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(54) **Thickened liquid bleaching compositions**

(57) The invention provides a liquid hypochlorite bleaching composition which is suitable for use in a toilet rim mounted toilet bowl cleaning device, the composition having a shear thinning rheology and being capable of generating a foam height of at least 3 cm immediately after the toilet flush when used in a toilet rim mounted

cleaning device.

Preferably, the composition is thickened using a combination of amine oxide and sarcosinate surfactants.

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Description**FIELD OF THE INVENTION**

5 [0001] The present invention relates to thickened liquid bleaching compositions. In particular, the invention relates to thickened liquid bleaching compositions which contain hypochlorite and which are particularly suitable for use in toilet rim mounted toilet bowl cleaning devices.

BACKGROUND TO THE INVENTION AND PRIOR ART

10 [0002] Toilet bowls require regular cleaning and disinfecting in order to prevent the accumulation of unsightly deposits, reduce odours and inhibit bacterial growth.

[0003] Liquid hypochlorite-based bleaching agents are widely used and effective in this context. Typically the liquid bleaching agent is squirted neat from a bottle around the bowl and under the rim, with manual scrubbing if necessary.

15 [0004] Since the manual cleaning process is laborious and unpleasant for the consumer, various dispensing devices have been developed which automatically supply a dose of liquid to the toilet bowl in response to the action of the flush water.

[0005] Devices of this type for the toilet rim have been described for example in EP 0 538 937, EP 0 785 315, WO 99/66139 and WO 99/66140.

20 [0006] Such devices, however, have only been used to dispense detergent and/or fragrancing formulations and not liquid hypochlorite-based bleaching agents. This limits their utility insofar as effective sanitisation and disinfecting of the toilet bowl is concerned.

[0007] It would be desirable to use a liquid hypochlorite-based bleaching agent in a liquid dispensing device for the toilet rim. However there are specific performance constraints which govern the suitability of a formulation for use in a liquid dispensing device for the toilet rim. For example, the formulation has to work at high dilution, due to the action of the flush water. Furthermore, a shear thinning rheology is desirable for effective liquid dispensing and dosing. Also, an adequate foam profile is necessary so that product efficacy can be perceived by the consumer when the liquid is dosed into the toilet bowl. These parameters are notoriously difficult to control simultaneously in hypochlorite-based systems.

30 [0008] The use of various detergents or surface-active agents for providing a thickening function in hypochlorite bleach containing compositions has been described in the literature.

[0009] For example, US 4,337,163 discloses a thickened bleach composition containing as the thickening agent a mixture of a first detergent such as an amine oxide and a second detergent selected from alkali-metal salts of saturated C₈₋₁₈ fatty acids, alkali metal acylsarcosinates, alkali metal alkyltaurides, sugar esters, and alkali metal C₁₀₋₁₈ alkyl ether sulphates with 1 to 10 moles of ethylene oxide and/or propylene oxide.

35 [0010] WO 86/01823 discloses a thickened hypochlorite solution with less than 4% amine oxide and one or more cosurfactants selected from sarcosinate, alkyl ether sulphate and alkylsulphonate in amounts less than that of the amine oxide.

[0011] US 4,588,514 discloses a thickened hypochlorite solution with a surfactant system including relatively large amounts of amine oxides, soaps or sarcosinates for thickening and a lesser amount of alkyl ether sulphate for storage stability.

40 [0012] The formulations described above are all pourable formulations intended for direct application by the user to the surface to be treated. Because of their increased viscosity, they are said to exhibit superior adhesion to vertical or inclined surfaces such as toilet bowls.

45 [0013] The present inventors have found that it is possible to formulate a thickened liquid bleaching composition which contains hypochlorite and possess the correct balance of foam profile, rheology and efficacy such that it is suitable for use in toilet rim mounted toilet bowl cleaning devices.

SUMMARY OF THE INVENTION

50 [0014] In a first aspect, the present invention provides a liquid hypochlorite bleaching composition which is suitable for use in a toilet rim mounted toilet bowl cleaning device, the composition having a shear thinning rheology and being capable of generating a foam height of at least 3 cm immediately after the toilet flush when used in a toilet rim mounted cleaning device.

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DETAILED DESCRIPTION OF THE INVENTIONRheology

- 5 **[0015]** The composition of the invention has a shear thinning rheology.
[0016] This is measured at 25°C on a Haake VT500 viscometer using spindle MV2.
[0017] Suitable compositions according to the invention will have a viscosity between 2500 and 5000 mPa s at a shear rate of 1 s⁻¹ and a viscosity between 1000 and 2500 mPa s at a shear rate of 161 s⁻¹ when measured according to the above protocol.

