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(54) Title: STABLE BLEACHING COMPOSITION

(57) Abstract: The present invention relates to an hypohalite liquid bleaching composition comprising at least one metal- phthalocyanine pigment or at least one optical brightener or mixtures thereof; at least a surfactant system selected from the group consisting of: a) at least 0.01% by weight of an anionic surfactant; b) at least 0.01% by weight of a cationic surfactant; c) at least 0.5% by weight of a zwitterionic surfactant; d) at least 0.01% by weight of a non ionic surfactant; or e) a mixture of at least two of a), b), c) and d); and a stabilizer of formula (I) R_1-O-($R_2CHCH_2O)_s$-H (I) wherein R1 represents an optionally substituted phenyl group or benzyl group; R2 represents a hydrogen atom or a methyl group; and s represents an integer from 0 to 4. It further relates to uses of the stabilizer of formula I and to a process of treating a surface with the hypohalite liquid bleaching composition.

"STABLE BLEACHING COMPOSITION"

TECHNICAL FIELD

The present invention relates to bleaching compositions, in particular to hypohalite bleaching compositions which can be used to treat various surfaces.

BACKGROUND ART

Bleach-containing compositions for bleaching various surfaces, such as fabrics for example, are well known in the art. Amongst the different bleaching compositions available, those relying on bleaching by hypohalite bleach, such as hypochlorite, are often preferred, mainly for bleaching performance reasons.

However, such hypohalite bleach composition often faced stability problems. Thus, an objective of bleach manufacturers has always been to obtain a bleach product that is chemically and physically stable over time, for example, over periods of storage.

In addition, it is often desirable to add further ingredients, such as dyes or pigments, to hypohalite bleach-containing compositions in order to improve the aesthetics of such compositions. Indeed, coloured bleaching compositions are particularly preferred compositions. As a matter of fact, the distinct appearance of the composition facilitates it's recognition by consumers, thereby reducing potential misuse or consumption of a potentially irritant composition.

However, formulating such coloured bleaching composition has been a constant challenge due to the aggressive nature of hypohalite bleaches. Such formulations often results in variety of stability related problems.

A drawback associated with coloured hypohalite bleach-containing compositions is that pigments and/or dyes, present herein, are decomposed by the bleach. Indeed, hypohalite bleaches are oxidising agents and pigments and dyes are very prone to attacks. In some cases such compounds can even be completely decomposed by such oxidising agents.

This decomposition results, therefore, in the loss of color of the composition and, even, sometimes, in the settling of pigments to the bottom of containers containing such composition. Moreover, as a consequence of the interaction of such components with the oxidising agent, a premature decomposition of the oxidising agent and of other actives present in the composition occurs, leading to a less efficient composition in term of cleaning performances for example. In addition, during oxidation, dyes and/or pigments release ions which attack oxidising agents, resulting thus in the acceleration of the decomposition of such agents.

Moreover, it is known that oxidizing agents of the bleaching composition may also cause degradation of optical brighteners present in the composition to increase whitening performances of the same.

DISCLOSURE OF INVENTION

It is thus an object of the present invention to provide a hypohalite-containing composition, comprising a pigment and/or a brightener, in which this compound is chemically stable and wherein the cleaning performances of the composition are maintained.

It is known in the art to add a stabilising agent to hypohalite bleach-containing compositions in order to prevent, or at least reduce, the decomposition of further ingredients, in particular pigments and/or dye, present in such compositions.

For example, EP-A-0668345 and EP-A-1001010 relates to bleaching compositions comprising a hypohalite bleach and a radical scavenger. However, even though such stabilization systems, and especially radical scavengers, are capable of stabilising further ingredients, it has been found that pigments and/or dyes are still particularly prone to attacks by hypohalite bleaches and hence are extremely difficult to be stably incorporated into bleaching compositions comprising the known stabilization systems.

Thus, although the systems described in the art provide stabilisation of further ingredients in hypohalite bleach-containing compositions, it has been found that the stabilization of pigments and/or dyes and of the composition may still be further improved.

EP 2112218 discloses the use of trimethoxy benzoic acid (TMBA) or a salt thereof as stabilizer of pigments and/or dyes in hypohalite bleach-containing composition. TMBA is able to stabilize also the Brightener 49, which is rapidly oxidised by the hypochlorite. However, TMBA is an expensive chemical, then a cheaper and more efficient substitute of TMBA would be really attractive.

Another stabilizing system is disclosed in JP2006077199 teaching the use of a compound of formula R_2-O-$(R_3CHCH_2O)_s$-H, such as phenoxyethanol, to stabilize a synthetic dyes in a bleaching composition containing a hypohalite, an alkali agent, an alkali metal salt of sulfonic acid. However, the composition containing phenoxyethanol, although stable, causes staining of the hard surfaces to which it is applied when the dye is a copper phtalocyanine pigment.

It is therefore an objective of the present invention to provide stable bleaching composition comprising phtalocyanine pigments, wherein the decomposition of said ingredients is significantly reduced and staining is avoided. Moreover, it is a further object of the present invention to provide a hypohalite bleach-containing compositions, having excellent bleaching performances and comprising a brightener, that are stable over long periods.

It has now been found that this objective can be met by compositions according to claim 1. Furthermore, according to the present invention, uses of compound of formula (I) according to claim 10 or 11 and a process of treating a surface according to claim 12 are provided.

BEST MODE FOR CARRYING OUT THE INVENTION

Bleaching composition

The bleaching compositions herein described are formulated as liquid compositions, including gel and paste form. The bleaching compositions are, preferably, but not necessarily, formulated as aqueous compositions. Preferred liquid bleaching compositions of the present invention are aqueous and therefore, preferably, may comprise water, more preferably may comprise water in an amount of from 60% to 98%, even more preferably of from 80% to 96% and most preferably 85% to 97% by weight of the total composition.

An essential aspect of the present invention is that the composition is stable on storage. By “stable on storage”, it is to be understood that the compositions of the present invention typically do not undergo more than 36% loss of available oxidising agent after 10 days of storage at 50°C ± 0.5°C and more preferably not more than 32%. The percentage of loss of available chlorine (%AvCl) may be measured using the method described, for instance, in "Analyses des Eaux et Extraits de Javel" by "La chambre syndicale nationale de L'eau de Javel et des produits connexes", pages 9-10 (1984). Said method consists in measuring the available oxidising agent in the fresh compositions, i.e. just after they are made, and in the same compositions after 5 days at 50°C.

The compositions according to the present invention are preferably alkaline compositions. The pH of the liquid compositions herein is from 9.0 to 14, preferably from 10.5 to 14 when measured at 25°C. It is in this alkaline range that the optimum stability and performance of the composition as well as fabric whiteness and/or safety are obtained.

Accordingly, the compositions herein may comprise an acid or a source of alkalinity to adjust the pH as appropriate. Suitable sources of alkalinity are the caustic alkalis such as sodium hydroxide, potassium hydroxide and/or lithium hydroxide, and/or the alkali metal oxides such as sodium and/or potassium oxide. A preferred source of alkalinity is a caustic alkali, more preferably sodium hydroxide and/or potassium hydroxide. Typical levels of such sources of alkalinity, when present, are of from 0.1% to 2% by weight, preferably from 0.5% to 1.5% by weight of the composition.

Hypohalite bleach

As a first essential ingredient, the bleaching compositions of the present invention comprise a hypohalite bleach.

Suitable hypohalite bleaches may be provided by a variety of sources, including bleaches that lead to the formation of positive halide ions and/or hypohalite ions, as well as bleaches that are organic based sources of halides, such as chloroisocyanurates.

