mixtures of fatty acids suitably hardened, derived from natural sources such as tallow, coconut oil, ground oil and babassu oil. Fatty acids according to the present invention may comprise from 0.2% to 2% by weight of the total composition.

It has been found that the cleaning performance of the composition according to the present invention can be boosted by the incorporation of hypochlorite compatible short chain surfactants.

The compositions according to the present invention comprise a hypochlorite compatible short chain surfactant, or mixtures thereof. All surfactants have in common that they comprise a hydrophobic portion and a hydrophilic portion. By short chain surfactant, it is meant herein surfactants which comprise a C_6-C_{10} alkyl chain as their hydrophobic portion. Such short chain surfactants are accordingly those conventionally used in this field, but with a shorter alkyl chain, and can be of any type. Accordingly, suitable short chain surfactants for use herein include C_6-C_{10} alkyl sulfates (C_6-$C_{10}SO_4$), alkyl ether sulfates (C_6-C_{10}-$(OCH_2CH_2)eSO_4$), alkyl sulphonates (C_6-$C_{10}SO_3$), alkyl succinates (C_6-$C_{10}OOCCH_2CH_2COOZ$), alkyl carboxylates (C_6-$C_{10}COOM$), alkyl ether carboxylates (C_6-$C_{10}(OCH_2CH_2)_eCOOM$), alkyl sarcosinates (C_6-$C_{10}CON(CH_3)R$), alkyl sulpho succinates (C_6-$C_{10}OOCCH(SO_3M)CH_2COOZ$), amine oxides ($C_6$-$C_{10}RR'NO$) and betaines ($C_6$-$C_{10}N^+(CH_3)_2CH_2COO$-). In the formulae in brackets, e and p are independently from 0 to 20, 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 alkoxylated derivative thereof, 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. 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.

Preferred nonionic surfactants are amine oxides. Suitable short chain amine oxides for use herein may be selected from amine oxides according to the formulae $R_2R_3R_4NO$, wherein R_4 is a C_6-C_8 alkyl group, and R_2 and R_3 are independently C_1 to C_3 alkyl groups, and mixtures thereof.

Preferred short chain anionic surfactants for use herein are C_6-C_{10} alkyl sulfates (C_6-$C_{10}SO4$) and alkyl sulphonates (C_6-$C_{10}SO_3$). Most preferred are the C6-C8 alkyl sulfates and sulphonates. Such short chain anionic surfactants can be made by well known sulphation 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@.

Preferred short chain surfactants for use herein are dimethyloctylamine oxide, dimethylhexylamine oxide and octyl sulphate. Suitable short chain surfactants for use herein are preferably hypochlorite compatible. According to the present invention, the compositions comprise from 0.5% to 2% preferably from 1% to 1.5% of short chain surfactants.

The compositions according to the present invention comprise said long chain amine oxides and said short chain surfactants in the ratio of from 4:1 to 1:1, preferably 2:1 to 1:1 more preferably 1.5:1 to 1:1.

The incorporation of short chain surfactants in the compositions according to the present invention results in the decrease of said compositions viscosity. It has been found that the viscosity of the compositions can be restored by the addition of a tertiary alcohol.

Suitable tertiary alcohols for use herein can be selected from alcohols according to the formula, $R_7R_8R_9COH$, wherein R_7 is C_4-C_9, preferably C_6-C_8, R_8 and R_9 are C_1-C_3 preferably methyl groups. The present invention comprises a viscosity restoring amount of tertiary alcohols. The compositions may comprise from 0.05% to 1%, preferably from 0.05% to 0.8%, more preferably from 0.05% to 0.5% of said tertiary alcohol. Suitable tertiary alcohols for use herein are those having from 8 to 12 carbon atoms, preferably dimethylhexylcarbinol and dimethyloctyl carbinol.

The compositions according to the present invention comprise said tertiary alcohols and said short chain surfactants in the ratio of from 0.04 to 1, preferably from 0.2 to 0.6.

The tertiary alcohols of the present invention thicken the compositions to a viscosity of from 20cps to 200cps, preferably from 20cps to 150cps measured with a Brookfield viscosimeter RVT at a temperature of 25 °C, using a number 3 spindle at 50 r.p.m.

Another essential requirement of the compositions according to the present invention is that the pH is greater than 12, preferably greater than 12.5, more preferably greater than 12.8. This is achieved by the addition of from 0.5% to 2% of a caustic alkali. Suitable caustic alkalis for use herein include sodium and potassium hydroxide.