Foam Height

- 10 **[0018]** The composition of the invention is capable of generating a foam height of at least 3 cm immediately after the toilet flush when used in a toilet rim mounted cleaning device.
 15 **[0019]** The foam height is measured when the composition is dosed at 0.17 g per flush from a dispenser mounted on the rim of a Villeroy & Boch toilet model "Magnum", with 6 litres of water released per flush.

Thickening System

- 20 **[0020]** The inventors have found that liquid hypochlorite bleaching compositions which are thickened with a particular combination of amine oxide and sarcosinate surfactants have the desired properties as described above for suitability for use in toilet rim mounted toilet bowl cleaning devices.

Amine Oxide

- 25 **[0021]** Suitable amine oxide surfactants for use in thickened liquid hypochlorite compositions according to the invention may be generally described as those tertiary amine oxides of the formula R₂R'NO, in which each R is a lower alkyl group, for instance methyl, and R' is a long chain alkyl group having from 12 to 18 carbon atoms, for instance a lauryl, myristyl, palmityl, cetyl or stearyl group.
 30 **[0022]** The inventors have found that the chain length of the long chain alkyl group in the amine oxide surfactant is especially important for delivering optimum properties.
[0023] Suitably the amine oxide surfactant will be present in the composition of the invention as a blend in which there is a certain quantitative distribution of different long chain alkyl group (R') chain lengths.
 35 **[0024]** Preferably at least 20 wt% of the amine oxide surfactant has an R' of C₁₂, such as from 20 to 40 wt%, more preferably from 25 to 30 wt% (by weight based on the total weight of amine oxide surfactant), and at least 40 wt% of the amine oxide surfactant has an R' selected from C₁₄, C₁₆ and C₁₈ and mixtures thereof, such as from 60 to 80 wt%, more preferably from 70 to 75 wt%, (by weight based on the total weight of amine oxide surfactant).
[0025] Most preferably the amine oxide surfactant will have a chain length distribution as follows (each by weight based on the total weight of amine oxide surfactant):
 40 from 20 to 40 wt%, ideally from 25 to 30 wt%: R' is C₁₂;
 from 35 to 75 wt%, ideally from 40 to 60 wt% : R' is C₁₄;
 from 5 to 40 wt%, ideally from 10 to 35 wt%: R' is C₁₆ and/or C₁₈.

- 45 **[0026]** The total amount of amine oxide surfactant used in thickened liquid hypochlorite compositions of the invention is also important for optimum performance, and it is most preferred that the amount is at least 6 wt%. The amount will typically range from 6 to 15 wt%, more preferably about 10 wt%, by total weight of amine oxide surfactant based on total weight of the composition.

Sarcosinate

- 50 **[0027]** Suitable sarcosinate surfactants for use in thickened liquid hypochlorite compositions according to the invention include acyl sarcosinates or mixtures thereof. The acyl sarcosinate surfactants are derived from natural fatty acids and the amino-acid sarcosine (N-methyl glycine). Preferred are long chain acyl sarcosinates having the formula RCON
 55 (CH₃)CH₂ COOM, in which M is an alkali metal cation, especially sodium or potassium, and R is a branched or straight chain C₈-C₁₈ alkyl group. Specific examples of suitable long acyl sarcosinates include sodium lauroyl sarcosinate, sodium myristoyl sarcosinate, sodium stearyl sarcosinate, the corresponding potassium salts, and mixtures thereof.
[0028] Sodium lauroyl sarcosinate is most preferred. This material is commercially available from Croda Chemical,

UK under the trademark CRODASINIC® LS30.

[0029] The amount of sarcosinate surfactant that may be used for use in thickened liquid hypochlorite compositions according to the invention preferably ranges from 0.1 to 10 wt%, more preferably from 1 to 5 wt%, and most preferably from 2 to 3 wt%, by total weight of sarcosinate surfactant based on total weight of the composition.

Hypochlorite

[0030] Compositions of the invention comprise hypochlorite in an aqueous matrix. The hypochlorite may be a simple hypochlorite salt such as those of the alkali or alkaline earth metals or a compound which produces hypochlorite on hydrolysis, such as organic N-chloro compounds. It is preferred to use an alkali metal hypochlorite such as sodium hypochlorite.

[0031] The amount of hypochlorite present in thickened liquid hypochlorite compositions according to the invention preferably ranges from 0.1 to 10 wt%, more preferably from 1 to 8 wt%, and most preferably from 3 to 6 wt%, by weight of hypochlorite based on total weight of the composition.

Alkalinity

[0032] Preferably, the composition of the invention also contains a source of alkalinity which keeps its pH at or above 11.5, not only during production of the product but also during storage. By "a source of alkalinity" is meant a mixture of ingredients which is able to keep the pH at or above the required level. The pH of compositions of the invention will preferably be from 8 to 13, more preferably from 9 to 13. Suitable sources of alkalinity are known in the art and are generally made up of highly alkaline compounds such as alkali metal hydroxides and alkali metal salts of weak acids such as alkali metal carbonates and silicates.