Suitable hypohalite bleaches for use herein include the alkali metal and alkaline earth metal hypochlorites, hypobromites, hypoiodites, chlorinated trisodium phosphate dodecahydrates, potassium and sodium dichloroisocyanurates, potassium and sodium trichlorocyanurates, N-chloroimides, N-chloroamides, N-chloroamines and chlorohydantoins. In a preferred embodiment, said hypohalite bleach is an alkali metal and/or alkaline earth metal hypochlorite. More preferably, said hypohalite bleach is an alkali metal and/or alkaline earth metal hypochlorite selected from the group consisting of sodium hypochlorite, potassium hypochlorite, magnesium hypochlorite, lithium hypochlorite and calcium hypochlorite, and mixtures thereof. Even more preferably, said hypohalite bleach is sodium hypochlorite.

Preferably, the liquid bleaching compositions herein comprise hypohalite bleach such that the content of active halide (for hypochlorite : AvCl2) in the composition is of from 0.01% to 15% by weight, more preferably from 0.1% to 10% by weight, even more preferably from 0.5% to 7% by weight and most preferably from 1% to 6% by weight of the composition.

Surfactants

As another essential ingredient, the bleaching compositions of the present invention comprises a surfactant system. Said surfactant system may be present in the compositions herein in amounts of at least 0.01% by wight, preferably from 0.5% to 50% by weight, more preferably from 0.5% to 30% by weight and even more preferably from 0.5% to 10% by weight of the composition. The amount of surfactant must be superior to 0.5% in order to avoid staining of surfaces.

The surfactant system suitable for use herein is selected from the group consisting of:

a) at least 0.01% by weight of an anionic surfactant;

b) at least 0.01% by weight of a cationic surfactant;

c) at least 0.5% by weight of a zwitterionic surfactant;

d) at least 0.01% by weight of a non ionic surfactant;

or

e) a mixture of at least two of a), b), c) and d).

Suitable anionic surfactants for use in the compositions herein include water-soluble salts or acids of the formula $ROSO_3M$ wherein R preferably is a C_{10}-C_{24} hydrocarbyl, preferably linear or branched alkyl having a C_{10}-C_{20} alkyl component, more preferably a C_{12}-C_{18} linear or branched alkyl, and M is H or a cation, e.g., an alkali metal cation (e.g., sodium, potassium, lithium), or ammonium or substituted ammonium (e.g., methyl-, dimethyl-, and trimethyl ammonium cations and quaternary ammonium cations, such as tetramethyl-ammonium and dimethyl piperdinium cations and quaternary ammonium cations derived from alkylamines such as ethylamine, diethylamine, triethylamine, and mixtures thereof, and the like).

Other suitable anionic surfactants for use herein are water-soluble salts or acids of the formula (II)

$$R_3O(A)_mSO_3M_1 \quad (II)$$

wherein R_3 is an unsubstituted C_6-C_{24} linear or branched alkyl group having a C_6-C_{24} alkyl component, preferably a C_{10}-C_{20} linear or branched alkyl, more preferably C_{12}-C_{18} linear or branched alkyl, A is an ethoxy or propoxy unit, m is greater than zero, typically between about 0.5 and about 30, more preferably between about 0.5 and about 5, and M_1 is H or a cation which can be, for example, a metal cation (e.g., sodium, potassium, lithium, calcium, magnesium, etc.), ammonium or substituted-ammonium cation. Alkyl ethoxylated sulfates as well as alkyl propoxylated sulfates are contemplated herein. Specific examples of substituted ammonium cations include methyl-, dimethyl-, trimethyl-ammonium and quaternary ammonium cations, such as tetramethyl-ammonium, dimethyl piperdinium and cations derived from alkanolamines such as ethylamine, diethylamine, triethylamine, mixtures thereof, and the like. Exemplary surfactants are C_{12}-C_{18} alkyl polyethoxylate(1.0)sulfate, C_{12}-$C_{18}E(1.0)$sulfate, C_{12}-C_{18} alkyl polyethoxylate(2.25)sulfate, C_{12}-$C_{18}E(2.25)$sulfate, C_{12}-C_{18} alkyl polyethoxylate(3.0)sulfate, C_{12}-$C_{18}E(3.0)$sulfate, and C_{12}-C_{18} alkyl polyethoxylate(4.0)sulfate, C_{12}-$C_{18}E(4.0)$sulfate, wherein the counterion is conveniently selected from sodium and potassium.

In a particularly preferred embodiment of the present invention the surfactant system used is an anionic surfactant system, namely alkyl alkoxy (preferably ethoxy) sulphate alone for example alkyl (ethoxy) 3 sulphate (AE3S) or in combination with a co-surfactant, preferably a C_2-C_{10} alkyl sulphate and/or a C_8-C_{22} alkyl or aryl sulphonate like C_8-C_{22} benzene sulphonate and/or another alkyl alkoxy sulphate apart the 3 ethoxylated one. Indeed the presence of said alkyl (ethoxy) 3 sulphate alone or in combination with a co-surfactant provides the desired viscosity to the present compositions and delivers excellent stain removal properties to said compositions especially when used in any laundry application. Typically compositions according to the present invention have a viscosity between 25 cps and 1500 cps, preferably between 50 cps and 200 cps, depending of the ratio between AE3S and the co-surfactant, when measured with a Rheometer like Carri-med CSL2-100® at the following viscosity parameters: angle: 1°58, gap: 60, diameter: 4.0 cm, iner.: 63.60 at a temperature of 25°C and a shear rate of 30 1/sec.

Other suitable anionic surfactants for use herein are water-soluble salts or acids of the formula (III)

$$R_4O(A)_mCH_2COOM_1 \quad (III)$$

wherein R_4 is an unsubstituted C_6-C_{24} linear or branched alkyl group having a C_6-C_{24} alkyl component, preferably a C_{10}-C_{20} linear or branched alkyl, more preferably C_{12}-C_{18} linear or branched alkyl, A is an ethoxy or propoxy unit, m is greater than zero, typically between about 0.5 and about 30, more preferably between about 0.5 and about 5, and M_1 is as defined above. Alkyl ethoxylated carboxylates as well as alkyl propoxylated carboxylates are contemplated herein. Exemplary surfactants are C_{12}-C_{18} alkyl ethoxylated(2.0)carboxylate, C_{12}-C_{18} alkyl ethoxylated(5.0)carboxylate, C_{12}-C_{18} alkyl ethoxylated(7.0)carboxylate, wherein the counterion is conveniently selected from sodium and potassium.

Other anionic surfactants useful for detersive purposes can also be used herein.

According an embodiment of the present invention, the anionic surfactant may be selected in the group consisting of alkyl sulphates, alkyl ether sulphates, sarcosinates, taurates, ether carboxylate, alkyl ethoxylated sulphates, alkyl propoxylated sulfates or their mixtures.

Suitable nonionic surfactants for use herein are capped nonionic ethoxylated surfactants according to the formula (IV):

$$R_5(OR_6)_nOR_7 \quad \text{(IV)}$$

wherein R_5 is a C_8-C_{18} linear or branched alkyl or alkenyl group, aryl group, alkaryl group, preferably, R_5 is a C_{10}-C_{15} alkyl or alkenyl group, more preferably a C_{10}-C_{15} alkyl group; R_6 is a C_2-C_{10} linear or branched alkyl group, preferably a C_4 group; R_7 is a C_1-C_{10} alkyl or alkenyl group, preferably a C_1-C_5 alkyl group, and n is an integer ranging in the range of from 1 to 20, preferably from 1 to 10, more preferably from 1 to 5; or mixtures thereof. These surfactants are commercially available from BASF under the trade name Plurafac®, from HOECHST under the trade name

Genapol® or from ICI under the trade name Symperonic®. Preferred capped nonionic ethoxylated surfactant of the above formula are those commercially available under the tradename Genapol® L 2.5 NR from Hoechst, and Symperonic® LF/CS 1100 from ICI.

