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(54) Thickened liquid bleaching compositions

Verdickte flüssige Bleichmittelzusammensetzungen

Compositions de blanchiment liquides épaississantes

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(73) Proprietors:
• **UNILEVER PLC**
London EC4P 4BQ (GB)
Designated Contracting States:
CY GB IE
• **UNILEVER N.V.**
3013 AL Rotterdam (NL)
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(72) Inventors:
• **Van de Scheur, Frank Theodoor**
9204 HR Drachten (NL)
• **Trombetta, Ivana**
26841 Casalpusterlengo, Lodi (IT)

(74) Representative: **Rosen Jacobson, Frans Lucas M.
et al**
Unilever Patent Group
Olivier van Noortlaan 120
3133 AT Vlaardingen (NL)

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WO-A-95/33810 **WO-A-97/06233**
US-A- 5 693 601

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Description**FIELD OF THE INVENTION**

[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

[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.

[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. 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.

[0006] 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.

[0007] 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.

[0008] 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.

[0009] 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.

[0010] 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.

[0011] Further examples of cleaning compositions comprising hypochlorite, tertiary amine oxide surfactant and sarcosinate surfactant may be found in WO-A-95/33810 and WO-A-97/06233.

[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.

[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

[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; wherein the composition comprises:

- sarcosinate surfactant;
- amine oxide surfactant having the formula R₂R'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 C₁₂;
- from 40 to 60 wt% : R' is C₁₄;
- from 10 to 35 wt%: R' is C₁₆ and/or C₁₈.

[0015] The invention further provides the use of said composition according to claim 4.

DETAILED DESCRIPTION OF THE INVENTION

Rheology

[0016] The composition of the invention has a shear thinning rheology.

[0017] This is measured at 25°C on a Haake VT500 viscometer using spindle MV2.

[0018] 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

[0019] 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.

[0020] 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

[0021] 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

[0022] 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.

[0023] 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.

[0024] 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

[0025] 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(CH₃)CH₂COOM, 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.

[0026] Sodium lauroyl sarcosinate is most preferred. This material is commercially available from Croda Chemical, UK under the trademark CRODASINIC® LS30.

[0027] 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

[0028] 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.

[0029] 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

[0030] 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.

[0031] Particularly suitable sources of alkalinity are mixtures of alkali metal hydroxide and alkali metal silicate such as sodium silicate.

Other Optional Components

[0032] 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

[0033] The composition of the invention is particularly suitable for use in toilet rim mounted toilet bowl cleaning devices.

[0034] 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.

[0035] 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.

[0036] 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

[0037] 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

[0038] 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

[0039] Two comparative compositions were prepared, each having ingredients as shown in the following Tables:

Comparative Example A

[0040]

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

[0041]

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:

[0042]

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.

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.

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; wherein the composition comprises:

- sarcosinate surfactant;
- amine oxide surfactant having 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 C₁₂;
- from 40 to 60 wt% : R' is C₁₄;
- from 10 to 35 wt%: R' is C₁₆ and/or C₁₈.

2. A composition according to claim 1, in which the sarcosinate surfactant has the formula RCON(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.
3. A composition according to any one of claims 1 or 2, 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.
4. Use of the composition according to any one of claims 1 to 3 in a toilet rim mounted toilet bowl cleaning device.

Patentansprüche

1. Flüssige Hypochloritbleichzusammensetzung, die zur Verwendung in einer am Toilettenrand angebrachten Toilettenbeckenreinigungsverrichtung geeignet ist, wobei die Zusammensetzung eine strukturviskose Rheologie aufweist und unmittelbar nach dem Spülen eine Schaumhöhe von mindestens 3 cm erzeugen kann, wenn sie in einer am Toilettenrand angebrachten Reinigungsverrichtung verwendet wird; wobei die Zusammensetzung
 - oberflächenaktives Sarkosinat;
 - oberflächenaktives Aminoxid mit der Formel R₂R'NO umfaßt, worin jeder R eine Niederalkylgruppe ist, und R' eine langkettige Alkylgruppe mit 12 bis 18 Kohlenstoffatomen ist, und worin die Verteilung der Kettenlängen der langkettigen Alkylgruppe (R'), jeweils basierend auf dem Gesamtgewicht des Aminoxids, wie folgt ist:
 - von 25 bis 30 Gew.-%: ist R' C₁₂;
 - von 40 bis 60 Gew.-%: ist R' C₁₄;
 - von 10 bis 35 Gew.-%: ist R' C₁₆ und/oder C₁₈.
2. Zusammensetzung nach Anspruch 1, worin das oberflächenaktive Sarkosinat die Formel RCON(CH₃)CH₂COOM hat, worin M ein Alkalimetallkation ist, insbesondere Natrium oder Kalium, und R eine verzweigte oder geradkettige C₈-C₁₈-Alkylgruppe ist.
3. Zusammensetzung nach einem der Ansprüche 1 oder 2, worin die Menge des oberflächenaktiven Aminoxids im Bereich von 6 bis 15 Gew.-%, bezogen auf das Gesamtgewicht des oberflächenaktiven Aminoxids, basierend auf dem Gesamtgewicht der Zusammensetzung, liegt.
4. Verwendung der Zusammensetzung nach einem der Ansprüche 1 bis 3 in einer am Toilettenrand angebrachten Toilettenbeckenreinigungsverrichtung.

Revendications

1. Composition de blanchiment liquide à base d'hypochlorite qui est adaptée pour être utilisée dans un dispositif de nettoyage de la cuvette des toilettes monté sur le rebord des toilettes, la composition ayant une rhéologie rhéofluifiante et étant capable de générer une hauteur de mousse d'au moins 3 cm immédiatement après que la chasse a été tirée lorsqu'elle est utilisée dans un dispositif de nettoyage monté sur le rebord des toilettes ; dans laquelle la composition comprend :
 - un surfactant à base de sarcosinate ;
 - un surfactant à base d'oxyde d'amine ayant la formule R₂R'NO, dans laquelle chaque R est un groupe alkyle inférieur, et R' est un groupe alkyle à longue chaîne ayant de 12 à 18 atomes de carbone, et dans laquelle la distribution des longueurs de chaîne du groupe alkyle (R') à longue chaîne, chacune en poids par rapport au poids total de l'oxyde d'amine, est la suivante :

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- de 25 à 30 % en poids : R' est en C₁₂ ;
- de 40 à 60 % en poids : R' est en C₁₄ ;
- de 10 à 35 % en poids : R' est en C₁₆ et/ou C₁₈.

- 5 **2.** Composition selon la revendication 1, dans laquelle le surfactant à base de sarcosinate a la formule RCON(CH₃)CH₂ COOM, dans laquelle M est un cation de métal alcalin, notamment de sodium ou de potassium, et R est un groupe alkyle en C₈-C₁₈ à chaîne linéaire ou ramifiée.
- 10 **3.** Composition selon l'une quelconque des revendications 1 ou 2, dans laquelle la quantité du surfactant à base d'oxyde d'amine se trouve dans la plage de 6 à 15 % en poids du poids total du surfactant à base d'oxyde d'amine par rapport au poids total de la composition.
- 15 **4.** Utilisation de la composition selon l'une quelconque des revendications 1 à 3 dans un dispositif de nettoyage de la cuvette des toilettes monté sur le rebord des toilettes.

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