[0033] Particularly suitable sources of alkalinity are mixtures of alkali metal hydroxide and alkali metal silicate such as sodium silicate.

Other Optional Components

[0034] The composition of the invention may also contain other optional components to enhance consumer appeal such as such as perfumes and colorants. Such components should be sufficiently stable to hypochlorite at the pH of the composition to ensure adequate storage stability. Ultramarine Blue (UMB) and copper phthalocyanines are examples of widely used hypochlorite-stable pigments which may be incorporated in the composition of the present invention.

Device

[0035] The composition of the invention is particularly suitable for use in toilet rim mounted toilet bowl cleaning devices.

[0036] A preferred type of dispenser for use with the composition of the invention may be generally described as a device which is adapted to be suspended over the toilet rim, and which comprises a cartridge adapted to contain the composition, and a dispensing mechanism for the composition which releases the composition in response to the action of the flush water.

[0037] A most preferred type of dispenser for use with the composition of the invention comprises a reusable holder which is adapted to engage with the cartridge, which is replaceable when empty. The holder incorporates a securing means such as a hook which is shaped to be clipped over the rim of the lavatory bowl, and has a distribution plate which projects into the path of flushing water from the lavatory when the dispenser is secured to the rim of the lavatory bowl. The plate typically bears a wicking device to spread the composition over the surface of the plate. The wicking device may for example be a porous pad, or more preferably a system of channels which direct the passage of the composition by capillary action. In use, the composition is delivered from the cartridge to the surface of the plate where it is exposed to flushing water and washed off the plate and carried to the lavatory bowl.

[0038] The invention will now be illustrated by the following nonlimiting Examples, in which all percentages are by weight based on total weight, unless otherwise indicated.

EXAMPLES

Example 1

[0039] A composition according to the invention was prepared having ingredients as shown in the following Table:

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INGREDIENT	LEVEL
	wt%
sodium lauroyl sarcosinate ⁽¹⁾	2.00
C12-18 alkyl dimethyl amine oxide blend ⁽²⁾	10.00
sodium hydroxide	1.00
sodium silicate	1.00
sodium hypochlorite	4.87
Demineralised water, minors	To 100%

⁽¹⁾ Added as CRODASINIC® LS30, commercially available from Croda Chemicals (30 wt% active solution)

⁽²⁾ A blend of amine oxide containing 25 wt% C₁₂ alkyl dimethyl amine oxide, 40 wt% C₁₄ alkyl dimethyl amine oxide and 35 wt% C₁₆ and C₁₈ alkyl dimethyl amine oxide (each by weight based on the total weight of amine oxide). Prepared by blending AROMOX® BW 500 and AROMOX® 14D-W 970 (both commercially available from Akzo Nobel)

Example 2

[0040] A composition according to the invention was prepared having ingredients as shown in the following Table:

INGREDIENT	LEVEL
	wt%
sodium lauroyl sarcosinate ⁽¹⁾	2.00
C12-18 alkyl dimethyl amine oxide blend ⁽³⁾	10.00
sodium hydroxide	1.00
sodium silicate	1.00
sodium hypochlorite	4.87
Demineralised water, minors	to 100%

⁽³⁾ A blend of amine oxide containing 30 wt% C₁₂ alkyl dimethyl amine oxide, 60 wt% C₁₄ alkyl dimethyl amine oxide and 10 wt% C₁₆ and C₁₈ alkyl dimethyl amine oxide (each by weight based on the total weight of amine oxide). Prepared by blending AROMOX® BW 270 and AROMOX® 14D-W 970 (both commercially available from Akzo Nobel).

Comparative Testing

[0041] Two comparative compositions were prepared, each having ingredients as shown in the following Tables:

Comparative Example A

[0042]

INGREDIENT	LEVEL
	wt%
CRODASINIC® HT ⁽⁴⁾	15.00
sodium hydroxide	1.00
sodium hypochlorite	4.87
Demineralised water, minors	to 100%

⁽⁴⁾ An amine oxide/sarcosinate surfactant system commercially available from Croda Chemicals.

Comparative Example B**[0043]**

INGREDIENT	LEVEL
	wt%
sodium lauroyl sarcosinate ⁽¹⁾	1.5
AROMOX® BW 500 ⁽⁵⁾	33.33
sodium hydroxide	1.00
sodium silicate	1.00
sodium hypochlorite	4.87
Demineralised water, minors	To 100%

⁽⁵⁾ A blend of amine oxides commercially available from Akzo Nobel.

Evaluation of the compositions showed that:

[0044] Comparative Example A has a shear thinning viscosity profile but does not give sufficient foam when dosed from a toilet rim mounted toilet bowl cleaning device.