Other suitable nonionic surfactants for use herein include a class of compounds which may be broadly defined as compounds produced by the condensation of alkylene oxide groups (hydrophilic in nature) with an organic hydrophobic compound, which may be branched or linear aliphatic (e.g. Guerbet or secondary alcohol) or alkyl aromatic in nature. The length of the hydrophilic or polyoxyalkylene radical which is condensed with any particular hydrophobic group can be readily adjusted to yield a water-soluble compound having the desired degree of balance between hydrophilic and hydrophobic elements.

Other suitable zwitterionic surfactants for use herein are that include the amine oxides corresponding to the formula (V):

$$R_8R_9R_{10}N\rightarrow O \quad (V)$$

wherein R_8 is a primary alkyl group containing 6-24 carbons, preferably 10-18 carbons, and wherein R_9 and R_{10} are, each, independently, an alkyl group containing 1 to 6 carbon atoms. The arrow in the formula is a conventional representation of a semi-polar bond. The preferred amine oxides are those in which the primary alkyl group has a straight chain in at least most of the molecules, generally at least 70%, preferably at least 90% of the molecules, and the amine oxides which are especially preferred are those in which R contains 10-18 carbons and R_8 and R_9 are both methyl. Exemplary of the preferred amine oxides are the N-decyldimethylamine oxide, N-dodecyl dimethylamine oxide, the corresponding amine oxides in which one or both of the methyl groups are replaced with ethyl or 2-hydroxyethyl groups and mixtures thereof. A most preferred amine oxide for use herein is N-decyldimethylamine oxide.

Other suitable zwitterionic surfactants for the purpose of the invention are the phosphine or sulfoxide surfactants of formula (VI):

$$R_{11}R_{12}R_{13}A \rightarrow O \quad (VI)$$

wherein A is phosphorus or sulfur atom, R_{11} is a primary alkyl group containing 6-24 carbons, preferably 10-18 carbons, and wherein R_{12} and R_{13} are, each, independently selected from methyl, ethyl and 2-hydroxyethyl. The arrow in the formula is a conventional representation of a semi-polar bond.

Suitable surfactants with multiple charges for use herein are zwitterionic detergents that comprise the betaine and betaine-like detergents wherein the molecule contains both basic and acidic groups which form an inner salt giving the molecule both cationic and anionic hydrophilic groups over a broad range of pH values. Some common examples of these detergents are described in U.S. Pat. Nos. 2082275, 2702279 and 2255082.

Amphoteric and ampholytic detergents which can be either cationic or anionic depending upon the pH of the system are represented by detergents such as dodecylbeta-alanine, N-alkyltaurines such as the one prepared by reacting dodecylamine with sodium isethionate according to the teaching of U.S. Pat. No. 2658072, N-higher alkylaspartic acids such as those produced according to the teaching of U.S. Pat. No. 2438091 , and the products sold under the trade name "Miranol", and described in U.S. Pat. No. 2,528,378. Additional synthetic detergents and listings of their commercial sources can be found in McCutcheon's Detergents and Emulsifiers, North American Ed. 1980.

Other suitable zwitterionic detergents for use herein comprise quaternary amine (or diamine) alkyl ether sulfate of formula (VII):

$$R_{14}[N(A_mSO_3M_1)_4]_n \quad (VII)$$

wherein R_{14} is an unsubstituted C_2-C_{24} linear or branched alkyl group having a C_4-C_{24} alkyl component, preferably a C_4-C_{20} linear or branched alkyl, more preferably C_4-C_{18} linear or branched alkyl, and A, m and M1 are as defined above, in particular, m is typically between about 0.5 and about 50, more preferably between about 5 and about 30.

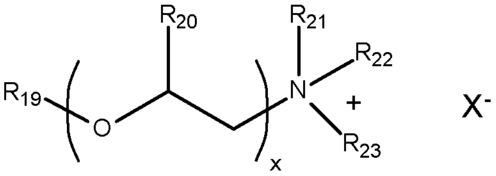
Quaternary diamine alkyl ether sulfates, as well as quaternary amine alkyl ether sulfates are contemplated herein. Exemplary surfactants are Lutensit z96 form BASF®.

Cationic surfactants suitable for use in compositions of the present invention are those having a long-chain hydrocarbyl group. Examples of such cationic surfactants include the ammonium surfactants such as alkyltrimethylammonium halogenides, and those surfactants having the formula (VIII):

$$[R_{15}OR_{16})_y][R_{17}(OR_{16})_y]_2R_{18}N^+X^- \quad (VIII)$$

wherein R_{15} is an alkyl or alkyl benzyl group having from 8 to 18 carbon atoms in the alkyl chain, each R_{16} is selected from the group consisting of $-CH_2CH_2-$, $-CH_2CH(CH_3)$, $-CH_2CH_2CH_2-$, and mixtures thereof; each R_{17} is selected from the group consisting of C1-C4 alkyl, benzyl ring structures formed by joining the two R_{17} groups, and hydrogen when y is not 0; R_{18} is the same as R_{17} or is an alkyl chain wherein the total number of carbon atoms of R_{15} plus R_{18} is not more than about 18; each y is from 0 to about 10 and the sum of the y values is from 0 to about 15; and X is any compatible anion.

Quaternary ammonium surfactant suitable for the present invention has the formula (IX):



(IX)

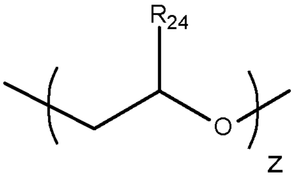
whereby R_{19} is a short chain length alkyl (C6-C10),

whereby R_{20} is H or a C1-C3 alkyl,

whereby x is 0-4, preferably 0-2, most preferably 0,

whereby R_{21}, R_{22} and R_{23} are either the same or different and can be either a short chain alkyl (C1-C3) or alkoxylated alkyl of the formula X,

whereby X^- is a counterion, preferably a halide, e.g. chloride or methylsulfate.



(X)

R_{24} is C1-C4 and z is 1 or 2.

Highly preferred cationic surfactants are the water-soluble quaternary ammonium compounds useful in the present composition having the formula :

$R_{25}R_{26}R_{27}R_{28}N^+X^-$ (i)

wherein R_{25} is C8-C16 alkyl, each of R_{26}, R_{27} and R_{28} is independently C1-C4 alkyl, benzyl, and $-(C_2H_4)_xH$ where x has a value from 2 to 5, and X is an anion. Not more than one of R_{26}, R_{27} and R_{28} should be benzyl.

preferred alkyl chain length for R1 is C12-C15 particularly where the alkyl group is a mixture of chain lengths derived from coconut or palm kernel fat or is derived synthetically by olefin build up or OXO alcohols synthesis. Preferred groups for R2R3 and R4 are methyl and the anion X may be selected from halide, methosulphate, acetate and phosphate ions.