The compositions according to the present invention may further comprise as an optional ingredient other long chain surface active agents. Suitable long chain surface actives include alkyl sarcosinates, alkyl ether sulphates and paraffin sulphonates.

The compositions according to the present invention may also comprise a number of additional ingredients such as hypochlorite soluble and stable colourants and perfumes, and hydrotopes such as sodium xylene sulphonate.

The compositions according to the present invention are prepared by methods well-known in the art such as the methods described in GB 1 329 086.

The compositions of the present invention may be used for a variety of bleaching purposes such as bleaching hard surfaces whereby said compositions thickened nature results in longer adhesion to vertical or inclined surfaces than non-thickened bleaching compositions.

The compositions according to the present invention can be illustrated by the following examples.

CONSTITUENTS	Examples					
	I	II	III	IV	V	VI
C12 amine oxide	1.8	1.8	1.8	1.8	1.8	1.8
coconut fatty acid	0.8	0.8	0.8	0.8	0.8	-
sodium hypochlorite	1	1.1	1	1	1.1	1
octyl dimethyl amine oxide	0.4	0.4	0.4	0.4	-	-
octyl sulfate	-	-	-	-	1.2	1.2
sodium hydroxide	0.8	0.8	0.8	0.8	0.8	0.8
perfume	0.2	0.2	0.2	0.2	0.2	0.2
dimethyl n-octyl carbinol	0.2	0.05	0.1	0.2	-	-
dimethyl n-hexyl carbinol	-	-	-	-	0.1	0.20
water and minors	----------balance----------					
viscosity, cps	100	50	70	80	100	130

Claims

1. An aqueous detergent composition having a viscosity of from 20cps to 200cps, at a 50r.p.m shear rate and a pH greater than 12, comprising an alkali metal hypochlorite, a hypochlorite compatible long chain amine oxide according to the formula $R_1R_2R_3NO$, wherein R_1 is a C_{10}-C_{18} alkyl group and R_2 and R_3 are independently C_1 to C_3 alkyl groups and an alkali-metal salt of a C_8-C_{18} fatty acid **characterized in that** said composition further comprises a hypochlorite compatible short chain surfactant comprising

a hydrophobic and a hydrophilic portion, wherein the chain length of said hydrophobic portion is C_6-C_{10} and wherein the ratio of said long chain amine oxides to short chain surfactants is from 4:1 to 1.5:1, and a viscosity restoring amount of a tertiary alcohol according to the formula $R_7R_8R_9COH$, wherein R_7 is a C_4-C_9 alkyl group, R_8 and R_9 are C_1-C_3 alkyl groups said tertiary alcohol having a total of from 8 to 12 carbon atoms and mixtures thereof.

2. An aqueous detergent composition according to claim 1, wherein said ratio of long chain amine oxides to short chain surfactants is from 1.5 to 1.

3. An aqueous detergent composition according to claims 1 to 2, comprising from 0.5% to 2% of said short chain surfactants.

4. An aqueous detergent composition according to any of the preceding claims, wherein said short chain surfactant is selected from dimethyloctyl amine oxide, dimethylhexyl amine oxide and octyl sulphate.

5. An aqueous detergent composition according to any of the preceding claims, comprising from 0.05% to 1% of said tertiary alcohols.

6. An aqueous detergent composition according to any of the preceding claims, wherein said tertiary alcohols are selected from dimethylhexyl carbinol and dimethyloctyl carbinol.

7. An aqueous detergent composition according to any of the preceding claims, having a viscosity of from 20cps to 150cps.

8. An aqueous detergent composition according to claim 8, comprising from 0.5% to 3% of said alkali metal hypochlorite.

9. An aqueous detergent composition according to any of the preceding claims, having a pH greater than 12.5.

10. An aqueous detergent composition according to any of the preceding claims, wherein the ratio of said tertiary alcohol to said short chain surfactant is from 0.04:1 to 0.2:0.6.

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EUROPEAN SEARCH REPORT

Application Number
EP 93 20 2187

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.6)
A	US-A-4 789 495 (J. L. CAHALL ET AL.) * column 4, line 11 - column 6, line 31; examples 3,4 *	1-8,10	C11D3/395 C11D1/75
A D	GB-A-2 003 522 (ICI) * claims 1,11 * & DE-A-28 37 880 (...)	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

C11D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 January 1994	VAN BELLINGEN, I

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
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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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