[0045] Comparative Example B gives sufficient foam but has a Newtonian viscosity profile which is undesirable for use in a toilet rim mounted toilet bowl cleaning device.

[0046] Examples 1 and 2 each have a shear thinning viscosity profile and give sufficient foam when dosed from a toilet rim mounted toilet bowl cleaning device. It is believed that this is due to the optimal distribution of long chain alkyl group chain lengths in the amine oxide component, which is not present in either of Comparative Examples A or B.

Claims

1. A liquid hypochlorite bleaching composition which is suitable for use in a toilet rim mounted toilet bowl cleaning device, the composition having a shear thinning rheology and being capable of generating a foam height of at least 3 cm immediately after the toilet flush when used in a toilet rim mounted cleaning device.
2. A composition according to claim 1, which is thickened with a combination of amine oxide and sarcosinate surfactants.
3. A composition according to claim 2, in which the amine oxide surfactant has the formula $R_2R'NO$, in which each R is a lower alkyl group, and R' is a long chain alkyl group having from 12 to 18 carbon atoms, and in which the distribution of long chain alkyl group (R') chain lengths, each by weight based on the total weight of amine oxide, is as follows:
 - from 25 to 30 wt%: R' is C_{12} ;
 - from 40 to 60 wt% : R' is C_{14} ;
 - from 10 to 35 wt%: R' is C_{16} and/or C_{18} .
4. A composition according to claim 2 or claim 3, in which the sarcosinate surfactant has the formula $RCON(CH_3)CH_2COOM$, in which M is an alkali metal cation, especially sodium or potassium, and R is a branched or straight chain C_8 - C_{18} alkyl group.
5. A composition according to any one of claims 2 to 4, in which the amount of amine oxide surfactant ranges from 6 to 15 wt% by total weight of amine oxide surfactant based on total weight of the composition.
6. A composition according to any one of claims 1 to 5, in combination with a toilet rim mounted toilet bowl cleaning device.



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PARTIAL EUROPEAN SEARCH REPORT

Application Number

which under Rule 45 of the European Patent Convention EP 02 25 7478 shall be considered, for the purposes of subsequent proceedings, as the European search report

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	WO 95 33810 A (RECKITT & COLMAN INC) 14 December 1995 (1995-12-14) * claims 1,2,5-7 * * examples * * page 3, line 12 - page 4, line 21 * * page 1, line 5 - line 9 * ---	1,2,4,6	C11D3/395 C11D1/83
X	WO 97 06233 A (RECKITT & COLMAN INC) 20 February 1997 (1997-02-20) * claims 1,3-6 * * examples * * page 5, line 18 - page 6, line 9 * * page 3, line 14 - line 21 * ---	1,2,4,6	
X	EP 0 137 551 A (UNILEVER NV) 17 April 1985 (1985-04-17) * example 4; table VII * * page 5, line 13 - line 21 * * page 3, line 17 - line 33 * ---	1,2,4,6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			C11D
INCOMPLETE SEARCH			
<p>The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC to such an extent that a meaningful search into the state of the art cannot be carried out, or can only be carried out partially, for these claims.</p> <p>Claims searched completely :</p> <p>Claims searched incompletely :</p> <p>Claims not searched :</p> <p>Reason for the limitation of the search: see sheet C</p>			
Place of search		Date of completion of the search	Examiner
THE HAGUE		1 April 2003	Neys, P
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			



Claim(s) searched completely:

2-6

Claim(s) searched incompletely:

1

Reason for the limitation of the search:

The subject-matter of present claim 1 is defined by reference to desired properties, namely the liquid hypochlorite bleaching composition should have 'a shear thinning rheology and should be capable of generating a foam height of at least 3 cm immediately after the toilet flush when used in a toilet rim mounted cleaning device'.

The claims cover all hypochlorite bleaching compositions having these properties, whereas the application provides support within the meaning of Article 84 EPC and/or disclosure within the meaning of Article 83 EPC for only a very limited number of compositions. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Independent of the above reasoning, the claims also lack clarity (Article 84 EPC). An attempt is made to define the composition by reference to a result to be achieved. Again, this lack of clarity in the present case is such as to render a meaningful search over the whole of the claimed scope impossible. Consequently, the search has been carried out for those parts of the claims which appear to be clear, supported and disclosed, namely those parts relating to hypochlorite bleaching compositions which comprise:

* a combination of a tertiary amine oxide of the formula $RRR'NO$, in which R is a lower alkyl group and R' is an alkyl group having from 12 to 18 carbon atoms, and a sarcosinate surfactant (see claim 2; page 5, lines 21-27)



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Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
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A	US 5 693 601 A (SODDU ANDREA ET AL) 2 December 1997 (1997-12-02) * claims 1-6 * * examples * * column 2, line 48 - line 63 * * column 3, line 59 - column 4, line 42 * -----	1-6	
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