Examples of suitable quaternary ammonium compounds of formulae (i) for use herein are :

coconut trimethyl ammonium chloride or bromide;

decyl triethyl ammonium chloride;

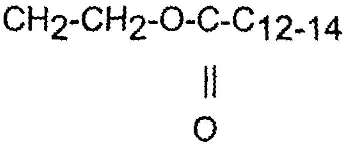
C12-15 trimethyl ammonium chloride or bromide;

myristyl trimethyl ammonium methyl sulphate;

lauryl dimethyl benzyl ammonium chloride or bromide;

lauryl dimethyl (ethenoxy)$_4$ ammonium chloride or bromide;

choline esters (compounds of formula (i) wherein R_{25} is



$$CH_2\text{-}CH_2\text{-}O\text{-}\underset{\underset{O}{\|}}{C}\text{-}C_{12\text{-}14}$$

di-alkyl imidazolines

alkyl and $R_{26}R_{27}R_{28}$ are methyl.

Stabilizer of formula I

As another essential ingredient, the compositions of the present invention comprise a stabilizer of formula (I):

$$R_1\text{-}O\text{-}(R_2CHCH_2O)_s\text{-}H \quad (I)$$

wherein R_1 represents an optionally substituted phenyl group or benzyl group; R_2 represents a hydrogen atom or a methyl group; and s represents an integer from 0 to 4.

Preferably, R_1 is a phenyl group, R_2 represents a hydrogen atom and s represents an integer from 1 to 2.

More preferably, the stabilizer of formula (I) is phenoxyethanol.

Typically, the bleaching composition herein may comprise from 0.001% to 5%, preferably from 0.005% to 3.0% and more preferably from 0.03% to 2.0% by weight of the total composition of said stabilizer of formula (I).

It is has been found that the use of a stabilizer of formula (I), such as phenoxyethanol, in combination with the specific surfactant system described above has a synergetic effect on the stability of the pigment and/or of the brightener and on the bleaching composition itself.

Pigment

As another ingredient, the compositions of the present invention may comprise at least one metal-phthalocyanine pigment. The presence of a pigment in the composition of the present invention is essential to provide a colored bleaching composition.

The metal, in the metal-phthalocyanine pigment, can be any metal with which phthalocyanine forms a metal chelate complex, such as Cu, Ni, Mg, Pt, Al, Co, Pb, Ba. Preferably, the metal-phthalocyanine pigments contained in the bleaching composition of the present invention is a copper-phthalocyanine pigment. In a highly preferred embodiment according to the present invention, the pigment used in the present invention herein is a blue or green copper phthalocyanine pigment.

Blue copper phtalocyanine is commercially available under the tradename Dye Pigmosol Blue 15®, from BASF; Direct Blue 86 (commercially available under the tradename Iragon Blue DBL86® from Clariant); Pigment Blue 15:1 (commercially available under the tradename Disperse Blue 69-007® from BASF); and Pigment Blue 15:3 (commercially available under the tradename Hostafine Blue B2G® from Clariant). The pigment, or mixture thereof, is present in the compositions of the present invention at levels of from 0.0001% to 0.5% by weight, preferably from 0.0002% to 0.05%, more preferably from 0.0005% to 0.005% and most preferably from 0.0005% to 0.003% by weight.

Brighteners

The compositions according to the present invention may also comprise a brightener or mixture thereof.

Naturally, for the purpose of the invention, the brightener has to be stable to the hypohalite bleach. The brighteners may be desired herein to further enhance the whiteness performance of the compositions herein.

Brighteners are compounds which have the ability to fluorescent by absorbing ultraviolet wave-lengths of light and re-emitting visible light. Brighteners, also referred to as fluorescent whitening agent (FWA), have been extensively described in the art, see for instance EP-A-0265041 , EP-A-0322564 , EP-A-0317979 or "Fluorescent whitening agents" by A.K. Sarkar, published by MERROW, especially page 71-72.

Commercial optical brighteners which may be useful in the present invention can be classified into subgroups, which include, but are not necessarily limited to, derivatives of stilbene, pyrazoline, coumarin, carboxylic acid, methinecyanines, dibenzothiophene-5,5-dioxide, azoles, 5- and 6-membered ring heterocycles, and other miscellaneous agents. Examples of such brighteners are disclosed in "The Production and Application of Fluorescent Brightening Agents", M. Zahradnik, Published by John Wiley & Sons, New York (1982). Further optical brighteners which may also be used in the present invention include naphthlimide, benzoxazole, benzofuran, benzimidazole and any mixtures thereof. Examples of optical brighteners which are useful in the present compositions are those identified in U.S. Patent 4,790,856. These brighteners include the PHORWHITE® series of brighteners from Verona. Other brighteners disclosed in this reference include: Tinopal-UNPA®, Tinopal CBS® and Tinopal 5BM® available from Ciba-Geigy; Artic White CC® and Artic White CWD®; the 2-(4-

styryl-phenyl)-2H-naptho[1,2-d]triazoles; 4,4'-bis(1,2,3-triazol-2-yl)-stilbenes; 4,4'-bis(styryl)bisphenyls; and the aminocoumarins.

Further specific examples of brighteners useful in the present invention include the polycyclic oxazole derivatives such as benzo-oxazole derivatives, or mixtures thereof and particularly preferred herein the benzo-oxazole derivatives. An example of such a brightener is benzoxazole,2,2'-(thiophenaldyl)bis having the following formula $C_{18}H_{10}N_2O_2S$, commercially available from Ciba-Geigy under the trade name Tinopal SOP®. This brightener is almost insoluble in water, i.e. it has a solubility being lower than 1 gram per liter. Another example of such a brightener is bis(sulfobenzofuranyl)biphenyl, commercially available from Ciba-Geigy under the trade name Tinopal PLC®.

Typically the compositions according to the present invention comprise up to 1.0% by weight of the total composition of a brightener or mixture thereof, preferably from 0.005% to 0.5%, more preferably from 0.005% to 0.3% and most preferably from 0.008% to 0.1% by weight.

Silicate component

As optional ingredient, the compositions of the present invention may comprise an alkali metal salt of silicate. Indeed, when this ingredient is present in the composition according to the present invention a synergetic effect on stability of the pigment and of the oxidising agent is obtained.

As alkali metal salt of silicate, it is meant herein an alkali metal salt of silicate or polysilicates, or mixtures thereof. The preferred alkali metal salt of silicate to be used herein is sodium silicate. Preferred compositions of the present invention comprise from 0.005%

to 5% by weight of the total composition of an alkali metal salt of silicate, preferably from 0.01 % to 2% and more preferably from 0.05% to 1%.

It has been found that alkali metal salt of silicate, such as sodium silicate, have an excellent effect on chemical stabilization of the bleaching composition. Indeed, without being bound to the theory, it is believed that such compounds protect pigments from being attacked by the oxidising agent coming from hypochlorite. This results, thus, in a stable amount of pigment in the composition.

Moreover, it has been found that the presence of alkali metal salts of silicate, such as sodium silicate in the composition result also, indirectly, in a reduced decomposition of the bleaching agent present in said composition. Indeed, it is believed that pigments such as copper-phthalocyanine when decomposed by oxidizing agent, release free metal ion, such as copper, which results in the acceleration of hypohalite decomposition.

Thus, a further advantage of the bleaching compositions according to the present invention is that they show excellent bleaching performances upon storage. The cleaning performances of the bleaching composition are therefore maintained.

pH buffering components

In the compositions of the present invention, the presence of a pH buffering component is not compulsory, but is preferred.

It is believed that the presence of a pH buffering component in the compositions of the present invention further contributes to the stability of these compositions, effective whiteness performance as well as to the fabric safety. Indeed, the pH buffering component allows to control the alkalinity in the bleaching solution, i.e.

maintain the pH of the bleaching solution at a pH of at least 7.5, preferably at least 8, and more preferably at least 8.5 for a longer period of time starting from the moment at which the dilution is completed (e.g. when the bleaching composition of the present invention is diluted in the bleaching solution at a dilution level of 500:1 (water: composition)). It is believed that the pH buffering component may also contribute to stability of the bleach-unstable ingredients herein.

The pH buffering component ensures that the pH of the composition is buffered to a pH value ranging from 7.5 to 13, preferably from 8 to 12, more preferably from 8.5 to 11.5 after the composition has been diluted into 1 to 500 times its weight of water.

Suitable pH buffering components for use herein are selected from the group consisting of alkali metal salts of carbonates, polycarbonates, sesquicarbonates, silicates, polysilicates, boron salts, phosphates, stannates, alluminates and mixtures thereof. More preferably alkali metal salts of carbonate, silicate and borate. The preferred alkali metal salts for use herein are sodium and potassium.

Particularly preferred pH buffering components are selected from the group consisting of sodium carbonate, sodium silicate, sodium borate, sodium metaborate and mixtures thereof.

The raw materials involved in the preparation of hypohalite bleaches usually contain by-products, e.g. calcium carbonate resulting in an amount of up to 0.4% by weight of by-product within the hypohalite composition. However, at such amount, the by-product will not have the buffering action defined above.

Liquid bleaching compositions of the invention may contain a mixture of inorganic alkaline compounds, preferably a mixture of at least an hydroxide and at least a carbonate.

Liquid bleaching compositions herein may contain an amount of pH buffering component of from 0.5% to 9% by weight, preferably from 0.5% to 5% by weight, and more preferably in an amount of from 0.6% to 3% by weight of the composition.

Optional chelating agents

The compositions according to the present invention may optionally also comprise a chelating agent as an optional ingredient.

Suitable chelating agents may be any of those known to those skilled in the art such as the ones selected from the group comprising phosphonate chelating agents, phosphate chelating agents, polyfunctionally-substituted aromatic chelating agents, ethylenediamine N,N'- disuccinic acids, or mixtures thereof.

Chelating agents may be desired in the compositions of the present invention, preferably phosphate chelating agents like phytic acid, as they further contribute to the benefit delivered by the stabilizer herein by further improving the stability of the brighteners, thus delivering effective whiteness performance in any laundry application upon ageing of the compositions, i.e. after prolonged periods of storage.

Suitable phosphonate chelating agents for use herein may include alkali metal ethane 1-hydroxy diphosphonates (HEDP), alkylene poly (alkylene phosphonate), as well as amino phosphonate compounds, including amino aminotri(methylene phosphonic acid) (ATMP), nitrilo trimethylene phosphonates (NTP), ethylene diamine tetra methylene phosphonates, and diethylene triamine penta methylene phosphonates (DTPMP). The phosphonate compounds may be present either in their acid form or as salts of different cations on some or all of their acid functionalities. Preferred phosphonate chelating agents to be used herein are diethylene triamine penta methylene phosphonate (DTPMP) and ethane 1-hydroxy diphosphonate (HEDP). Such phosphonate chelating agents are commercially available from Monsanto under the trade name REQUEST®.

Suitable phosphate chelating agents for use in the compositions of the present invention are described in EP-A-0 867 502 in the section titled "The Phosphate ingredient", such ingredients are specifically incorporated herein by reference, especially for their fabric whitening benefit (i.e., yellowing prevention effect) and/or fabric safety benefit. All phosphate ingredients described in EP-A-0 867 502 in the section titled "The Phosphate ingredient" are suitable for use herein. Preferred phosphate chelating agents for use herein are linear phosphate ingredients, wherein R in the formula in the section titled "The Phosphate ingredient" of EP-A-0867502 is M and wherein n is 1 (pyrophosphate) or n is 2 (tripolyphosphate (STPP)), most preferably wherein n is 2. The most commonly available form of these phosphates is where M is Sodium. Indeed, preferred phosphate chelating agents for use in the compositions of the present invention are pyrophosphate and/or tripolyphosphate (STPP), more preferably Na phosphate and/or Na tripolyphosphate (STPP).

Phytic acid, which is particularly suitable for use herein, is a hexa-phosphoric acid that occurs naturally in the seeds of many cereal grains, generally in the form of the insoluble calcium-magnesium salt. It may also be derived from corn steep liquor. Commercial grade phytic acid is commercially available from J. T. Baker Co., e.g.

as a 40% aqueous solution. It is intended that the present invention covers the acidic form of phytic acid as well as alkali metal salt derivatives thereof, particularly sodium or potassium salts thereof. Sodium phytate is available from Jonas Chemical Co (Brooklyn, N.Y.). In fact since the typical pH of the compositions of the present invention are in the alkaline pH range, the phytic acid component exists primarily as the ionized salt in the liquid compositions herein even if it is added in its acidic form. Mixtures of such salts of phytic acid are also covered. Polyfunctionally-substituted aromatic chelating agents may also be useful in the compositions herein. See U.S. patent 3812044, issued May 21, 1974, to Connor et al. Preferred compounds of this type in acid form are dihydroxydisulfobenzenes such as 1,2-dihydroxy-3,5-disulfobenzene.

A preferred biodegradable chelating agent for use herein is ethylene diamine N,N'-disuccinic acid, or alkali metal, or alkaline earth, ammonium or substitutes ammonium salts thereof or mixtures thereof. Ethylenediamine N,N'-disuccinic acids, especially the (S,S) isomer have been extensively described in US patent 4704233, November 3, 1987, to Hartman and Perkins. Ethylenediamine N,N'-disuccinic acids is, for instance, commercially available under the tradename ssEDDS® from Palmer Research Laboratories.

Particularly preferred chelating agents for use herein are phosphate chelating agents like sodium pyrophosphate, sodium tripolyphosphate, phytic acid, and mixtures thereof.

Typically, the compositions herein comprise up to 10%, preferably from 0.01% to 5% by weight, more preferably from 0.03% to 2% by weight of the composition of a chelating agent or mixture thereof.

Builder

A further optional ingredient of the present composition is a builder. Highly preferred builder compounds for use in the present invention are water-soluble phosphate builders. Specific examples of water-soluble phosphate builders are the alkali metal tripolyphosphates, sodium, potassium and ammonium pyrophosphate, sodium and potassium and ammonium pyrophosphate, sodium and potassium orthophosphate, sodium polymeta/phosphate in which the degree of polymerisation ranges from 6 to 21, and salts of phytic acid.

Specific examples of water-soluble phosphate builders are the alkali metal tripolyphosphates, sodium, potassium and ammonium pyrophosphate, sodium and potassium and ammonium pyrophosphate, sodium and potassium orthophosphate, sodium polymeta/phosphate in which the degree of polymerization ranges from 6 to 21, and salts of phytic acid.

Other optional ingredients

The bleaching compositions herein may further comprise a variety of optional ingredients such as bleach activators, soil suspenders, soil suspending polyamine polymers, polymeric soil release agents, foam reducing systems/agents, catalysts, dye transfer agents, perfumes, hydrotropes and solvents.

Process of treating surfaces

In the present invention, the bleaching composition can be used to treat surfaces. By “surfaces”, it is meant herein any inanimate surface. These inanimate surfaces include, but are not limited to, hard-surfaces typically found in houses like kitchens, bathrooms, or in car interiors, e.g., tiles, walls, floors, chrome, glass, smooth vinyl, any plastic, plastified wood, table top, sinks, cooker tops, dishes, sanitary fittings such as sinks, showers, shower curtains, wash basins, WCs and the like, as well as fabrics including clothes, curtains, drapes, bed linens, bath linens, table cloths, sleeping bags, tents, upholstered furniture and the like, and carpets. Inanimate surfaces also include household appliances including, but not limited to, refrigerators, freezers, washing machines, automatic dryers, ovens, microwave ovens, dishwashers and so on.

By "treating a surface", it is meant herein bleaching and/or disinfecting said surfaces as the compositions of the present invention comprise a hypohalite bleach and cleaning, i.e. removing various types of stains from the surfaces.

Thus, the present invention also encompasses a process of treating (e.g. bleaching) a fabric, as the inanimate surface. In such a process a fabric is contacted with a composition according to the present invention.

This can be done either in a so-called "pretreatment mode", where a liquid bleaching composition, as defined herein, is applied neat onto said fabrics before the fabrics are rinsed, or washed and then rinsed, or in a "soaking mode" where a liquid bleaching composition, as defined herein, is first diluted in an aqueous bath and the fabrics are immersed and soaked in the bath, before they are rinsed, or in a "through the wash mode", where a liquid bleaching composition, as defined herein, is added on top of a wash liquor formed by dissolution or dispersion of a typical laundry detergent. It is also essential in both cases, that the fabrics be rinsed after they have been contacted with said composition, before said composition has completely dried off.

The processes of treating surfaces fabrics according to the present invention, especially fabrics, delivers effective whiteness performance and/or effective stain removal performance avoiding staining of the treated surface upon ageing of the compositions.

The compositions according to the present invention are preferably contacted to fabrics in a liquid form. Indeed, by "in a liquid form", it is meant herein the liquid compositions according to the present invention per se in neat or diluted form.

The compositions according to the present invention are typically used in diluted form in a laundry operation. By "in diluted form", it is meant herein that the compositions for the bleaching of fabrics according to the present invention may be diluted by the user, preferably with water. Such dilution may occur for instance in hand laundry applications as well as by other means such as in a washing machine. Said compositions can be diluted up to 500 times, preferably from 5 to 200 times and more preferably from 10 to 80 times.

More specifically, the process of bleaching fabrics according to the present invention comprises the steps of first contacting a fabrics with a bleaching composition according to the present invention, in its diluted form, then allowing said fabrics to remain in contact with said composition, for a period of time sufficient to bleach said fabrics, typically 1 to 60 minutes, preferably 5 to 30 minutes, then rinsing said fabrics with water. If said fabrics are to be washed, i.e., with a conventional composition comprising at least one surface active agent, said washing may be conducted together with the bleaching of said fabrics by contacting said fabrics at the same time with a bleaching composition according to the present invention, or said washing may be conducted before or after that said fabrics have been bleached.

Accordingly, said process allows to bleach fabrics and optionally to wash fabrics with a detergent composition comprising at least one surface active agent before the step of contacting said fabrics with said bleaching composition and/or in the step where said fabrics are contacted with said bleaching composition and/or after the step where said fabrics are contacted with the bleaching composition and before the rinsing step and/or after the rinsing step.

In another embodiment of the present invention the process of bleaching fabrics comprises the step of contacting fabrics with a liquid bleaching composition according to the present invention, in its neat form, of allowing said fabrics to remain in contact with said bleaching composition for a period of time sufficient to bleach said fabrics, typically 5 seconds to 30 minutes, preferably 1 minute to 10 minutes and then rinsing said fabrics with water. If said fabrics are to be washed, i.e., with a conventional composition comprising at least one surface active agent, said washing may be conducted before or after said fabrics have been bleached. In the embodiment of the present invention wherein the fabric is contacted with a bleaching composition of the present invention in its neat form, it is preferred that the level of hypohalite bleach, is from 0.01% to 6%, preferably from 0.1% to 5%, more preferably from 0.3% to 4.5% and most preferably from 1.0% to 4.0%. Advantageously, the present invention provides liquid hypohalite bleach-containing compositions that may be applied neat onto a fabric to bleach, despite a standing prejudice against using hypochlorite-containing compositions neat on fabrics.

It is preferred to perform the bleaching process herein before said fabrics are washed. Indeed, it has been observed that bleaching said fabrics with the compositions according to the present invention (diluted and/or neat bleaching processes) prior to washing them with a detergent composition provides superior whiteness and stain removal with less energy and detergent than if said fabrics are washed first, then bleached.

Alternatively instead of following the neat bleaching process as described herein above (pretreater application) by a rinsing step with water and/or a conventional washing step with a liquid or powder conventional detergent, the bleaching pre-treatment operation may also be followed by the diluted bleaching process as described herein before either in bucket (hand operation) or in a washing machine.

In another embodiment the present invention also encompasses a process of treating a hard-surface, as the inanimate surface. In such a process a composition, as defined herein, is contacted with the hard-surfaces to be treated. Thus, the present invention also encompasses a process of treating a hard-surface with a composition, as defined herein, wherein said process comprises the step of applying said composition to said hard-surface, preferably only soiled portions thereof, and optionally rinsing said hard-surface.

In the process of treating hard-surfaces according to the present invention the composition, as defined herein, may be applied to the surface to be treated in its neat form or in its diluted form typically up to 200 times their weight of water, preferably into 80 to 2 times their weight of water, and more preferably 60 to 2 times.

When used as hard surfaces bleaching/disinfecting compositions the compositions of the present invention are easy to rinse and provide good shine characteristics on the treated surfaces. By "hard-surfaces", it is understood any hard-surfaces as mentioned herein before as well as dishes.

The following examples will further illustrate the present invention.

Example 1

The following compositions are made by mixing the listed ingredients in the listed proportions (weight percent unless otherwise specified).

Table 1

Compositions	I (comp.)	II	III	IV	V
Sodium hypochlorite	3.000	3.000	3.000	3.000	3.000
Sodium hydroxide	1.200	1.200	1.200	1.200	1.200
Sodium carbonate	1.200	1.200	1.200	1.200	1.200
STPP	0.049	0.049	0.049	0.049	0.049
NaCl partial cloride	2.500	2.500	2.500	2.500	2.500
AE3S/AS	1.064	1.064	1.064	1.064	1.064
Amine oxide C12-C14	-	-	-	-	-
Fatty acid	0.078	0.078	0.078	0.078	0.078
perfume	0.085	0.085	0.085	0.085	0.085
TMBA	0.100	---	---	---	---
2-PE	---	0.100	0.150	0.200	0.066
Blue copper phtalocyanine	0.0015	0.0015	0.0015	0.0015	0.0015
Sodium silicate	0.100	0.100	0.100	0.100	0.100
Br49	--	--	--	--	--
Minors and	---- balance up to 100%----				

water	

Table 1 cont.

Compositions	VI	VII (comp.)	VIII	IX	X
Sodium hypochlorite	3.000	3.000	3.000	3.000	3.000
Sodium hydroxide	1.200	1.200	1.200	1.200	1.200
Sodium carbonate	1.200	1.200	1.200	1.200	1.200
STPP	0.049	0.049	0.049	0.049	0.049
NaCl partial cloride	2.500	2.500	2.500	2.500	2.500
AE3S/AS	1.064	1.064	1.064	1.064	1.064
Amine oxide C12-C14	-	-	-	-	-
Fatty acid	0.078	0.078	0.078	0.078	0.078
perfume	0.085	0.085	0.085	0.085	0.085
TMBA	---	0.100	---	---	---
2-PE	0.033	---	0.100	0.150	0.200
Blue copper phtalocyanine	0.0015	0.0015	0.0015	0.0015	0.0015
Sodium silicate	0.100	0.100	0.100	0.100	0.100
Br49	---	0.020	0.020	0.020	0.020
Minors and water	---- balance up to 100%----				

Table 1 cont.

Compositions	XI	XII	XIII (comp.)	XIV (comp.)
Sodium hypochlorite	3.000	3.000	3.000	3.000
Sodium hydroxide	1.200	1.200	1.000	1.000

Sodium carbonate	1.200	1.200	1.700	1.700
STPP	0.049	0.049	0.049	0.049
NaCl partial cloride	2.500	2.500	---	---
AE3S/AS	1.064	1.064	0.1	0.2
Amine oxide C12-C14	-	-	-	-
Fatty acid	0.078	0.078	---	---
perfume	0.085	0.085	---	---
TMBA	---	---	---	---
2-PE	0.066	0.33	---	---
Blue copper phtalocyanine	0.0015	0.0015	---	---
Sodium silicate	0.100	0.100	---	---
Br49	0.020	0.020	0.020	0.020
Minors and water	---- balance up to 100%----			

Table I cont.

Compositions	XV (comp.)	XVI	XVII	XVIII
Sodium hypochlorite	3.000	3.000	3.000	3.000
Sodium hydroxide	1.000	1.000	1.000	1.000
Sodium carbonate	1.700	1.700	1.700	1.700
STPP	0.049	0.049	0.049	0.049
NaCl partial cloride	---	---	---	---
AE3S/AS	0.3	0.1	0.2	0.3
Amine oxide	-	-	-	-

C12-C14				
Fatty acid	---	---	---	---
perfume	---	---	---	---
TMBA	---	---	---	---
2-PE	---	0.100	0.100	0.100
Blue copper phtalocyanine	---	---	---	---
Sodium silicate	---	---	---	---
Br49	0.020	0.020	0.020	0.020
Minors and water	---- balance up to 100%----			

Table I cont.

Compositions	XIX	XX	XXI	XXII	XXIII	XXIV
Sodium hypochlorite	3.000	3.000	3.000	3.000	3.000	3.000
Sodium hydroxide	1.000	1.000	1.000	1.200	1.200	1.200
Sodium carbonate	1.700	1.700	1.700	1.200	1.200	1.200
STPP	0.049	0.049	0.049	0.049	0.049	0.049
NaCl partial cloride	---	---	---	2.500	2.500	2.500
AE3S/AS	0.1	0.1	0.1	-	-	-
Amine oxide C12-C14	-	-	-	1.1	0.4	1.1
Fatty acid	---	---	---	0.078	0.078	0.078
perfume	---	---	---	0.085	0.085	0.085
TMBA	---	---	---	---	---	---
2-PE	0.2	0.3	0.1	0.100	0.100	-
Blue copper	---	---	---	0.0015	0.0015	0.0015

phtalocyanine						
Sodium silicate	---	---	---	0.100	0.100	0.100
Br49	0.020	0.020	0.010	-	-	-
Minors and water	---- balance up to 100%----					

The pH of these samples is between 13.0 and 14.0.

STPP = Na tripolyphosphate

TMBA = 3,4,5-trimethoxybenzoic acid

2-PE = 2-phenoxyethanol

Br49 = 4,4'-bis(2-sulfostyryl)biphenyl disodium salt

Example 2

The compositions of Table I were tested in a Rapid Aging Test (RAT) for 10 days at 50°C.

Rapid Aging Test has been performed storing 100 mL of sample at 50°C (±0.5°C) into a ventilated oven. The bottles used for the test were 100 mL square bottle with plug cap in HDPE.

In order to evaluate the performances of the stabilizer, the following parameters were considered at the end of the RAT:

- Pigment stability (% of residual absorbance vs time plot): The degradation of pigment over the time was evaluated by UV-VIS spectrophotometer (selected λ = 610 nm). Assuming the absorbance of the formula as directly proportional to the concentration of the pigment, it is possible to follow the blue copper Phtalocyanine (CuPc) degradation during the RAT. "% of residual abs vs time" plot will be reported only for relevant stabilization of the pigment.

- Hypo stability (% of AvCl loss): Hypochlorite stability was evaluated as % of AvCl loss after 10 days. The following criteria was used:

- AvCl loss under 30%: Good stability;
- AvCl loss between 30 and 36%: Medium stability;
- AvCl loss over 36%: Unacceptable stability.

- Brightener 49 stability (% of Br49 loss): Brightner 49 stability was evaluated as % of Br49 loss after 10 days (for compositions VII-XXI).

The results are reported in Table II.

Table 2

Composition	AvCl loss (%)	Pigment loss (%)	Br49 loss (%)
I (TMBA 0. 10%)	22	26	---
II (2-PE 0.10%)	28	20	---
III (2-PE 0.15)	32	25	---
IV (2-PE 0.20%)	36	17	---
V (2-PE 0.066%)	26	21	---
VII (TMBA 0.10%+ Br49)	21	26	92
VIII (2-PE 0.10%+ Br49)	28	24	67
IX (2-PE 0.15+ Br49)	32	13	66
X (2-PE 0.20%+ Br49)	34	17	56
XI (2-PE 0.066%+ Br49)	26	24	91
XXII	27	19	---

(2-PE 0.100%+ AO)			
XXIII (2-PE 0.100%+ AO)	25	18	---
XXIV (AO)	60	90	---

As evident from table II, the stabilization of the pigment (Blue copper phtalocyanine) by 2-PE is better with respect to TMBA at the same concentration of 0.10% (composition I vs composition II in table 2). Generally, increasing the concentration of the 2-PE, the stabilization of the pigment increases (composition II vs composition IV in table 2), but also the loss of AvCl increases, probably due to the oxidation of the same 2-PE. Coherently with this trend, the decrease of 2-PE concentration slightly reduces the stabilization of the pigment (composition II vs composition V in table 2), but also decrease the loss of AvCl.

Amine oxide are suitable surfactants for these systems(compositions XXII, XXIII and XIV of table I), but it is worth to note that a level of surfactant lower than 0.5 % w/w causes the pigment to stain the surfaces where the product is used (see composition XXIII).

Analogue trends about pigment and AvCl were observed when the samples were prepared with the Br49 (compositions VII-XII). Moreover, the stabilization of the brightener by 2-PE is better in comparison with TMBA at the same concentration of 0.10% (composition VIII vs composition VII in table 2). Increasing the level of 2-PE, the stabilization of Br49 increases (composition VIII vs compositions IX-XII in table 2). The stabilization of the brightener provided by 0.10% of TMBA is comparable with the one obtained with 0.066% of 2-PE (composition VII vs composition XI in Table 2).

<u>Example 3</u>

In order to further verify the suitability of 2-PE as substitute of TMBA, Gas Evolution Rate test (GER) were performed on compositions I and II of Table 1.

As a matter of fact, hypochlorite-containing formulations develops molecular oxygen as main degradation product of the oxidant. This reaction is catalytically enhanced by metal impurities which are usually present in water, such as copper and iron. This phenomenon is very relevant for bleach products, because large values of gas evolution rate may cause bulging of bottles, which would cause drawbacks in terms of aesthetics and safety of the packaging. For this reason, GER is a key parameter for the assessment of the robustness of new formulations.

The Gas Evolution Rate test has been performed measuring the pressure increase in a close bottle containing a known volume of product at 50°C (±0.5°C). The pressure increase and the gas evolution rate were related on the basis of the following equation:

$$GER\left(\frac{ml}{500ml\ 24h}\right)=\left[500\,\frac{\Delta P(mbar)}{\Delta t(s)}\cdot\frac{V_{hs}(ml)}{V_{s}(ml)}\cdot\frac{V_{STP}}{R(J/mol\,K)\,T(K)}\,100(Pa/mbar)\,(24\cdot 3600)(s/24h)\right]\cdot\left[\frac{\Delta mol_{O_2,tot}}{\Delta mol_{O_2,gas}}\right]$$

where: V_S = volume of the solution (L);

V_{hs} = volume of the headspace (cc);

$\Delta P/\ \Delta t$ = rate of pressure increase in the head space (bar);

T= temperature (K);

R= Universal gas consant [8.31 (J/mol K)]

The equation takes into account:

1) The amount of product in the bottle, through the term: The pressure increase in the bottle increases considerably if the fill level is increased, for 2 reasons: (a) the amount of gas evolved is proportional to the volume of solution; (b) the pressure increase for each mole of gas

evolved is inversely proportional to the headspace volume.

2) The distribution of the O2 evolved between the gas and liquid phase, through the term: This term is a function of temperature and fill level and takes into account the fact that increasing the partial pressure of O2 leads to an increase of O2 dissolved (Henry's law).

In order to test the product under a worst case scenario, composition I and II were tested also with a contamination of Iron (500 ppb) and copper (250 ppb), which was added on top of the product. Typically the product already contains about 200 ppb of iron and 200 ppb of copper coming from raw materials.

The following results have been obtained for composition II (Table 3).

Table 3

GER ((mLO2/(500mL*day))	Day 0	Day 1	Day 3	Day 7	Day 10	Day 14
Composition I (TMBA 0.10%)	1.0	1.7	1.8	1.3	1.3	0.47
Composition II (2-PE 0.10%)	1.7	0.7	1.3	1.0	1.0	0.59
Composition I (TMBA 0.10%)+ metals	9.6	9.0	8.0	7.4	11.2	12.22
Composition II (2-PE 0.10%) + metals	6.0	5.4	4.6	3.6	4.6	4.01

The results of the GER test indicate exceptional stability of the composition containing 2-PE, both with and without metals.

Example 4

The performances of the stabilizer have been evaluated also on compositions XIII to XXI. Hypo stability (%AvCl loss) e brightener stability (% Br49 loss) have been measured according to the methods indicated in example 2.

The results are obtained are illustrated in Table 4.

Table 4

Composition	fresh		18 hours		3 days	
	AvCl loss (%)	Br49 loss (%)	AvCl loss (%)	Br49 loss (%)	AvCl loss (%)	Br49 loss (%)
XIII(0.1% AE3S+0.020% Br49)	0	37	1	78	4	100
XIV(0.2% AE3S+0.020% Br49)	0	38	1	76	5	100
XV(0.3% AE3S+0.020% Br49)	0	39	2	76	6	100
XVI(0.1% AE3S+0.020% Br49+0.1%2-PE)	0	42	1	50	8	61
XVII(0.2% AE3S+0.020% Br49+0.1%2-PE)	0	39	2	54	8	65
XVIII(0.3% AE3S+0.020% Br49+0.1%2-PE)	0	48	2	56	7	65

It is worth to note that the main consumption of Br49 takes place in few hours, as the fresh products already lose from 37% to 48% of Br49. No relevant effect is reported for the presence of 2-PE at this stage. At longer aging, the stabilizing effect 2-PE became more important, and after 3 days the products without stabilizer has no Br49 left (entry composition XIII vs composition XVI in table 4). No effect of the variation of the concentration of AE3S was observed (composition XVI vs composition XVII vs composition XVIII in table 9).

CLAIMS

1.- Hypohalite liquid bleaching composition comprising
- at least one metal-phthalocyanine pigment or at least one optical brightener or mixtures thereof;
- at least a surfactant system selected from the group consisting of:

a) at least 0.01% by weight of an anionic surfactant;

b) at least 0.01% by weight of a cationic surfactant;

c) at least 0.5% by weight of a zwitterionic surfactant;

d) at least 0.01% by weight of a non ionic surfactant; or

e) a mixture of at least two of a), b), c) and d); and
- a stabilizer of formula (I)

$$R_1\text{-O-}(R_2CHCH_2O)_s\text{-H} \quad (I)$$

wherein R_1 represents an optionally substituted phenyl group or benzyl group; R_2 represents a hydrogen atom or a methyl group; and s represents an integer from 0 to 4.

2.- Hypohalite liquid bleaching composition according to claim 1, comprising at least one metal-phthalocyanine pigment and at least one optical brightener.

3. Hypohalite liquid bleaching composition according to claim 1 or 2, wherein the metal-phthalocyanine pigment is a copper-phthalocyanine pigment.

4.- Hypohalite liquid bleaching composition according to claim 3, wherein the metal-phthalocyanine pigment is a blue or green copper phthalocyanine pigment.

5.- Hypohalite liquid bleaching composition according to claim 1, wherein the anionic surfactant has the following formula (II):

$$R_3O(A)_mSO_3M_1 \quad (II)$$

wherein R_3 is an unsubstituted C_6-C_{24} linear or branched alkyl group having a C_6-C_{24} alkyl component, A is an ethoxy or propoxy unit, m is greater than zero, and M_1 is H or a cation.

6.- Hypohalite liquid bleaching composition according to claims 1, wherein the anionic surfactant is selected from the group consisting of alkyl sulphates, alkyl ether sulphates, sarcosinates, taurates, ether carboxylate, alkyl ethoxylated sulphates, alkyl propoxylated sulfates or their mixtures.

7.- Hypohalite liquid bleaching composition according to claim 1, wherein the cationic surfactant is a quaternary ammonium compound.

8. Hypohalite liquid bleaching composition according to claim 1, wherein the surfactant having multiple charges is selected in the group consisting of betaines and amine oxide.

9. Hypohalite liquid bleaching composition according to claim 1, wherein the stabilizer of formula (I) is 2-phenoxyethanol.

10.- Use of a stabilizer of formula (I)

$$R_1\text{-O-}(R_2CHCH_2O)_s\text{-H} \quad (I)$$

for stabilizing an hypohalite liquid bleaching composition comprising at least one metal-phthalocyanine pigment wherein R_1 represents an optionally substituted phenyl group or benzyl group; R_2 represents a hydrogen atom or a methyl group; and s represents an integer from 0 to 4.

11.- Use of a stabilizer of formula (I)

$$R_1\text{-O-}(R_2CHCH_2O)_s\text{-H} \quad (I)$$

for stabilizing an hypohalite liquid bleaching composition comprising at least one brighteners wherein R_1 represents an optionally substituted phenyl group or benzyl group; R_2 represents a hydrogen atom or a methyl group; and s represents an integer from 0 to 4.

12.- A process of treating a surface with a composition such as defined in any of the claims 1 to 9, said process comprising the steps of applying said composition, in its neat form, in its diluted form, or in its dissolved or dispersed form, onto at least a portion of a surface, for a period of time sufficient to bleach said surface, before said surface is optionally washed and/or rinsed.

13.- A process according to the claim 12 wherein said surface is a fabric.

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2015/054669

A. CLASSIFICATION OF SUBJECT MATTER
INV. C11D3/20 C11D3/395 C11D3/42
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP H03 140387 A (LION CORP) 14 June 1991 (1991-06-14)	1,3,4,6, 8-10,12, 13
Y	abstract example 1 -----	2,5,7
X	DATABASE WPI Week 201515 Thomson Scientific, London, GB; AN 2015-123033 XP002754192, -& CN 104 250 590 A (QINGDAO KANGTAIXIN ENVIRONMENTAL PROTECT) 31 December 2014 (2014-12-31)	1,11-13
Y	abstract ----- -/--	2,5,7

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search 12 February 2016	Date of mailing of the international search report 24/02/2016
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Gault, Nathalie

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 2008 214545 A (LION CORP) 18 September 2008 (2008-09-18) abstract tables 1-3 page 4, paragraph 0012	1,8,9, 11,12 2,5,7
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